Fleet Management Study Report

Prepared for

The City of University City

MERCURY

Mercury Associates, Inc.
April 2009

Fleet Management Study Report

Prepared for

The City of University City

April 2009

Submitted by

Mercury Associates, Inc.
Gaithersburg MD
www.mercury-assoc.com

Table of Contents

The City of University City
Fleet Management Study Report

Introduction

The stated objective of the Fleet Maintenance Division of the Public Works Department is "*to most economically provide vehicles, equipment, maintenance and service for City operational needs*". As part of this effort, the City of University City (hereinafter referred to as the City) engaged the services of Mercury Associates, Inc. (MAI), to provide professional fleet management consulting services.

The primary objective of this Study was to evaluate the City's current fleet program and provide recommendations to improve the management and maintenance of the City's fleet of vehicles and equipment.

The project proposal submitted by MAI and accepted by the City explained that MAI would review the City's fleet program needs, evaluate the cost competitiveness of the organization, review the levels of service provided by the Division, evaluate the fleet replacement program, and document findings, conclusions and recommendations in a project report. The results of this evaluation are to serve as the foundation for reengineering or upgrading current organizational structures, staffing levels, facilities, and business processes so as to reduce the costs and/or improve the quality and effectiveness of both fleet management activities and the maintenance of vehicles and equipment themselves that comprise the City's fleet. This report also provides significant amount of discussion regarding best management practices in the industry that the City will find useful as improvements are made to the fleet program.

On-site research trips were conducted in November 2008 and again in January and February 2009.

Study Approach

Study methods employed in this project included:

Analysis of Quantitative Information: We forwarded an information request to the City asking for documents and data pertaining to the fleet management areas examined in this report. We received information on the fleet inventory, fleet budget, fleet costs, parts, and other data-related aspects of the fleet operation. Analyses of this information, or lack thereof, provided the basis for key findings, conclusions, and recommendations.

Review of Documentary Materials: We reviewed documentary material pertinent to the fleet management functions discussed herein, including an organizational chart, work orders, billing statements, and other relevant information.

Site Visits and Interviews: We conducted face-to-face interviews and meetings with City staff, fleet and maintenance personnel, and the customers of the Fleet Maintenance Division (Department Heads, Division Managers, and Operational Supervisors) while on site. We examined the shop building and took pictures to document characteristics of the facility, with special attention to the shop.

Fleet Management Basics

Motor vehicles and equipment are an essential element in the day to day operations and service-delivery activities in the City of University City. In fact, the City could not provide services without them. In some cases the equipment is an integral part of service delivery, such as the case with first response emergency medical aid or law enforcement. In other instances vehicles and equipment are essential tools, such as a backhoe or dump truck. In many cases, however, the critical nature of vehicles and equipment is less apparent, but no less important. The Community Development inspector who needs to inspect a complaint; the Street Maintenance Supervisor that needs to check on the progress of crew; or a department manager who needs transportation to an important meeting, are all such examples. Each of these represents a vehicle or equipment need that must be satisfied.

The primary mission for a fleet service organization is to maximize the availability of vehicles so that its "customers" can productively do their jobs. One focus for fleet managers in serving these customers revolves around the provision of vehicles and equipment that are reliable, available and maintainable. A second focus includes developing a strategy that minimizes unscheduled incidents of repair and, following repair, returns vehicles to service as quickly as possible. A third and equally important focus for fleet managers includes providing organized services to customers efficiently and effectively.

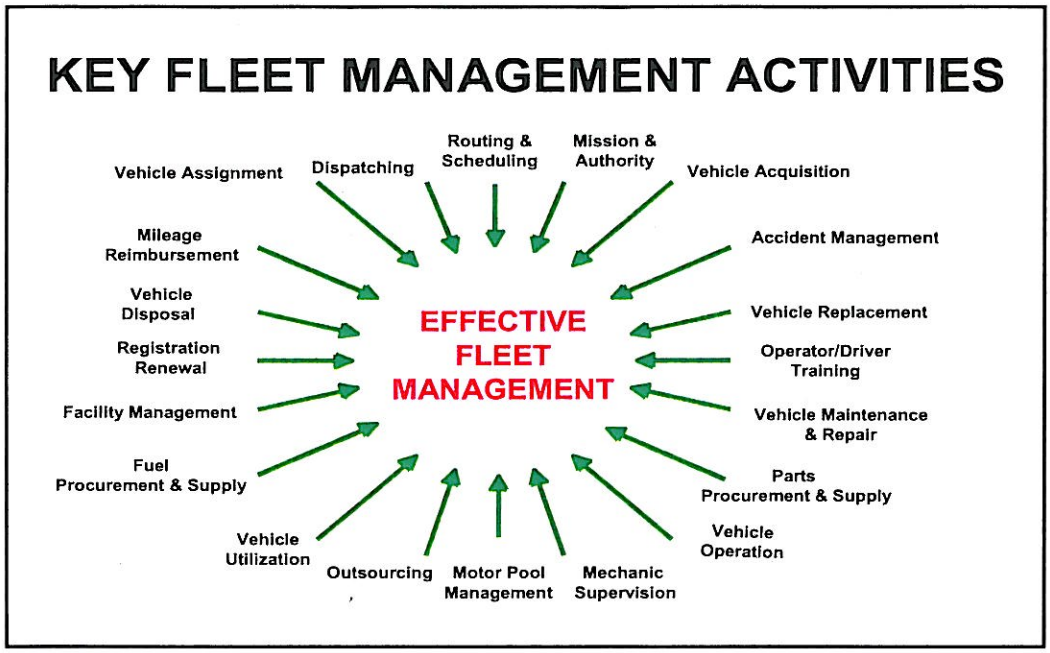
Fleet-services tenets sometimes seem elementary and self-evident:

- ✓ Organization structures should reflect reasonable spans of control and channels of communication that are consistent with formally defined authority and responsibilities.
- ✓ Staffing levels should be consistent with the amount of effort required to produce desired services productively, efficiently, and effectively.
- ✓ All acquisition, modification, and disposal services should be documented and the documents, whether hard copy or electronic, should be retained for each vehicle.
- ✓ All maintenance and repair services provided should be documented, and the information should be retained for each vehicle and used to ensure continued sound management practices.

As elementary and self-evident as these tenets sound, they can be surprisingly difficult to initiate, promote, sustain, and enforce. Behind these seemingly elementary tenets are a myriad of intricate and complex strategies and tactics, crucial to successful operations. These intricacies and complexities can confound even the most capable and savvy of organizations, sometimes interfering with and even precluding success.

Because most individuals are experienced in the acquisition, operation, maintenance, and replacement of their personal passenger vehicles – the notion that acquiring, operating, maintaining, and replacing several motor vehicles and pieces of equipment as a particularly intricate or demanding undertaking is often difficult to appreciate. In the minds of many people, fleet management is "just not that complicated."

Not true. As the chart of typical fleet management activities below indicates, few functions involve as many business disciplines as fleet management. Activities included in this function range from managing the depreciation of millions of dollars worth of assets over time to diagnosing an electrical problem in a diesel engine control module.



It is altogether imperative that upper management and the designated fleet manager develop and preserve an organized framework for running this business.

Measuring Performance

Now, more than ever, fleet organizations are pressured to demonstrate their competitiveness and accomplishments using objective and quantifiable measures. Technological advances made available by computerized fleet management information systems (FMIS) provide fleet managers the capability of capturing and reporting on key measures of performance and therefore managing fleets in ways never seen before. Fleet organizations are now able to collect and analyze hundreds of thousands of work orders to determine worker productivity, fleet availability, maintenance effectiveness, repair turn-around rate and a myriad of other performance statistics. Performance measurement and benchmarking have become important tools in a fleet manager's toolbox. They are invaluable because they provide an objective look at the fleet organization.

Benchmarking is important because it can take the politics and personalities out of fleet management decision making; it can help an organization detect areas of weak performance and where improvements are needed; it helps an organization measure goals and objectives; and it tracks changes or trends in performance over time. For any organization concerned with managing costs a professional approach to managing and maintaining a fleet is critical.

However, management should keep in mind that comparing fleet organizations with other peer organizations is difficult and the measures often misleading. The fleet industry lacks standardized ways to quantify performance, and variables that can influence a metric are many and often unknowable from the outside. Therefore, comparisons with other organizations can be misleading and unreliable if the type of data collected is different and calculation methods are dissimilar. For example, one fleet organization may not include facility depreciation in the calculation of a fully burdened labor rate. Or mechanics may be required to charge time based on a flat rate to jobs while another group of mechanics charge actual time spent performing the repair.

For these reasons, and others, a measure of an organization's effectiveness should not be based solely on external comparisons. Development of internal measures and goals for improvement are often the most effective approach. Therefore, possibly the most important benchmarks are measures of internal performance over time. As long as these are calculated consistently, they more accurately indicate the competitiveness and effectiveness of the fleet organization. These trends reveal whether performance is improving, remaining constant, or declining.

As a professional services firm dedicated to fleet management consulting, MAI has developed several measures of performance and established standards using a consistent methodology. These are included throughout this review of the fleet maintenance and repair practices of the City's fleet organization and several have been identified and summarized in this report.

Vehicle Equivalent Unit Statistical Referencing System

Introduced several decades ago by the U.S. Air Force and modified by MAI, the Vehicle Equivalent Unit Statistical Referencing System (VSRS) levels the playing field for all vehicles used in a given fleet. Through use of this system, organizations with relatively large and diverse fleets are capable of determining the "size" of the fleet based on the associated maintenance burden.

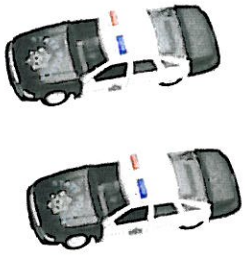
Even to the untrained eye, it is evident that a typical sedan, rated at 1.0 Vehicle Equivalency Units (VEUs), requires less maintenance than a dump truck (less certainly in effort and probably in cost of parts). For this reason and a host of others, a medium duty dump truck is given a rating of 4.5 VEUs.

MAI maintains and constantly updates a data base of over six hundred vehicles and equipment organized by class. The data base includes the entire spectrum of vehicles and equipment and each is given a VEU "score" as it relates to that 1.0 VEU sedan noted above. A transit bus, for example, can be assigned a rating of 6.5 VEUs and a chain saw a rating of .25 VEUs. A backhoe, on the other hand, may be 4.0 VEU. By

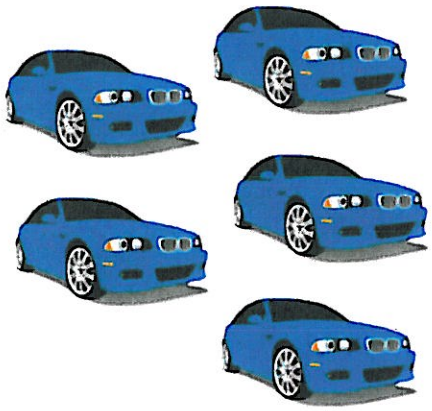
statistically reducing a fleet to its equivalent in terms of sedans, we can make reasonable, standards-based comparisons with the fleet operations of other organizations.

A fleet of one hundred patrol cars[1] rated at 2.5 VEUs each constitutes a fleet of 250 VEUs. The number of mechanics/technicians required to maintain this fleet is more than a fleet of 100 sedans, but far less than a fleet of 100 dump trucks. In fleets like these the VEU issues are somewhat intuitive. However, imagine a fleet with 78 different classes of vehicles and equipment - the number of vehicle and equipment classes we have identified within the City's fleet.

5 VEUs



5 VEUs



5 VEUs

Over the years MAI has come to recognize the value of the VSRS. These VEU assignments help to identify many fleet-related issues, including staffing levels and facilities programming and planning. VEUs can also help in estimating the impact of growth for a given organization. Many of the estimates, conclusions and recommendations found in this document can be traced back to the VSRS. Some of the City's vehicles and equipment classifications and associated VEUs are provided in the following table. We calculated the City's fleet to be 539.25 VEUs.

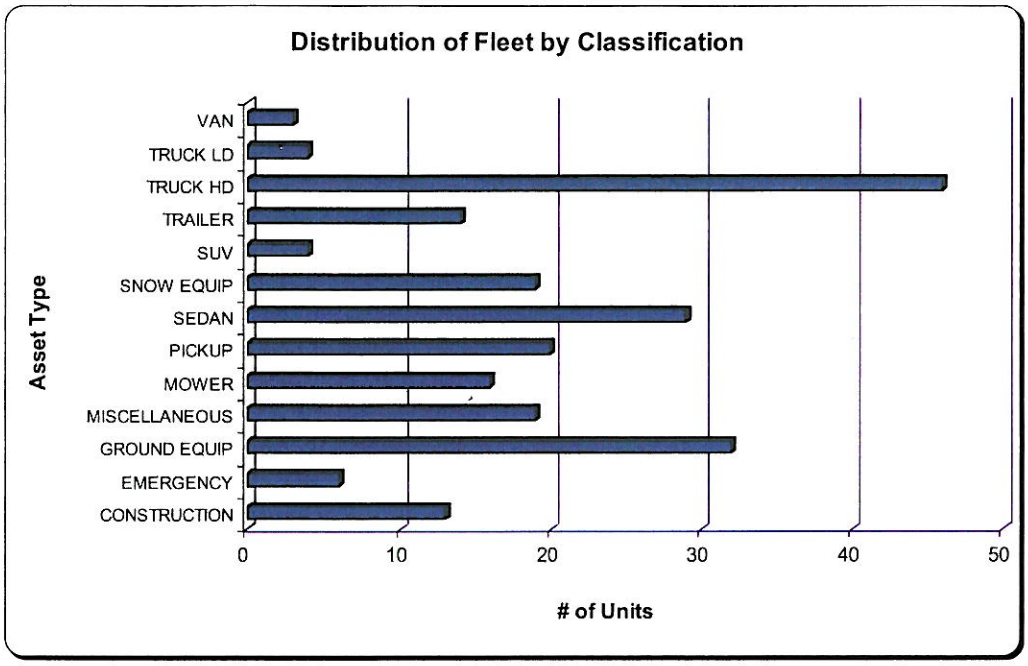
Classification	VEU
Passenger Sedan	1.0
Police Patrol Sedan	2.5
¾-ton Pickup Truck	1.5
SUV	1.25
Passenger Van	1.0
Truck, HD, with Grapple	5.0
Truck, HD, Dump	4.5

[1]For patrol cars, a VEU assignment of 2.5 is one of many used across the nation based on any number of different deployment characteristics. The same is true for dump trucks assigned [e.g.] 4.5 VEUs.

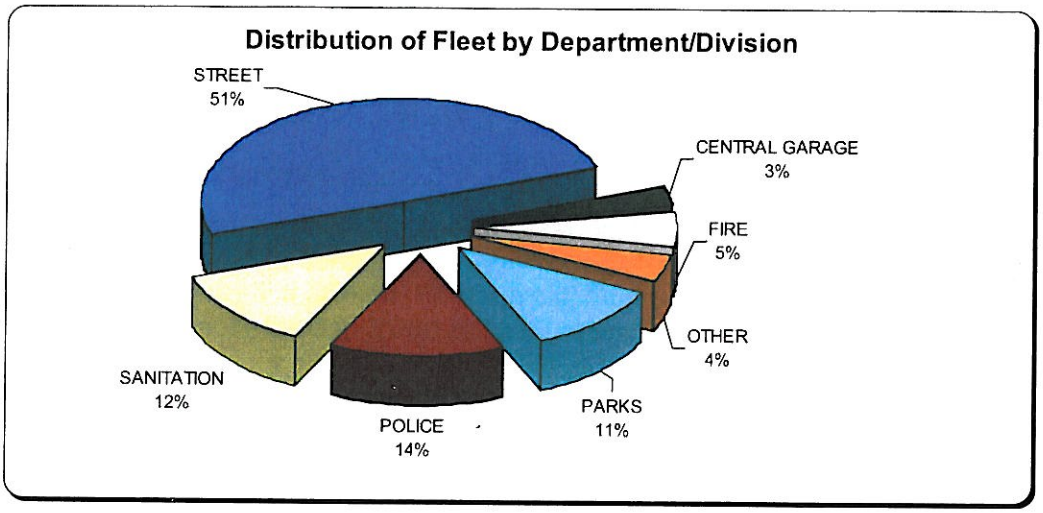
Classification	VEU
Truck, HD, Refuse	8.0
Street Sweeper	6.5
Backhoe, HD	5.0

Background Fleet Information

The current (as of December 2008) City's fleet is consists of 225 vehicles and pieces of equipment[2]. The average age of the fleet is 6.8 years[3]. The estimated gross replacement value of the fleet is $10.3 million (i.e., if every unit was replaced today).



[2] Fleet size and composition changes often as old vehicles and equipment are replaced. This is a snapshot of the fleet and representative of the City's fleet.
[3] Age of assets based on actual in service date or model year and may be estimated if data was not provided.



Report Organization and Topics

To meet the requirements of this project, we cover these topics in this report:

- ✓ Fleet Program Review
- ✓ Fleet Replacement Planning
- ✓ Fleet Financial Management
- ✓ Fleet Management Information System
- ✓ Fleet Management Policy Design
- ✓ Fleet Maintenance Facilities

We have focused particularly on the maintenance operation and management of the fleet because they are areas of special interest, given the lack of a formal fleet program. In each area we provide a discussion on best management practices, current status, and opportunities for improvement (recommendations). As the purpose of this report is to identify opportunities for improvement, several program deficiencies have been noted throughout. This is not to say that all is bad given that work is getting done.

Fleet Program Review

Fleet Responsibilities, Management, Organization, Staffing

Best Management Practices

A clear best practice for fleet management programs, and a dominant trend over the past 20 years or so, is to consolidate fleet management functions. Increasingly, it has come to be recognized that many, if not most, fleet user needs can be met more cost effectively and efficiently through a consolidated approach to fleet management.

We can trace the move toward consolidation to the increasing complexity and cost of fleet management endeavors and a simultaneous increase in emphasis on organizational efficiency and cost effectiveness. Developments in such areas as information technology, human resources management and professional development, risk management, regulation of environmental protection and occupational safety and health, and automotive technology have changed the definition of "effective" fleet management, making it difficult, if not impossible, for an organization to achieve optimum levels of efficiency and cost control.

In short, the complexity of fleet management today produces significant economies of scale that often can be captured only through collective, enterprise-wide effort and centralized management. Thus, the key objective in examining the mission and organization of fleet management functions is to determine what type of structure will most likely optimize service effectiveness and/or cost control. Of course, one most always keep in mind that service to fleet customers should take precedence over or, at the very least, be balanced against cost reduction and other considerations because customer needs dictate the need for fleet management endeavors in the first place.

The performance of any fleet management program also is affected by the number of personnel employed to deliver services and the manner in which they are organized and deployed to accomplish their mission. Organization structures should reflect reasonable spans of control and channels of communication that are consistent with formally defined authority and responsibilities. Staffing levels should be consistent with the workload and associated amount of effort required to produce desired services productively, efficiently, and effectively.

The organizational structure of a fleet program determines the responsibilities and accountabilities for each employee. The best structures are relatively flat without spreading the span of control to a point where responsibilities cannot be met. Additionally, job duties should be well defined and within the capabilities of the person occupying the position. When possible, the fleet maintenance organization should be either a free standing department or under a General Services type of department. This removes any appearance of conflict of interest or unfair priorities.

An organization's accumulation of operational and service-delivery requirements can and usually does result in a relatively large fleet of vehicles and equipment. As a result, the suitability, reliability, safety, cost effectiveness and operability of the fleet

must be actively managed. These fleet objectives define the management role of a fleet organization.

The goal of the City's fleet program is to meet the vehicle and equipment needs of its customer departments with the minimum number of resources at the lowest cost possible while maintaining quality service and support.

Organizations such as University City face a variety of challenges to efficient and effective management of those assets. We can summarize those challenges as:

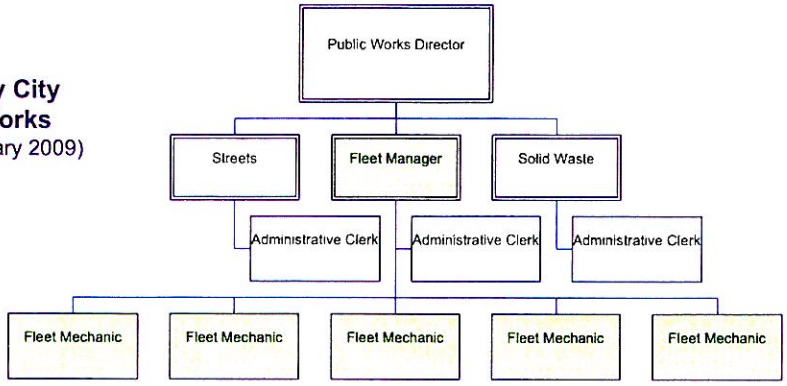
- Effective asset-inventory tracking that provides a "big picture" view of the fleet in terms of age, condition, cost, utilization, composition, and distribution, consistent with the organization's needs.
- Staffing the fleet-support organization with the right number of personnel who are well trained, hold consistent position titles and levels of responsibility, and who operate under an aligned and standard set of goals and procedures.
- Establishment of consistent, meaningful, and highly visible performance measures that recognize and track cost, quality, customer service, safety, utilization, and other appropriate fleet factors.
- Policies and procedures that allow fleet staff to support the operating sector of the organization productively, consistently, legally, and fairly, while allowing reasonable flexibility that recognizes broad variations in operating conditions and physical environments.
- A centralized information system that does not simply serve as a data repository but also generates informative reports that help people make sensible decisions.

Current Status

Fleet management and maintenance and repair functions for the City fleet are primarily centralized with the Fleet Maintenance Division. Some activities such as financial management of the Fleet Internal Service Fund, sublet maintenance and repairs of certain vehicles, and maintenance and repair of some Park Maintenance grounds equipment is decentralized.

The Fleet Maintenance Division is comprised of six full-time employees; 1 fleet manager and 5 mechanics. Administrative support is provided by a consolidated administrative unit located in an office adjacent to the fleet shop. The three clerks support the Fleet, Sanitation, and Street Divisions.

University City
Public Works
Current (January 2009)



In a fleet organization this small, the Fleet Manager and Mechanics are required to wear many hats. They turn wrenches (perform maintenance and repair tasks); order, receive, and stock parts; coordinate work with vendors; assist departments with vehicle acquisition and disposal; and perform a myriad of other tasks.

When performing a staffing analysis it is important to determine how much time employees actually spend performing the tasks that they are primarily assigned. This time allocation projection is arrived at through interviews with staff, general observation of shop practices, and evaluation of documentary material. For example, we estimate that the Fleet Manager is engaged in direct maintenance and repair activities (i.e., turning wrenches, troubleshooting, and supervising the mechanics) about 20% of the time. The other time is spent ordering parts, coordinating repairs with outside vendors, writing vehicle specifications, responding to management requests, and other fleet management type of duties. We estimate that the mechanics are engaged in direct fleet maintenance and repair activities about 85% of the time on average. The rest of their time is spent sourcing, ordering, and receiving parts since there is not a dedicated parts clerk to support the operation, and in sublet activities. Together, there are essentially 4.4 FTE mechanics performing actual direct M&R activities.

Performance Measure

Number of VEUs per Mechanic
Benchmark: 110-125
City Shop: 122.6 VEUs

Description: A measure of staffing adequacy. In a fleet of reasonable age and condition, each FTE mechanic should be able to support the benchmark number of VEU.

The evaluation of staffing levels must also include factors such as the age of the fleet, availability of parts, conditions in which the fleet is operated, skill levels of mechanics, etc. We would expect mechanics for the City of University City to be capable of maintaining 106 VEUs per technician. This ratio would increase significantly given adequate facilities, technical training, etc.

The current fleet that the Fleet Maintenance Division is responsible for maintaining includes 539.25 VEUs (225 units). A staff of 5.1 FTE mechanics would be required to successfully maintain this section of the fleet. Therefore, the City is nearly a mechanic short (0.7 FTE) of the optimum staffing level.

In the shop, the ratio of supervisor to mechanic staff is acceptable in terms of providing adequate control of shop performance and productivity. Mechanics have ready access to the Fleet Manager during parts of their shifts, and he is capable of providing adequate workload management and problem solving during those times. However, in order to accommodate customer groups, the shop has extended operating hours from 0600 hours until 1730 hours. This is consistent with best practices but does leave the mechanics unsupervised for a portion of work day.

Performance Measure

Supervisor to Mechanic Span of Control
Benchmark: 1: 8-10
City Shop: 1: 5

Description: A measure of program effectiveness. A high ratio provides an indication that staff may not be adequately supervised. A low ratio may indicate a top-heavy organization.

Staffing of a parts operation has a direct impact on the productivity of shop operations. One parts clerk should be able to support eight to ten technicians. Used correctly, a parts clerk should be responsible for ordering of all parts and supplies, distributing all items to the technicians, reporting all parts usage through the fleet management information system, and performing regular cycle inventory counts. With no dedicated parts clerk in the City's fleet operation, the mechanics and Fleet Manager are responsible for accomplishing all parts procurement and inventory management tasks.

Performance Measure

Parts Room Staffing
Benchmark: 1:8-10
City Shop: None

Description: A measure of program effectiveness. A properly sized parts operation will enhance the productivity of the technicians. Overstaffing will result in higher overall fleet costs to the operation.

Recommendations

- *All fleet maintenance and repair activities should be managed by the Fleet Maintenance Division including work that is sublet to commercial vendors. This will ensure that all fleet related costs are captured and reported consistently and accurately.*

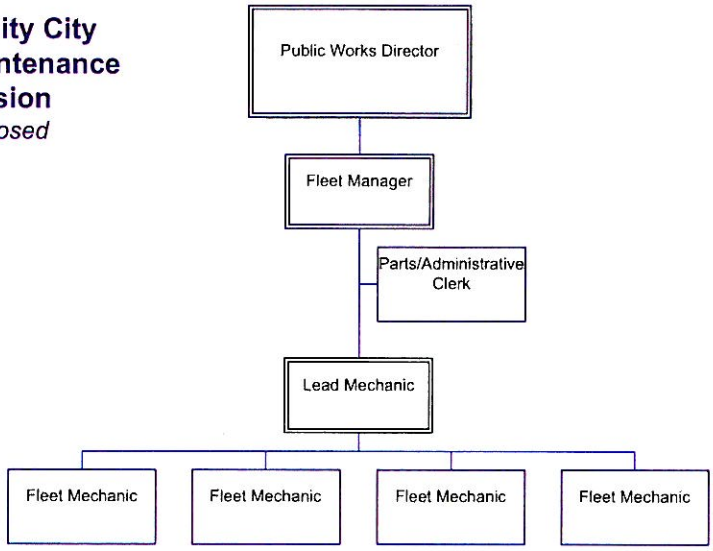
- *Develop Service Level Agreements between the Fleet Maintenance Division and customer groups to document levels of service and responsibilities for the Fleet Maintenance Division and the user Departments.*

- *Add a position of Parts Clerk to the Fleet Maintenance Division. This must be a qualified Parts Clerk with relevant experience. This Parts Clerk can also provide some administrative support to the Fleet Manager. This will allow the mechanics to focus on their core competency and spend more time "turning wrenches". This would increase the total wrench turning FTE's to 4.9 (from the current 4.4). With*

other improvements identified within this report, this staffing level should be sufficient to adequately support the fleet. This will also allow the Fleet Manager to spend more time managing the fleet.

- *Reclassify one of the mechanic positions to a Lead Mechanic position. This position would be responsible for supervising the shop (while turning wrenches) in the absence of the Fleet Manager and will provide a career ladder for the mechanics.*

University City Fleet Maintenance Division
Proposed



Fleet Maintenance and Repair

Best Management Practices

Because a fleet management organization's primary mission is to maximize the availability of vehicles so that its customers can productively perform their jobs, the focus of maintenance management needs to be to develop practices that minimize unscheduled repairs and that return vehicles and equipment requiring repair to service in as little time as possible. This should, of course, be accomplished at a competitive cost, given the requirement for a high level of service.

Fleet maintenance and repair (M&R) processes significantly impact vehicle availability, reliability, safety, economy, and environmental integrity. The principal requirements for achieving fleet maintenance are:

- Facilities and equipment,
- Mechanic labor,
- Parts, and
- Commercial (i.e., sublet or outsourced) services.

The challenge of any fleet maintenance process is to mix these ingredients so as to maximize vehicle reliability, safety, availability, and operating performance while minimizing labor, parts, and commercial sublet service expenditures.

Although difficult to quantify, indirect economic impacts of fleet maintenance are also important and can far exceed the direct costs. For example, mechanical failures that idle employees or disrupt service can result in productivity losses or more severe problems, the costs of which dwarf those associated with repairing the mechanical defects. Such impacts highlight the importance of using maintenance management and performance measurement techniques to control maintenance and repair quality.

Vendors may be tapped to perform fleet maintenance and repair services for various reasons, including managing in-house work backlogs; avoiding costly investments in facility construction, tooling, training, and staffing to meet low volumes of service demand in remote areas or for specialty repairs; and to achieve a degree of flexibility (e.g., in terms of locations, hours of service, etc.) in the provision of services. However, cost-effective use of vendors requires that procedures be followed for:

1. determining the comparative cost effectiveness of performing a service in house or using a vendor;
2. managing and controlling vendor performance relative to individual service orders and ongoing service levels (in the case of contract providers of services); and
3. capturing all relevant information on vendor-performed services so as to maintain a complete record of vehicle maintenance history and costs.

Competitiveness Assessment

The issue of competitiveness has become very important to public sector fleet managers in recent years. With each downturn in the economy elected officials' interest in privatizing services as a possible means of saving money increases. Add to this the well publicized successes that the Federal Government and some private companies have had with outsourcing activities that are considered to not be "core competencies" and it is not surprising that public sector fleet managers are under increased pressure from management and customers to demonstrate that they are providing competitive services.

In our opinion, the competitiveness of a fleet organization has two major components: 1) is it cost competitive? And 2) is it providing a competitive level of service? Fleet maintenance is an important support service for the City. Nearly every function performed by the organization requires a vehicle or other piece of motorized equipment. As a result, the consequences of poor fleet operations can have a dramatic negative impact on the delivery of services to the public. Therefore, low costs alone do not result in competitive fleet services.

Current Status

We calculated the cost per VEU for the City's fleet organization (based on current year operating budget and activity based cost allocation methodology). The results are provided in the following table.

Cost Factor	Benchmark[4]	University City
Labor cost per VEU	$500 - $ 700	$ 767
Parts cost per VEU	$300 - $ 500	$ 583
Sublet cost per VEU	$100 - $ 200	$ 215
Total M&R cost per VEU	$900 - $1,200	$1,565

The reason that we use a range of costs in our competitiveness assessments is to account for varying conditions that are difficult to quantify in a VEU analysis. These conditions include a fleet's operating environment, utilization levels, and the local market for labor, parts, and vendor services. With a generally favorable operating environment; an average market cost in the St. Louis area for labor, parts, and services; and an average level of utilization, we believe that a $1,100-$1,200 per VEU is an appropriate cost benchmark for University City.

Service Levels

Due to the lack of a fully functional fleet management information system, we were not able to calculate many of the service level performance indicators. The following table provides a list of the most common benchmarks in this area.

[4] Benchmarks developed in general from work with dozens of fleet clients and specifically from analysis of bids from outside contractors who provide total fleet maintenance services.

Service Area	Benchmark	University City
Fleet Availability	95%	NA
Repair Turnaround Time		
Services completed in one day	70%	NA
Services completed in two days	80%	NA
Scheduled Services	60-65%	NA
PM Compliance	95%	NA
Repeat Repairs (Comebacks)	<2%	NA

Once a FMIS is implemented, these statistics will become available.

In order to ascertain the perceived levels of service provided by the Fleet Maintenance Division, we conducted interviews with several department representatives. Responses ranged from *"I'd rather not use the City shop"* to *"they are responsive to our needs"*.

Based on our analysis and observations, discussions with fleet staff, and customer interviews, we conclude that the cost of service is slightly higher than it should be and service levels are slightly lower than they should be.

Mechanic Productivity and Efficiency

Best Management Practice

For the fleet maintenance industry, a best practice is to measure the productivity, efficiency, and effectiveness of the mechanic staff.

Productivity is defined as the number of paid work hours devoted to the actual work of repairing vehicles and equipment (hours charged to work orders). This utilization statistic is a measure of maintenance program productivity. For example, if a mechanic is paid for 8 hours of work and is able to account for 6 hours of that day as directly working on vehicle services (direct labor hours), his productivity would be 75 percent. Generally, we recommend that mechanics be 70 to 75 percent productive over the course of a year which equates to 1,400 to 1,500 direct labor hours annually. MAI's experience is that one VEU is equivalent to 12 to 15 labor hours per year, so mechanics that produce 1,500 hours of direct labor (actual wrench turning time) are at 72% productivity (1,500/2,080).

To measure efficiency, the labor hours that a mechanic applies to a certain task should be compared with a reasonable time standard for the performance of that task. Usually a shop can use guidelines published by original equipment manufacturers or

organizations such as Mitchell1 and AllData. Thus, if a task such as a brake job on a standard pickup truck is estimated to take 4 hours and a mechanic takes 4.2 hours to perform such a service, the mechanic could be assumed to be efficient. The value of this measurement lies in 1) measuring actual versus estimated time to perform a service across all shops, mechanics, and frequently performed services; and 2) determining why mechanics cannot meet the time standards. Problems with mechanics' efficiency levels can stem from a host of factors, including poor work assignment and workload management practices; insufficient technical training and/or supervision; inadequate work space, shop equipment, and tools, and/or poor parts procurement and inventory management practices.

The third key performance indicator in this area is mechanic effectiveness. This is measured by tracking the outcomes of each repair. In other words, the shop should determine how often repairs for the same problem on a vehicle must be repeated, otherwise known as a "comeback," and thus reflects quality. The best practices standard suggests that comebacks should not exceed two percent.

Current Status

The standard work year is 2,080 hours (40 hours per week multiplied by 52 weeks). However, the actual number of available hours for wrench-turning in a fleet maintenance operation is significantly lower as a result of vacation, holidays, sick leave, breaks, clean-up time, and other activities that take a mechanic away from the shop floor. Additionally, for the City of University City fleet shop, available wrench turning hours are further decreased since the mechanics are required to research, source, and order their own parts.

Performance Measure

Mechanic Utilization
Benchmark: 1,400-1,500 hours
City Shop: Not tracked

Description: A measure of mechanic productivity. In a fleet of reasonable age and condition, each FTE mechanic should be able to charge the benchmark number of hours to work orders.

Therefore, the industry standard for mechanics is 1,400-1,500[5] direct labor hours charged to work orders per year. We would expect a full-time mechanic at the City garage to be at the lower end of this range given the inadequate facilities, lack of formal fleet policies and procedures, and other conditions in the fleet program. Accurate direct labor reports were not available for the City's fleet operation.

The fleet organization does not track maintenance efficiency or effectiveness.

[5] 1,400-1,500 direct labor hours is standard provided that the mechanics are not charged with other tasks such as sourcing and ordering parts, etc.

Fleet Availability and Repair Turn-Around Time

Best Management Practice

An important predictor of customer satisfaction and overall condition of the fleet is fleet availability. From a fleet maintenance perspective this is commonly referred to from the "other side of the coin" as fleet downtime. Fleet downtime is the amount of time that a vehicle or piece of equipment is not available to the user.

Repair turn-around time is a performance measurement that indicates how long it takes for technician to perform maintenance or affect a repair.

Current Status

Empirically calculated fleet availability and repair turn-around are not standard reports or performance measures that are tracked regularly by the Fleet Maintenance Division.

Lengthy repair turn-around time was a common complaint listed by the departments that were interviewed.

Performance Measure

Repair Turn-Around Time
Benchmark: 24 hours >70%
48 hours >80%
City Shop: Not Tracked

Description: A measure of maintenance and repair effectiveness. Repair turn around time exceeding the benchmarks indicate a successful fleet operation.

Recommendations

- *Formally track direct labor hours for all mechanics. Actual hours should be recorded on all work orders and the data should be entered into the fleet management information system as soon as possible. Real time entry should be the goal of the fleet operation.*
- *Routinely check actual mechanic repair times against industry flat rate/time standards.*
- *Formally track comebacks, fleet availability, and repair turn-around times using the fleet management information system.*

Preventive Maintenance Program

Best Management Practice

A comprehensive preventive maintenance (PM) program is ***the most important element*** to the success of any fleet operation. Preventive maintenance is the regular, scheduled inspection, adjustment, refurbishment, replenishment, and replacement of vehicle components, systems, and fluids. The goal is to identify and correct conditions that may result in future mechanical failures and expensive repairs. PM programs enable minor problems to be detected and corrected before they result in service-disrupting breakdowns and costly repairs. A good PM program consists of thorough

documentation of activities to be performed at specific time or usage intervals, scheduling, and follow-up mechanisms to ensure vehicles are serviced at these intervals.

The fleet organization must make sure that PM intervals are based on original equipment manufacturer's recommendations, or actual historical experience. They also should notify users when units are due for service. Policies should be in place describing the consequences for consistently failing to show up for scheduled maintenance. Consequences should be such that they get the attention of those who fail to show up.

Because the ultimate goal of a PM is to prevent future failure, ensure operator and passenger safety, and to extend the useful life of a unit, it should be the most experienced mechanic(s) performing the PM. In reality though, the PM work in most shops is typically performed by the entry-level fleet maintenance position. Most experienced technicians find this type of work mundane and prefer to perform more challenging tasks. Therefore, it is important that technicians performing the PM are fully trained, and a more experienced technician or supervisor routinely checks their work for quality.

The best PM programs are tailored to the different types of assets in a fleet and include multiple echelons wherein the levels of service are progressively tiered according to manufacturers' recommendations. The program should be based on the expected levels of use of the vehicles (either in miles, engine hours, or fuel consumption) and should include an elapsed time element as a default. Also, the best programs include a means of notifying fleet users and vehicle operators of PMs that are due to ensure maximum compliance with the program.

Best practice points to at least 60-65 percent of the shop work being scheduled preventative maintenance.

When work is required beyond the standard PM, a new work order or repair task should be opened to account for the appropriate labor, parts, sublet, etc. This allows an organization to account for non-PM work and other repairs that are performed on a vehicle separately.

Performance Measure

PM Compliance
Benchmark: 95%
City Shop: Not Tracked

Description: This measures the number of PM's performed within a specified number of days (=/-) of the date scheduled. A low compliance rate indicates that PM's are not being performed regularly. A high PM compliance rate is a basic building block for an effective maintenance and repair program.

Current Status

The City's Fleet Maintenance Division has historically focused on corrective repairs as opposed to preventive maintenance.

The PM's that are completed are done so mostly informally and not formally documented. Quantifiable measures of performance such as PM compliance rates are not tracked. A list of PM's completed as of November 17, 2008 identified a significant number of vehicles (49 or 22 percent of the fleet) that were due or overdue for a PM.

Recommendations

- *Make the PM program the most important element of the City's fleet maintenance and repair operation. If work is to be sublet to commercial vendors, it should be corrective repairs and not regular maintenance.*

- *Formalize PM program through proper policies and procedures and track and report PM compliance rates by user groups.*

Maintenance Certification and Training

Best Management Practices

Due to continual and accelerating changes in vehicle technology, a rigorous, proactive training program is essential for maintaining the viability of in-house fleet maintenance programs. For a fleet organization to remain efficient and effective, mechanics should frequently receive technical training to ensure that they can acquire and sustain the high-level skills needed to maintain and repair the fleet. The process involves identifying training needs, earmarking funds, and selecting appropriate courses, seminars, etc., for attendance. Training investments yield dividends in technician effectiveness and efficiency. This translates into better and less costly maintenance and repair services. Each mechanic should be targeted for 40 hours of formal technical training per year.

Mechanics must also be provided with the resources necessary to successfully complete their work. This includes adequately sized and organized facilities, tools, and diagnostic equipment.

Mechanics must also possess all applicable Federal, state, and local licenses including Commercial Driver's License (CDL) with the proper endorsements. Essentially, the regulation states that the driver (in this case the mechanic) must have the type of license and endorsements for the type of vehicle he is driving and for the material which is on the vehicle. So, in the event that a mechanic is going to road test a commercial motor vehicle (CMV) he/she is required to have a valid CDL.

Current Status

The City does not have a formal training or certification program. Some training is provided but it falls well short of the recommended 40 hours per year. Reportedly none of the mechanics have a valid CDL.

Recommendations

- *Require all mechanics to obtain a valid CDL with applicable endorsements.*

- *Develop a formal technician training program that includes at least 40 hours of technical training per year for each technician. The training program should encourage professional certifications such as ASE and EVT. The most successful certification programs include financial (i.e., cents per hour increase for each ASE certification achieved) or career ladder incentives (i.e., Lead Mechanic must be ASE Master) for the mechanics to achieve the desired levels.*

- *Establish a tool replacement program for mechanics. Annual tool allowance of $200-$450 per mechanic is typical. Tools should be applicable to maintaining and repairing the City's fleet and documentation of purchase should be required.*

Parts Supply and Management

Best Management Practices

Cost effective and timely provision of high quality repair parts to maintenance staff is a key element in the overall provision of fleet maintenance services. The organization and staffing of the parts supply function, the procurement of parts, parts inventory management, warehousing, and inventory control – each affects the overall success of the supply function, and has a corresponding positive effect on the efficiency and effectiveness of fleet maintenance services.

The accumulation and storage of a spare parts inventory is a necessary evil for all fleet operations that maintain their own vehicles. The goal is to minimize capital investments in the parts inventory while maintaining a suitable level of product availability. This balance is accomplished through an ongoing and routine performance analysis: establishing, maintaining and regularly reporting on parts stock levels, parts consumption activity, inventory turnover rate, and parts availability. Clearly, a prerequisite for a successful inventory management system is the management of parts data with a high-quality, well-matched, interactive FMIS.

The long term goal of a fleet parts operation is to achieve an inventory of rational size and composition, providing a suitable level of product availability to fleet maintenance personnel while minimizing capital investment in inventories. Another goal: maintaining a high level of inventory performance through ongoing and routine performance analysis. A final goal: providing a database of information for diagnosing trends in overall fleet and parts performance, and parts consumption.

Key measures of performance in this area include inventory turns, which yields a ratio of the value of stock items issued per year to the average value of parts carried in inventory and order fill times (the average amount of time required to fill an order). This statistic should be a minimum of 4.0 (typical range is 4-8 turns) for a fleet organization and could be higher in large city or metropolitan area where access to parts suppliers is good.

The trends that develop over time and the direct comparisons between measures of performance will provide managers with information they can use to make informed decisions. For example, inventory value is not a particularly useful measure unless it is tracked consistently and/or used for comparison. If the value of inventory is recorded at set intervals, say monthly, then a trend line can be developed. This trend becomes

useful to managers by indicating whether the overall size of the inventory is increasing or decreasing. Now if we compare this trend with another measure, say the total value of inventory issued, managers can gauge whether the trend is understandable and appropriate. There may be cause for concern if inventory value decreases while the value of issues increases and the size of the fleet increases.

When inventory performance is measured and reported consistently, management will have the information readily available to make informed decisions about inventory policy. This includes establishing stocking criteria, re-order warning points, inventory reconciliation guidelines, and timeframes for disposal of obsolete or slow moving parts.

Well-designed contracts and blanket purchase agreements enable an organization to:

- ✓ reduce the administrative effort and time delays associated with procuring parts;
- ✓ monitor and control parts purchases;
- ✓ simplify payment for such purchases; and
- ✓ secure discounts associated with buying from particular suppliers in volume.

In short, they reduce the direct and indirect costs of buying parts and other fleet maintenance-related commodities. Procedures for establishing, monitoring, and renewing contracts should be designed to maximize vendor performance, minimize administrative effort, and maintain the organization's flexibility to procure a part by other means when contract suppliers cannot satisfactorily meet needs.

The organization should develop an aggressive obsolete parts disposal program. Typically, a stock line with no movement in the past twelve months deserves consideration for disposal. A parts organization should strive to have fewer than 5 percent of its stock lines that show no movement during the preceding twelve months. Disposal of obsolete or unneeded parts can include agreements with vendors to buy back unused items, disposal through multiple auctions throughout the year or through competitive sealed bids.

Because the parts supply and procurement functions often account for roughly 30-40 percent of maintenance and operation costs, maintenance of accurate and up to date records is essential. These records are the dataset from which a number of important fleet performance statistics are generated. Used together, they provide a better overall sense of inventory performance than any one used in isolation.

Performance Measure

Parts Inventory Value per VEU
Benchmark: $75-150/VEU
City Shop: Not Available

Description: A measure of inventory effectiveness in combination with inventory turnover. A large inventory is costly to the organization and may not provide any more benefit to the fleet operation than one that is smaller, but more appropriately comprised.

Current Status

Most parts are appropriately secured in the parts room. However, parts are not formally managed. Regular physical inventory counts are not taken.

Obsolete parts are not removed from inventory. No formal min/max levels are used to establish reorder points. Bar coding system is not used to track inventory. Some parts (i.e., tires) are stored in an unsecured area within the shop. It appeared that a significant amount of parts in the parts room were obsolete or at the very least had been on the shelf for a very long time.

At one time during this fleet review, 276 tires (new and used) were counted in the shop. Not only do they take up a considerable amount of space in the shop but they represent a considerable cost.

Recommendations

- *Take a physical inventory of all parts, discarding obsolete parts through an auction, on-line bid, or vendor buy-back program.*

- *Manage and report on inventory levels using the fleet management information system with a goal to meet the Parts Inventory Value to VEU ratio listed above.*

- *When at all possible, all parts should be dispensed by the Parts Clerk. This will improve accountability and prevent inventory shrinkage. The Parts Clerk should have a workstation positioned within the parts room.*

Current Outsourcing Practices

Best Management Practice

Commercial vendors are relied upon to perform fleet maintenance and repair services for a variety of reasons, including managing in-house work backlogs; avoiding costly investments in facility construction, tooling, training, and staffing to meet low volumes of service demand in remote areas or for specialty repairs; and to achieve a degree of flexibility (e.g., in terms of locations, hours of service, etc.) in the provision of services that is not possible with public sector constraints and sizable investments in fixed maintenance infrastructure.

Transportation of vehicles to and from vendors should be accomplished by the vendors or with the lowest cost employees to the organization. For example, general laborers, part-time staff, and workers on restricted work status.

Current Status

The Fleet Maintenance Division appropriately utilizes commercial vendors for specialty work and work that exceeds their capacity.

Other departments such as Fire use commercial vendors to meet their maintenance and repair needs.

Recommendations

- *Continue to use commercial vendors for specialty and overflow work.*

- *Rely on commercial vendors for corrective repairs while in-house staff works to increase PM compliance.*

- *All sublet work should be managed by the Fleet Maintenance Division.*

Vehicle Utilization

Best Management Practice

Owning/leasing vehicles and equipment represents the single largest cost component of fleet operations, easily eclipsing expenditures for maintenance, fueling (although this has been catching up recently) and other components. The methods used to acquire and dispose of vehicles and equipment directly impact fleet performance and cost.

The primary factors driving fleet related costs for any organization are the size and composition of the fleet. The more vehicles an organization owns, the higher the annual cost to that organization, because for each fleet asset there are costs associated with ownership and operation. Even under-utilized vehicles consume fuel and maintenance resources each year. More importantly, these units also lose value each and every day even if they are older and are fully depreciated (i.e., paid for) on the books. Time and effort are also required to maintain appropriate licenses, tags, fleet inventory records, insurance, fuel cards, etc.

There are two basic reasons why employers provide their employees with a vehicle:

1. **Compensation**. In some cases, an employer-provided vehicle is a form of remuneration that is given to certain types of employees or positions within an organization, regardless of how much or how little the employees need a vehicle to perform the duties of their position.

2. **Job Performance**. In most cases, an employer provides a vehicle to an employee because it is needed to fulfill certain job duties. That is, the job requires the transportation of people, equipment and tools, materials, and so forth or the use of a specialized vehicle (e.g., a backhoe/loader) or attachment (a mower deck) with sufficient frequency that it is necessary and cost effective to place a vehicle permanently at the disposal of one or more employees.

In many cases, the active management of fleet size occurs in response to economic pressures that force officials to scrutinize budgets for savings and future cost avoidance. Unfortunately, such reactive undertakings have two critical flaws: responsibility for reducing fleet size tends to be placed solely on the shoulders of the fleet manager, and organizations tend to apply arbitrary use thresholds in order to justify the retention of vehicles and equipment. Such methods are generally ineffective and often counterproductive.

The first flaw forces the fleet manager into a role wherein they must demand return of vehicles and equipment units that fail to meet established minimum-use guidelines and also have final authority for the approval of replacement and/or expansions to the fleet. This approach inappropriately vests decision-making authority in fleet managers who

may lack the intimate knowledge of user agencies' operations and work methods needed to make sound vehicle acquisition usage, and retention decisions. This approach also creates adversarial relationships between fleet managers and their customers, the users of the fleet.

Minimum use thresholds that are applied "across the board" are not effective because they fail to take into consideration the significant differences that exist in agency missions and the vehicle assignment, deployment, and usage patterns that result from these differences.

The most successful fleet size management programs involve a close collaboration between fleet users – who are best equipped to define how vehicles and equipment enable them to fulfill their missions – and fleet managers – who have technical expertise and access to jurisdiction-wide fleet data that individual user departments lack. Furthermore, it is better to use *guidelines* (rather than *thresholds*) that are designed to reflect the individual work patterns of each user department because guidelines allow the program to be flexible enough to accommodate unique operational requirements that cannot be met through alternative vehicle provision means, while still providing a method to trigger further investigation of vehicles that may not be needed based on the lack of consistency of their use compared to the guideline.

Consider a ¾-ton cargo van that is assigned to a City trades worker (i.e., plumber). The vehicle is specially equipped with shelving, bins, and cabinets to store parts and supplies. Roof racks may be installed on the top of the vehicle to carry ladders and piping. The plumber, in this case, starts each day at the City shop where work orders are generated and assigned. The plumber then may drive just 5 miles to a nearby City facility and spend the entire day performing maintenance or effecting repairs. At the end of the day the plumber drives the 5 miles back to the shop. In this example, the vehicle will obviously accumulate very little mileage even over the course of an entire year. However, it would not be reasonable or cost effective to provide transportation any other way. Hours would be lost each day (at the beginning and end of each shift) if the plumber was required to transport tools, parts, supplies, etc. from the shop to a vehicle each day.

Acquiring the "right vehicle for the right job" is an important decision that an organization must make. These decisions impact costs in a variety of ways. For example, purchasing a SUV at a cost of $28,000 to meet general transportation needs when an intermediate sedan is available at a cost of $13,000 is not fiscally responsible. Not only does an organization experience higher acquisition costs, but fuel costs and maintenance and repair costs are typically higher for larger vehicles. The following table provides a matrix that many organizations utilize to help determine what type of a vehicle will best meet the transportation needs of the requestor.

Application	Vehicle Standard
Basic transportation – 1-4 passengers	Compact or intermediate sedan
Basic transportation – 5 passengers	Full size sedan
Basic transportation – 5 to 7 passengers	Mini van
Basic transportation – up to 5 passengers	SUV or quad cab pickup truck

Application	Vehicle Standard
with light cargo capacity	
Light hauling – uncovered	Pickup truck (appropriately sized to match load and towing capacity)
Light hauling – covered	SUV, cargo van (mini van where payloads allow)
Off-road	Pickup truck (4x4) or SUV (4x4)

Mileage Reimbursement Program. One alternative to furnishing vehicles to employees to meet transportation needs is to compensate them for use of their personally provided vehicles (PPV). This is commonly done through an expense account reimbursement for mileage, when the duties involve occasional travel to nearby destinations. This alternative can be a potent tool to control or reduce the size of a fleet.

Vehicle/Equipment Rental. Many transportation and construction equipment needs are sporadic and do not justify ownership. In many of these cases, transportation and construction needs can be met more cost-effectively through commercial rentals. If an organization pro-actively adopts a transportation strategy that includes renting, it saves money by not having to shoulder the financial burden of maintenance and replacement of vehicles that would otherwise not be consistently utilized.

Two primary types of vehicle duty can most readily be provided through rental strategies: basic personal transportation (i.e., people movers such as cars, sport utility vehicles and passenger vans) and general construction equipment, such as backhoes, are also widely available for rent.

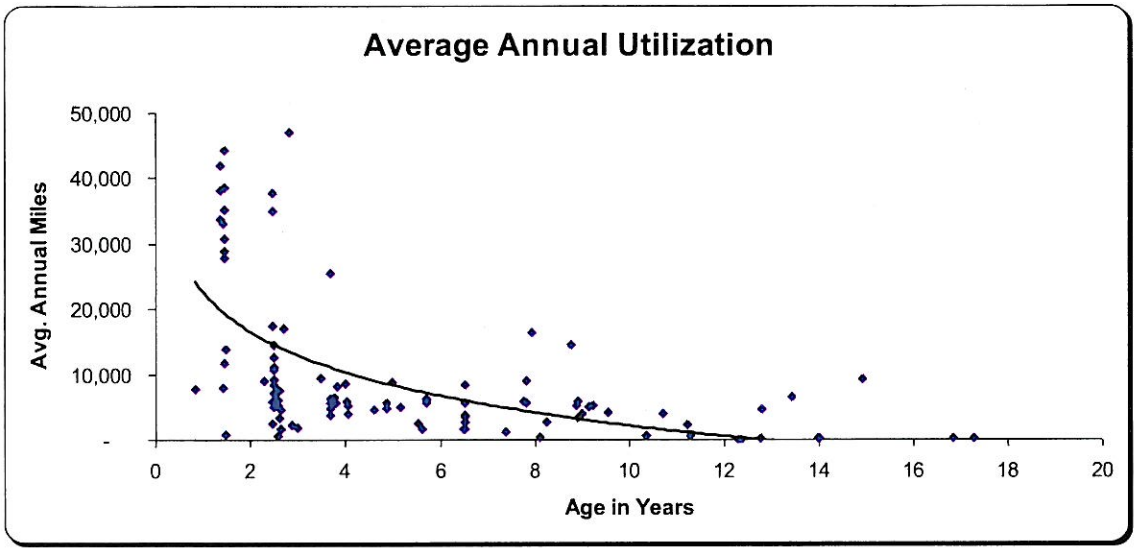
Notably, rental passenger vehicles are often more desirable than government vehicles because they are usually newer. Although work vehicles need not be appealing cosmetically, their high-maintenance nature makes passing the cost of maintenance to the rental company very desirable. Using rental vehicles is a good way to augment a vehicle pool in cases where the workplace of a department or individual is located prohibitively far from the pool or in the rare instance when more vehicles than the pool can provide are needed (i.e., "peak shaving").

Current Status

The City does not formally manage fleet utilization. Meter readings (mileage and/or engine hours) are not reported regularly. The most common method for an organization to obtain current meter readings is to require input of the information at the time of fueling. All robust fuel management systems (including the City's system) include this basic functionality. Users are required to input a meter reading before the fuel system authorizes fueling. While the City's system also requires this, system protocols have not been established. For example, most government and private organizations absolutely require a meter reading for fuel authorization. Additionally, meter parameters can be established that, for example, will not allow a meter reading that is lower than the preceding reading.

We reviewed over 3,800 fuel transaction records for a five month period. It is clear that some users make the effort to input accurate meter readings at the time of fueling. However, more often than not, users are either inputting no reading at all or bogus readings (i.e., "999999") when they fuel. Odometer readings reported by the system ranged from 0 to 1,266,111.

Due to the lack of potentially valid meter readings for many vehicles we were unable to evaluate utilization patterns except at a very high level and make only general findings and conclusions. The following scatter plot chart identifies average annual usage as a function of age.



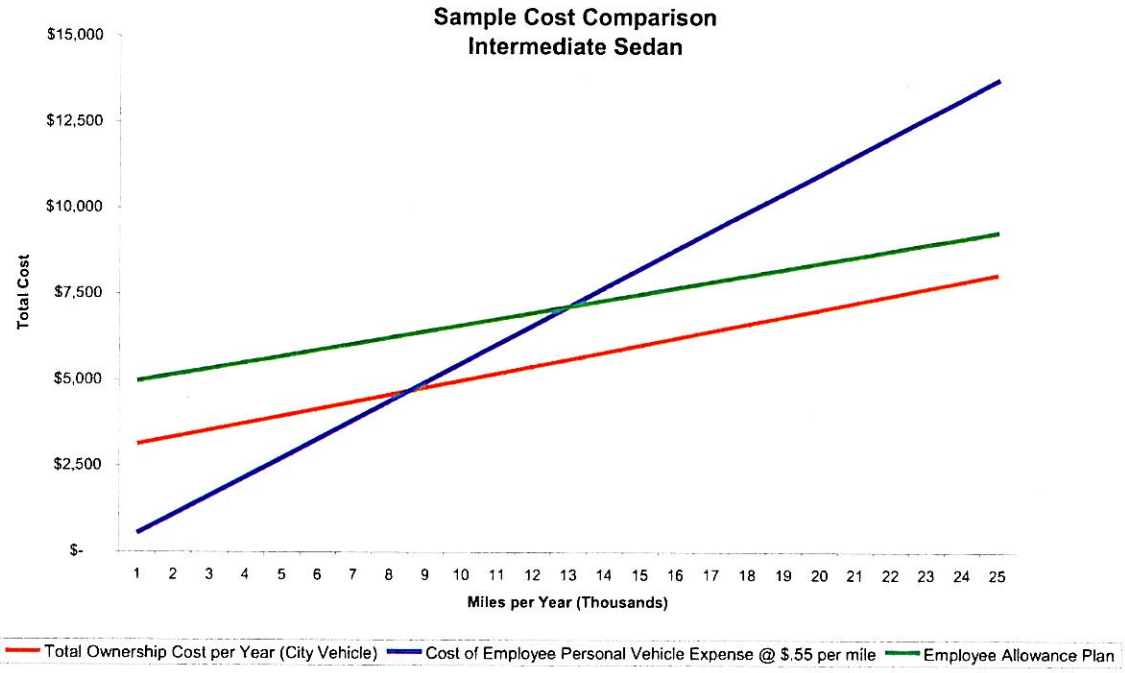
The following table reflects the average annual miles driven for several major vehicle classes in the City's fleet. The sedan class includes police patrol units and therefore we would expect high annual mileage.

Vehicle Class Type	# of Units	Avg. Miles/Year
Pickup Truck	20	4,658
Sedan	29	22,441
SUV	4	8,276
Truck, LD/MD	4	5,637
Truck, HD	46	5,398
Van	3	5,582

Further analyses of these vehicle classes indicate several potentially underutilized vehicles. Twenty-three (22%) of the 106 vehicles in the table had average annual mileage of less than half of their class average.

The City has relatively few take-home vehicles which are limited to executive staff, department heads and/or public safety.

The breakeven point for determining which manner to meet an organization's transportation needs varies by type of vehicle, type of work to be performed (i.e., would POV be practical?), reimbursement rates, and other factors. The following chart identifies the total cost of ownership versus employee mileage reimbursement versus a vehicle allowance. This chart is used for illustrative purposes only and is not intended to depict actual costs for the City of University City. As the chart indicates, the decision changes based upon utilization.



Recommendations

- *Establish meter reading parameters within the fuel management system and require each operator to input accurate meter readings during each fueling through formal fleet policies. Meter readings should be checked and updated each time a vehicle is in the fleet garage for maintenance and/or repair.*

- *Conduct a formal fleet utilization study to determine if there are opportunities to reduce the size of the City's fleet. This should be the charge of either a third party (i.e., MAI) or a committee of representatives from several departments established by the City. The Fleet Manager is a service provider and should not wear the hat of "enforcer" as well. These two functions do not mix and would not serve the City well at this time.*

- *Establish formal fleet utilization guidelines in a formal fleet policy document.*

- *Develop an electronic tool for calculating the break even point for assessing the cost-effectiveness of alternative transportation solutions: PPV, commercial rental, or City owned.*

Vehicle Disposal

Best Management Practice

Once vehicles and equipment have reached the end of their useful life or completed their duty tour, the procedures used to remove the vehicle permanently from the fleet should aim to maximize residual value and avoid unauthorized retention of assets that have been replaced. At the time a decision is made that a vehicle is to be disposed of, almost all vehicles have a salvage or residual value. Even a vehicle that has been "totaled" usually has value for parts not damaged. Therefore, once vehicles have been replaced and/or removed from service, it is desirable to dispose of the vehicles (turn the vehicles into cash) as quickly as reasonably possible.

Vehicles lose value each day they sit idle pending sale. Commercial fleet leasing companies have a performance standard that they monitor closely called "days to sale". They know that each day a surplus vehicle remains on its books represents an asset that is not earning money for them - losing value. Government fleets are no different. The biggest mistake that most make is conducting/participating in a once a year auction for all of its assets. A recent study completed for another client found that light duty vehicles (sedans, vans and pickup trucks) of reasonable disposal age and mileage lose as much as $2-$5 ***per day*** in value while waiting for disposal. The devaluation is due in part to seals drying out which results in leaks; batteries losing their charges and needing to be replaced; and general overall condition of the vehicle deteriorating.

Net proceeds from the sale or disposal of vehicles should be returned to the fleet replacement/sinking fund (and the using department's account credited) or to the owning department. The value derived at the time of vehicle resale is an incentive to the using organization to keep the vehicle clean and properly maintained – but only if the using organization is the beneficiary of the proceeds from the sale. Further, the using organization should be entitled to use the credit from the timely disposal of a well-maintained vehicle to offset the full cost of the replacement vehicle.

Once a vehicle is replaced and a new unit is put into service, the replaced vehicle should be taken out of service and disposed of as quickly as possible. This provides maximum salvage value and prevents "fleet creep" - growth of the fleet through unnecessary retention of replaced vehicles.

There are several methods of disposing of vehicles and equipment. They include:

- Auctions;
- Trade-Ins;
- On-line Sales;
- Direct Sales to Outside Individuals;
- Manufacture Sell-Back Programs; and
- Employee Sales.

Auctions have been one of the most common methods for disposing of fleet assets for public entities over the past several years. By the very nature of the process, auctions attempt to solicit the highest price for an asset. Auctions provide a quick solution to disposing of assets. It is relatively simple for an organization to conduct an auction or hire an auction service to conduct the sale.

The drawbacks to the auction approach include:

- ✓ The lag time between the time the asset is taken out of service and the time it is finally sold;
- ✓ Auction fees typically are based on a percent (5-10%) of the auction proceeds and can reduce the total revenues significantly if a large number of vehicles are sold;
- ✓ Auctions do not guarantee the sale of an asset; and
- ✓ The owner must settle for the auctioneer's wholesale price. Sometimes, higher prices could be obtained by selling the vehicles as individual units or as small groups.

Another popular method of disposing of old units is to offer them as a trade-in on the new unit being purchased. Vendors view the unit and submit a quote as a trade-in that offsets the new vehicle's purchase price. The benefits of this approach include the simplicity involved in disposing of the used asset. However, residual value is typically lower when traded to a commercial vendor. When using this method, an organization should always use language in the bid document that allows it to accept or reject the trade-in offer if the fleet organization believes that it can obtain a better price elsewhere in the market.

One of the newest and fastest growing methods of disposing of obsolete units is through on-line auctions. This method generally provides for the greatest exposure of an asset, which in turn generally results in a higher salvage value.

A seldom used approach is to come to an agreement with an original equipment manufacturer to "buyback" a vehicle or piece of equipment after a certain amount of time in service. This approach works well with construction equipment such as loaders and backhoes. Vendors receive a substantial discount for selling a unit to a governmental or other not-for-profit entity that the vendor may be able to buyback the same unit a year or two later and sell it to the general public for a higher price than it was originally sold (to the non-profit agency). The problem with this method is that it is only available occasionally and the number of vendors participating is limited.

The final method is to offer the out-going units to employees of the City at reasonable market value. This method has two distinct advantages; it can create a positive attitude among employees (a fringe benefit), and it can ensure the quick disposal of vehicles and equipment. The disadvantage of this approach: vehicles are sometimes over-maintained and too much time, effort, and money is spent ensuring the unit is in favorable condition

at time of disposal. Also, it may generate negative reaction from taxpayers if they assume it is an undue benefit for City employees.

Current Status

The City most often trades vehicles on new purchases or will solicit bids for vehicles and/or equipment that has been taken out of service. The process is informal and no set policies or practices are in place.

Recommendations

- *Formally document disposal practices in the fleet policies and procedures manual. Track key measures of performance such as days to sell, disposal value as a percent of original purchase price, auction fees, etc.*

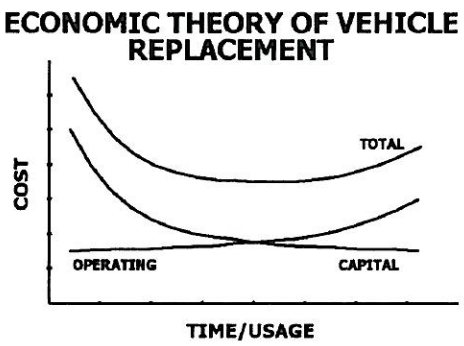
- *Consider using online auctions for units that have been taken out of service.*

Fleet Replacement Planning

Determination of Optimal Vehicle Replacement Cycles

Economic Principles of Vehicle Replacement

The economic theory of vehicle replacement is well known to fleet managers, and is illustrated graphically in the diagram. As a vehicle ages, its capital (i.e., depreciation) cost diminishes and its operating (e.g., maintenance, repair, and fuel) costs increase. The combination of these two costs produces a U-shaped total cost curve. Ideally, a vehicle should be replaced around the time that its total cost of ownership is at a minimum – that is, before the total cost curve begins to turn upward.



Operational Impacts of Vehicle Aging

When organizations attempt to determine optimal vehicle replacement cycles, they tend to focus solely on the direct, out-of-pocket costs of an asset. These include the costs of depreciation, maintenance and repair labor and parts, and fuel. However, there are indirect costs associated with the aging of fleet assets that can be as important as, or more important than, direct costs in determining when particular types of assets should be replaced. These indirect costs, some of which can be quantified and others of which cannot, include those associated with asset availability, safety, suitability, reliability, and appearance.

The indirect costs of more frequent breakdowns and higher out-of-service rates for some vehicles (i.e., pickup trucks) may be far greater for some uses of this type of vehicle than for others because the productivity of the employees engaged in activities that rely on the use of such trucks may be more directly impacted by vehicle availability or lack thereof than that of employees engaged in other activities. Due to the varying magnitude of indirect costs such as employee productivity, it sometimes is necessary to establish different replacement cycle policies for fleet assets that are physically identical to one another and whose direct capital and operating costs are essentially the same. More specifically, vehicles and equipment that are used to support activities that are vulnerable to disruption as breakdown frequency and out-of-service duration increase with asset age should have shorter replacement cycles than those that are used in applications, such as passenger transportation, for which substitute forms of transportation are readily available.

Determination of Long-term Fleet Replacement Costs

To identify the long-term replacement costs for the City's fleet, we developed a replacement plan using our proprietary software program *CARCAP™* (*Capital Asset Replacement Cost Analysis Program™*). We developed this plan to quantify future replacement dates and costs of each asset in the fleet over a period of 20 years, based on a number of planning and analysis assumptions.

To begin preparing this plan, we obtained an inventory of all fleet assets which was compiled by the Fleet Maintenance Division. The inventory included, for each vehicle and piece of equipment, identification, ownership, and classification information, as well as data on the in-service date, original purchase price, and life-to-date utilization – where available. We evaluated 172 rolling stock units that had sufficient information to perform the required replacement analysis.

Information on each asset was input to our replacement planning program. We incorporated our vehicle and equipment class codes for each major type of asset in the fleet and used actual City replacement cycles where available or industry standard planning parameters for each asset class. These parameters included:

- ✓ Recommended replacement cycle in months and/or miles or hours of usage;
- ✓ Purchase price in today's dollars;
- ✓ Purchase price inflation rate; and
- ✓ Financing terms (i.e., interest rates and financing periods) under a variety of alternative capital financing approaches, including tax-exempt lease purchase and open-ended operating lease.

The table below shows the replacement cycles in months and current year cost for several prominent types of vehicles in the City's fleet. Replacement parameters in miles/engine hours were not considered since the City does not rely on that statistic for replacement analysis.

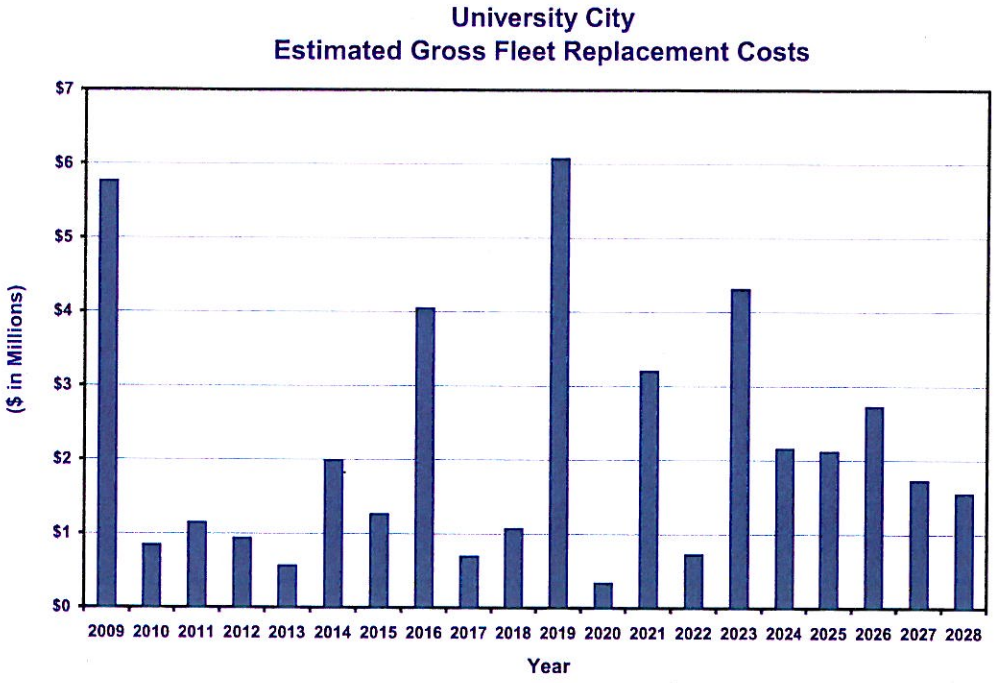
Vehicle Description	Months	Cost
Administrative Sedan	120	$12,000
Patrol Sedan	36	$19,000
Full size Van	96	$22,000
¾-ton Pickup Truck	60	$18,000
Truck, HD, Refuse	84	$155,000

The weighted average[6] recommended replacement cycle for the City's fleet turned out to be 6.65 years.

[6] The weighted average replacement cycle is determined by applying the recommended cycle for each type of vehicle to all of the vehicles of each type in the fleet inventory, and computing the resulting average replacement cycle for all the vehicles.

The current weighted average purchase price of the vehicles in the fleet is $60,074. We estimate the current (in 2009 dollars) replacement cost of the 172 units included in the replacement plan to be $10.3 million.

Using these replacement cycles and other planning parameters, we developed a baseline replacement plan for the City's fleet. This plan projects future replacement dates and costs for each asset in the fleet inventory each time during the 20-year analysis period that the assets meets the age and/or usage criterion (whichever comes first) for replacement. The following graph illustrates the end result of this analysis.



As reflected in this chart, there is a significant replacement backlog. Fifty-two percent of the total fleet will meet or exceed recommended replacement cycles during 2009. The cost of replacing all of them today would be $5.8 million.

Based on the weighted average replacement cycles (useful life projections provided by the City) the City should be spending approximately $1.6 million per year (constant dollars) for fleet renewal. The City has projected spending $1.2 million over the next five years. From 2004-2007 the City averaged approximately $0.9 million in fleet replacement spending.

This backlog has accumulated over the years, not because City staff does not realize the importance of renewing the fleet, but rather due to the lack of an organized, formal City-wide fleet replacement plan. Most fleet replacement decisions are currently based on near term budget issues and not a long term strategic goal of decreasing total fleet costs.

We recognize that the City is in no position to eliminate the current replacement backlog immediately. They did not develop overnight and are not going to go away overnight. Aside from the fact that the costs of eliminating the backlog immediately would be enormous, the logistical challenges would be all but insurmountable and the impact on the fleet's long-term performance and costs of having about half of the vehicles in the fleet aging simultaneously would be undesirable to say the least. Additionally replacement funding is quite volatile with several peaks and valleys through the planning period.

Alternate Capital Financing Approaches

Fleet organizations generally have three alternatives for financing fleet replacements: direct cash outlays, use of a "sinking (reserve) fund" replenished through charge-backs to users, and debt financing.

We have found that the cash option is the least effective method for funding replacement of capital assets. This approach will only succeed if the replacement plan is formally adopted and the funding is seen as non-discretionary.

Funding fleet replacements with cash is typically considered a "pay before you go" approach where an organization pays the entire amount for an asset before it is used even one day. Under this financing approach the entire capital cost of each asset in the fleet is paid at the beginning of the asset's service life. Consequently, if year-to-year replacement spending requirements are lumpy, the funding requirements associated with financing these expenditures also will be lumpy.

Most organizations that utilize a cash financing approach have difficulty dealing with fluctuations in fleet replacement spending needs because the amount of funds they can devote to the purchase of vehicles and equipment each year generally does *not* fluctuate. In fact, while the number of fleet assets that need to be replaced may "zig" upward (say, by 45 percent) in a given year government or departmental revenue in that year may not increase by a corresponding percentage, but may actually "zag" downward (see Estimated Gross Fleet Replacement Costs chart above). When this happens, some fleet replacement purchases must be deferred and a backlog of replacement spending needs begins to accumulate.

There is also a cost of using cash that can be put to uses other than the purchase of vehicles and equipment. This *opportunity cost* is many times at least equal to the interest rate the City could earn by investing the cash in securities.

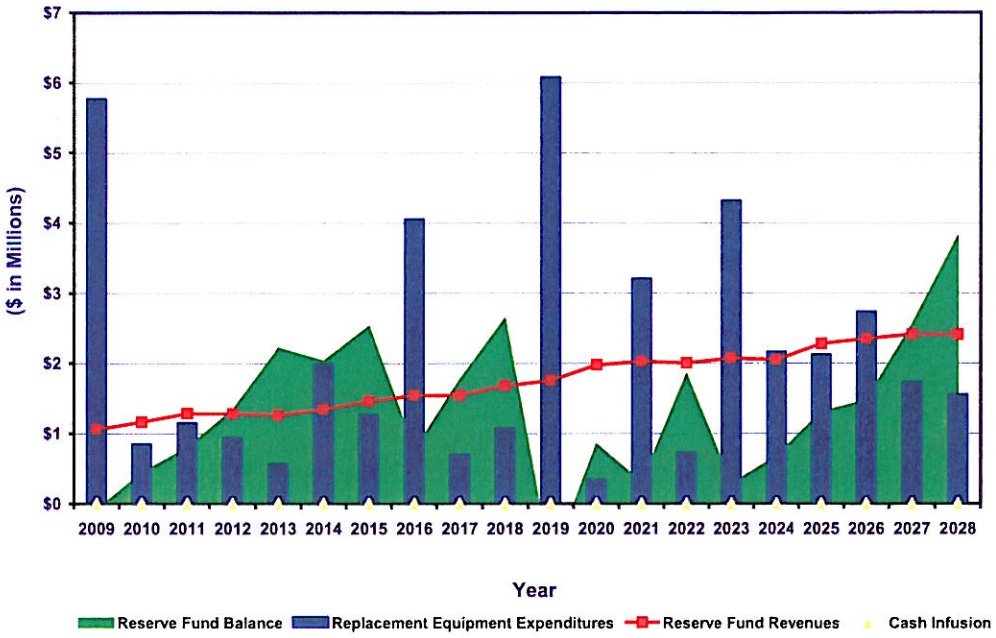
Proponents of this approach argue that this provides an organization the lowest capital cost for an asset since there are no interest payments. However, as we explain below, this is only one issue to consider when deciding how to fund fleet replacements. Another advantage of purchasing an asset with up-front cash is that the unit is owned entirely by the organization the day it takes possession of it.

The second approach, replacement reserve fund, is a "pay as you go" approach where customers are charged a replacement rate on a regular basis (monthly or annually) in

order to accumulate sufficient reserves to fund the replacement of a vehicle as it reaches the end of its useful life.

Although replacement ***spending*** requirements are identical to those shown in the earlier Smoothed Fleet Replacement Plan graph, ***funding*** requirements are represented by the red charge-back revenue line. A sinking fund permits vehicles to be paid for incrementally; it is a true pay-as-you-go approach to fleet replacement financing. As can be seen in the next graph, the sinking fund balance ebbs and flows in correspondence with peaks and valleys in spending needs.

Reserve Fund Financing



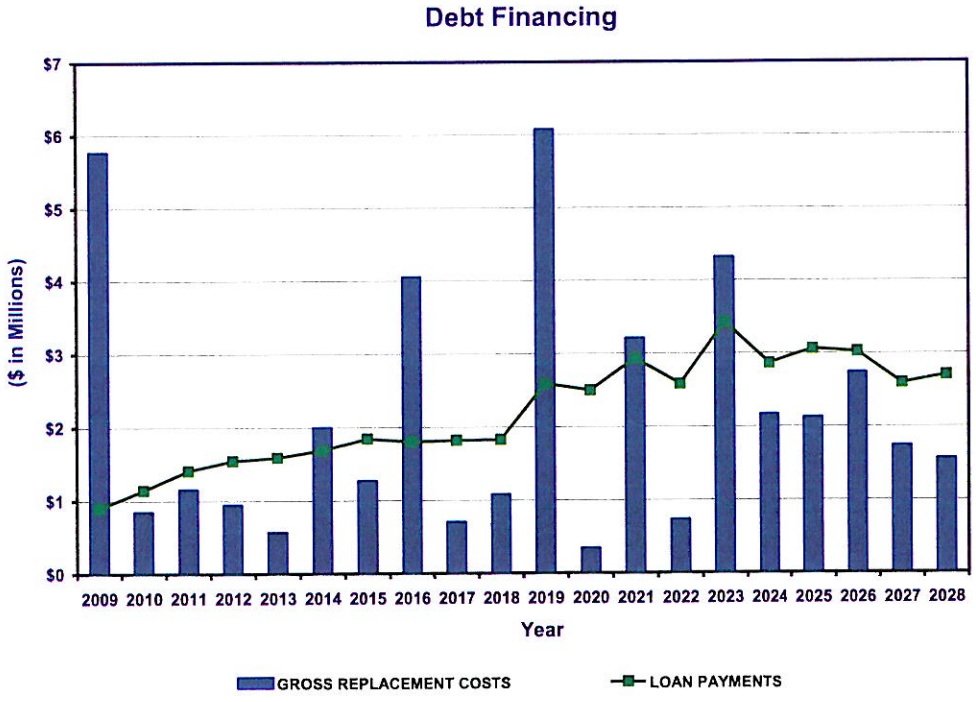
One of the challenges of managing a reserve fund properly is calculating charge-back rates so that the reserve fund balance does not get too big or too small. Many government jurisdictions have either depleted their reserve fund balance or built up unnecessarily large fund balances due to improper rate setting. Another challenge of using this financing approach is that some jurisdictions find it difficult to restrain themselves from raiding the fleet replacement fund "piggy bank" when budget dollars get tight, with the result that fleet user agencies who diligently pay internal fleet replacement charges month after month and year after year sometimes discover that their vehicles and equipment cannot be replaced on time after all.

A reserve fund approach would also require a significant infusion of cash to initially fund fleet replacements. In short, the proper use of a sinking fund requires considerable fiscal self-discipline; more than that required to maintain fleet replacement spending levels when a third-party lender is involved. Even when an organization succumbs to the temptation to "borrow" from its fleet replacement fund, however, it still is usually better off than are those organizations that finance their fleet replacement expenditures

entirely with ad hoc appropriations of cash. In a reserve fund approach, the disposal proceeds should be deposited into the reserve fund.

Like a revolving fund, debt financing – the third approach - allows organizations to spread the capital costs of fleet replacement purchases over the service lives of the vehicles in the fleet. Debt financing is similar to a reserve fund in that it eliminates most of the year-to-year volatility in replacement funding requirements. This reduces the likelihood that fleet replacement spending will be subordinated to other priorities and needs, particularly during lean budget years.

This approach is widely used in the private sector and is attractive to many cities, counties, and states not only because it eliminates the need to manage a replacement fund balance, but also because making the switch from cash financing or a sinking fund to debt financing can produce very large budget savings in the near term. Under this approach, the purchase of every vehicle and piece of equipment in the fleet would be financed over a period of years, typically matching the estimated useful life up to a maximum of 120 months (or a term established by a lending institute).



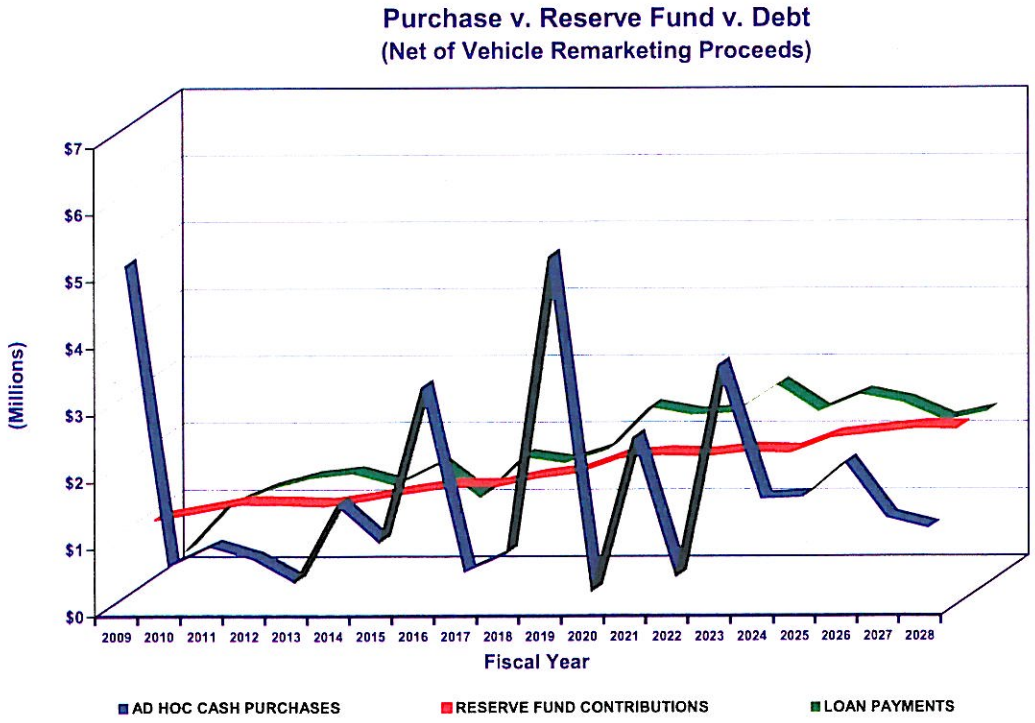
The bars in this graph represent projected annual replacement spending requirements which are the same as the smoothed replacement plan. The line in this graph illustrates projected debt financing payments and, consequently, the fleet's replacement funding requirements. Funding requirements are smooth and predictable under this financing approach.

Rather than accumulating cash in a reserve fund to pay for replacement vehicle purchases, however, this approach involves borrowing money from the capital markets and repaying it after vehicles have been placed in service. Debt financing instruments

take many forms, including certificates of participation and other bond programs in which a government jurisdiction issues its own securities for sale to investors; master lease agreements, revolving lines of credit, and fixed-term loans available through banks and other commercial finance companies; and leases offered by fleet management companies and the financing arms of major vehicle and equipment manufacturers.

One of the perceived drawbacks of this financing approach is the cost of borrowing money; i.e., real or imputed interest charges. There is a perception among many that it is fiscally irresponsible to use debt to finance the purchase of fixed assets such as vehicles that are "used up" relatively quickly. Without question, interest charges increase the total purchase price of a vehicle. However, to the extent that debt financing enables an organization to replace vehicles that it otherwise would keep in service for excessive periods of time due to its inability to accommodate all fleet replacement funding requests each year, interest payments may actually result in lower vehicle life-cycle costs. In other words, interest expenses may be more than offset by higher vehicle residual values and lower vehicle operating costs resulting from more affordable (i.e., budgetarily manageable) and, thus, more timely vehicle replacements.

The chart below identifies funding requirements for the three approaches.



The cash approach will only be successful if the City adopts a long term fleet replacement plan and earmarks funding for fleet replacements at the level that the plan identifies.

Establishment of a dedicated fleet reserve fund would be successful as long as charge-back rates are developed and administered appropriately, disposal proceeds and

interest earnings are returned to the fund, and the fund balance is not raided. This fund should be separate from the fleet operating fund.

Debt financing is a viable option and provides a level of fiscal discipline and is easier to administer than a reserve fund.

Recommendations

- *Develop a set of formal replacement parameters including months in service and usage (miles/engine hours) to be used as the strategic guide to fleet replacement. Replacement cycles should be based on empirical data that supports the planning parameter. As assets reach these replacement cycles use a set of tactical guidelines to determine replacement priority (tactical guideline sample included in the appendix).*

- *Develop a long-term (20-year) replacement plan that identifies when each asset in the fleet should be replaced and the associated cost. The goal should be a "smoothed" replacement plan that presents relatively consistent and predictable funding requirements.*

Fleet Financial Management

Best Management Practice

Effective financial management procedures are crucial for acquiring and operating a fleet efficiently and effectively. Well-designed fleet management policies and procedures, motivated vehicle operators and maintenance service providers, state-of-the-art information systems, and so forth have limited effectiveness if an organization cannot consistently secure sufficient financial support for its fleet operation or is constantly under scrutiny regarding the appropriateness of its costs and expenditures.

Effective budgeting ensures that funds requested to support an organization's fleet-related endeavors accurately reflect the costs of those endeavors. Key to such budgeting is line-item requests that clearly link funding needs to specific, fleet-related resource requirements and activities.

Inadequate funding requests and/or appropriations can impair an organization's ability to provide an adequate level of service, while excessive budget requests may reflect a lack of emphasis on cost control. The amount of funds provided to support fleet-related operating costs typically affects:

- ✓ the number of people who can be employed to perform fleet management, maintenance, and fueling tasks;
- ✓ the amount and quality of training that can be provided to these people; and
- ✓ the amount and quality of other resources – e.g., parts, contractual services, computer systems, maintenance facilities and equipment, and tools – that can be provided to support or augment their activities.

Cost control procedures are the final component of an effective fleet financial management process. Appropriate procedures enable an organization to identify, monitor, evaluate the appropriateness of, and adjust fleet ownership, operating, and management costs regularly. Although an internal audit process can achieve these objectives, a cost charge-back system – under which fleet users must budget and pay for the vehicles and related services (e.g., vehicle maintenance) and resources (e.g., fuel) they consume – is recognized as the best, on-going means of controlling fleet costs. This is because organizations always pay more attention to the costs of things they must purchase than to the cost of things they receive "for free."

Furthermore, organizations that must pay for the fleet resources and services they use are much more motivated to hold fleet management organizations accountable for the costs – and cost competitiveness – of the goods and services the latter provide. Consequently, properly designed cost charge-back systems promote efficiencies in both the provision and use of vehicles and fleet management services.

Use of a charge-back system is preferable to direct appropriation of funds for three main reasons: properly designed charge-back systems:

1) improve the consumption and provision of fleet resources;
2) promote equitable treatment of fleet users; and
3) ensure the timely replacement of capital assets.

Under a charge-back program for services provided, markups should include all costs of that line of business, including any charge card or other fees and all other costs of providing that service so that the particular function (line of business, i.e., parts or fuel in this case) breaks even. For example, in a well-defined rate model, not only would the markup include any fees, but also the costs of the parts clerks (or a portion of the mechanic's salary and benefits if there weren't a parts clerk) and a portion of all other reasonable overhead, such as utilities for lighting, heating, air conditioning of the parts room; part of the supervisor's all-in costs proportionally allocated for the amount of time (effort) that he/she puts in on that function; the fuel for the parts truck used to run parts, etc.

To segregate revenues and expenditures, many fleet organizations are established as self-supporting Internal Service Funds (ISF), which are used to account for the cost-reimbursement financing of goods and services provided by one department or agency to other departments or agencies. They are set up to identify costs of specific governmental services accurately. Use of Internal Service Funds has several advantages:

- ✓ Enables identification and accumulation of the total cost of a support activity, including the depreciation of capital assets;
- ✓ Facilitates costing and pricing of support services;
- ✓ Allows for the accumulation of funds for equipment replacement; and
- ✓ Allows for the allocation of General Fund overhead costs to the Internal Service Funds for redistribution to the benefiting programs.

From a General Fund perspective, Internal Service Funds should be zero budgeted. In other words, the ISF should generate enough revenue from its charges to customers to recover the costs of all expenses fully – neither "making" nor "losing" money. The rates should be developed to ensure the recovery of funds expended through sufficient charges for goods and services. Under this type of rate structure, you eliminate the cross subsidization of service delivery costs.

Current Status

The Fleet Maintenance Division operates as an Internal Service Fund (ISF) under the Fleet Management Fund. Users are charged monthly for fleet costs (capital and operating). The fleet charges are summarized in the following table:

Fleet Charge	Comment
Depreciation	Fixed capital cost charged to users for vehicles and/or equipment. Cost represents net cost of the asset over the anticipated useful life.

Insurance	Fixed cost for insurance.
Labor	Charge for labor based on mechanic's actual rate of pay.
Parts	Pass through of actual part costs. No markup.
Lube	Pass through of actual lube costs. No markup.
Sublet	Billed directly to department's budget.
Fuel	Pass through cost. No markup except to outside agencies (10%).

The charges are primarily an accounting exercise as the department representatives interviewed were not aware or did not understand them. Therefore the current method of charging back costs to fleet users does not impact behavior or promote cost awareness.

Recommendations

- *Develop service based charge-back rates for all fleet lines of business such as labor, parts, sublet activities, fuel, fleet management, etc.*
- *Develop capital replacement rates as opposed to depreciation based rates.*
- *The capital fleet replacement fund and the fleet maintenance operating budget should be separate.*

Fleet Management Information System

Best Management Practices

Accurate, easily accessible information is crucial to all aspects of fleet management. The best systems are specifically tailored to fleet management needs, such as detailed vehicle inventory information, multiple methods for tracking vehicle use and scheduling work, parts inventory information, methods to track labor hours and costs, and other key informational data. The systems must also be intuitive to allow a range of users to be effective when working with the system and, finally, flexible with respect to developing critical reports for management analysis.

Some key benefits to be derived from a single FMIS include:

a. Improved central management of the fleet;
b. Timely response to reporting requirements or special data calls;
c. Current and electronically available inventory data;
d. Current, complete, and electronically available maintenance and fuel costs;
e. Availability of data essential to development of a comprehensive replacement plan;
f. A standard method for replacement planning;
g. Tracking and reporting of fleet performance measures;
h. Elimination of manual data capturing and calculation.

In recent years, the fleet management profession has begun to undergo a fundamental change in its approach to decision-making. Traditional methods of managing fleet operations based on hands-on experience and "gut instinct" are being augmented by decision-making based on the development and analysis of objective, quantitative information and the application of management science principles and techniques. This shift stems from growing pressure on fleet managers to maintain or improve service levels and quality while holding the line on, or reducing, costs. The pressure can come from anywhere: elected officials, upper management, customers and competitors.

Recent advances in information technology clearly are the most important enablers of this shift toward scientific management of fleet operations. Many fleet management organizations have responded to these developments by implementing, with varying degrees of success, new management information systems, e-mail, office automation software and Intranets. In the future, the effective integration and application of such tools will constitute one of the major pillars of progressive, professionally managed fleet operations, regardless of size or financial resources.

Current Status

University City recently acquired a commercial off-the-shelf maintenance management system from GBA Master Series, Inc. Several fleet/asset management related modules were included in the purchase (i.e., Equipment Master, Fleet Master, Warehouse

Master). While we did not evaluate the configuration of the system or system codes, we met with GBA Master Series representatives to discuss the functionality of the system.

Although the system is not considered a Tier I fleet management information system it has some of the basic functionality required to manage a fleet. With some modifications/customization to the system and additional canned reports established using their report writer (Crystal Reports) the system should be capable of providing the City with most of the fleet management information that is required.

The initial setup and implementation of the system will be critical for the long term success of the FMIS and fleet program.

Recommendations

- *Work closely with GBA MS during initial configuration and implementation of the system.*

- *Include the mechanics in the configuration and implementation of the system. This will provided much needed "buy in" to the system and a sense of ownership with the project.*

- *The goal should be to go live with all staff (Fleet Manager, Mechanics, Parts Clerk, Administrative Clerks) using the system as it is designed.*

Fleet Management Policy Design

Best Management Practices

A formal fleet policy and procedures manual provides an organization with a single point of reference for all fleet related issues. The purpose of a formal policy is to establish procedures for the use, maintenance, acquisition, billing, replacement, and disposal of vehicles and equipment, as well as fueling, vehicle justification, and other operational requirements. The documents ensure consistency among the various departments, divisions and other organizational components in the use and care of fleet assets and when operating their personal vehicles in the conduct of official City business.

Industry best practice demands that a comprehensive "Fleet Management Policy and Procedure Manual" be provided as one of the foundations for effective and uniform control of fleet assets and their operation and maintenance. In organizations even as geographically circumscribed as the City, such manuals are most effective when issued by a central authority but developed with representation and contribution from major operating activities. A number of sound management reasons underlie the value of preparing and communicating a policy:

- ✓ Encourages planning and goal setting
- ✓ Details effective problem-solving strategies
- ✓ Provides supervisors with standard guidelines
- ✓ Promotes teamwork; reduces squabbling
- ✓ Reduces management and driver downtime
- ✓ Reduces crisis communication
- ✓ Contributes to employee and organization success
- ✓ Reduces supervisor and employee anxiety
- ✓ Improves control over costs and operations
- ✓ Standardizes processes in multiple locations
- ✓ Reduces confusion, questions, errors

The intent of this section of the report is to guide the City in its efforts to update and improve upon its existing fleet services business model. As such, and to take initial steps toward achieving "best-in-class" status, it must shoulder the inherent responsibilities to:

- Ensure the availability of safe and modern vehicles and equipment, properly designed for the mission, reliable, and replaced on a timely basis.
- Provide a full range of success-oriented fleet services; control costs; report abuse, unsafe acts or conditions; monitor and report fleet size and utilization; and continue to seek ways to improve management of the fleet.
- Help to procure, maintain, provide fuel for, and/or dispose of vehicles and equipment in a manner that is cost effective and consistent with City goals and objectives.

- Continually make positive contributions to customers, avoid unnecessary costs, and provide full service, "best in class" support.
- Comply with all laws and regulations that apply to fleet management.

Essential Elements: The solution can be found in a series of policies and procedures that address, organize, and simplify these strategies and tactics. Seven essential elements apply to all policies and procedures; that is, the policies and procedures must be:

1. Endorsed by the very highest officials within the City;
2. Organized, useful, helpful and relevant for all concerned;
3. Communicated to every location/organization that has a vehicle or vehicles;
4. Easily accessible for all 'customers' and subject to constructive criticism;
5. Safeguarded in content and structure;
6. Developed according to 'best practices'; and
7. Managed locally/departmentally in a uniform fashion.

First Element: Policies and procedures must be endorsed by the very highest officials. Employees working in diverse departments operate City fleet vehicles and equipment. Additionally, the City operates an in-house fleet maintenance shop and uses several outsource maintenance approaches. Because the policies and procedures for fleet management and fleet services cross diverse organizations, operations and maintenance solutions, it is abidingly apparent that a strong endorsement from a City official "encouraging" compliance with a comprehensive fleet and transportation policies and procedures document would be necessary and helpful. At a minimum, this endorsement can be in the form of a signed cover letter. The endorsement should state that *without exception, all fleet users are obliged to follow the guidance set forth in the policies and procedures document(s).* For the City of University City, "endorsement" precedes "enforcement."

Second Element: The policies and procedures must be organized, useful, helpful, and relevant for all concerned. Mercury supports a consistent and positive approach to the development of policies and procedures documentation. The policies and procedures should be logically organized, as reflected in the document's (s') table of contents. Every policy should reflect the strategies to be implemented across the organization, and every procedure should address the tactics that should occur. Even though a department may have just one vehicle, all the policies should apply to it, and every procedure requiring management that it needs to use should be included.

The policies should be defined. A standard Webster dictionary defines "policy" as "a definite course or method of action selected to guide and determine present and future decisions." Needed policies must be consistently prepared according to this or any other established definition selected for use by the City.

The procedures should also be defined. Webster defines "procedure" as "a particular way of doing something; a series of steps followed in a regular order." As tactics, procedures also need to be consistently prepared and strictly adherent to the definition. The steps within each procedure should flow logically from one to the next and must

amplify the strategy – the associated policy. Simply stated, policies establish "what to do" and display *an absence of action*. On the other hand, procedures establish "how to do it" and display *the presence of action.* Conversely, no policy should include action or be included in the procedures book/section, and no procedure should exclude action or be included in the policy book/section[7]. If they are combined, alignment of each policy with its accompanying procedure(s) should be clear and evident.

No policy should be omitted as possibly unremarkable, and no procedure should be omitted as applicable to too small an audience. No policy should be written that invites local interpretation, and no procedure should be inadequate in its description of a tactical requirement. It is in these instances that policies and procedures can become forgotten, ignored, and ultimately overtaken by local practice. Fleet management breaks down. That is NOT to imply that policies and procedures be "ironclad," irreversible, or not subject to change. We address these issues in Elements Five and Seven below.

Third Element: Policies and procedures must be communicated to each organization that has a fleet vehicle. If prepared correctly and accurately, all policies and a specified number of procedures will have relevance for every fleet user. In other words, even though a department may have only one unit, the policies and procedures document(s) will provide them with the guidance necessary to manage their "fleet." The same should apply to policies and procedures that apply to students and various transportation alternatives.

Fourth Element: Policies and procedures must be easily accessible for all customers and subject to constructive criticism. A policies and procedures document(s) must be user friendly. It must be simple to read and understand, organized and thorough, relevant and practical. Each reader should be able to locate procedures quickly and as needed, and each reader must understand that the documents(s) are available to be criticized. In the past, this was as simple as specifying or suggesting a location for retaining the document(s), providing an instruction describing navigation, and inviting users to call the fleet manager to register criticisms.

Communication has been rendered very simple in today's electronic world. We contend that the best way to provide access to the document(s) is to "web enable" it. This medium allows all users to access the "website" and view the policies and procedures that govern their fleet management obligations.

Every policy and procedure in the document(s) is subject to change and can probably be improved upon. If the document(s) requires updating or change, the "website" could be linked to another location where any user could suggest an update or change to the policies and procedures(s).

---

[7] In our experience, a single document containing both policies and procedures is more user friendly, and it proves easier to track the genesis of each procedure while ensuring clear alignment. We have also found that an electronic and searchable policy/procedures document is more readily kept current and more readily consulted.

Fifth Element: Policies and procedures document[s] should be safeguarded in content and structure. Best in class organizations make it a matter of policy that the *fleet manager is the only individual with the authority to alter the policies and procedures document(s).* If the endorsements are correctly prepared, customers will be obliged to follow the guidance contained in these documents. In other words, they do not have the authority to comply with them in part or adjust them to fit a local situation. If they are prepared correctly, no local variances should occur. The Fourth Element above describes how the policies and procedures document(s) is best published on a website. Once published, each customer will have read-only access. If he or she wants to criticize the information, allow that person to go elsewhere to do so, as described above.

Sixth Element: Policies and procedures document(s) must be developed according to "best practices." In the introduction to this report, we identifies some duties that fleet managers across the nation typically are expected to carry out. The City should develop each policy with these duties in mind, and each of the associated procedures must describe how these policies should be put into practice. Of course, in some cases, law or regulation dictates fleet requirements. And "Best Practices" can be in accordance with how the best performers among your customers operate, or in accordance with established best practices, known and used by successful fleet managers across the nation.

Some of the duties shown in the table below may not apply, and others may apply that are not specified. We suggest developing the policies needed by reviewing the goals that are to be achieved and the associated strategies. The following table lists some of the strategies that may be relevant for the City.

Sample Strategic Responsibilities

Ensure the availability of safe and modern vehicles and equipment.
Ensure the proper mix of vehicles and equipment, appropriate for the mission.
Ensure the customer's fleet is reliable and well-maintained.
Ensure the customer's fleet is replaced on a timely basis.
Provide a full range of fleet services to customers.
Respond quickly and supportively when called on to provide services.
Control costs and avoid unnecessary costs.
Report abuse, unsafe acts or conditions.
Monitor and report fleet size and utilization.

Relentlessly pursue and incorporate "best-in-class" fleet management practices.
Seek ways to improve management of the fleet.
Procure, maintain, provide fuel for, and dispose of the customer's vehicles and equipment in a manner that is cost effective and consistent with stated or known goals and objectives.
Make positive mission-related contributions to customers and provide full-service support.

Seventh Element: Policies and procedures should be managed locally in a uniform fashion. Element One above addresses the endorsement process and how every fleet user will be obliged to comply with the contents of the policies and procedures document(s). To affirm an obligation such as this, best-in-class fleet managers develop "service level agreements" with their customers. Simply stated, these coordinated, signed, and published agreements describe what the fleet manager can expect from his/her customers, and what the customers can expect from the fleet manager. Service level agreements may or may not be necessary for the City.

At the very least, each department that uses fleet vehicles must identify a Fleet Management Coordinator (FMC) – an individual nominated to coordinate all fleet activity within his/her organization. Providing a "single face" to the City fleet manager will minimize administrative lead times and unnecessary time lags that can rob the program of certain efficiencies of operation.

When the City fleet manager requires information about the fleet within any organization, s/he need only communicate with one individual, the FMC for that organization. When a procedure specifies submission of certain information, the FMC has the responsibility to request, obtain, and submit the information in response to the procedure's specification.

Recommendations

- *Develop comprehensive fleet policies and procedures using the sample table of contents included in the Appendix as a guide. No short cut exists for the preparation of policies and procedures. For an organization with the complexity of the City, it will be a labor-intensive undertaking that can prove extremely difficult to accomplish correctly. Carefully prepared policies and procedures provide the fleet manager with a potent tool for identifying waste and reducing costs. If the policies and procedures are prepared according to the recommendations provided in this section of the report, and if they are enforced and followed, fleet costs will go down and service will assuredly improve.*

- *Arguably the best way to initiate and retain management over this fleet is through the use of a well-conceived, well-prepared, and user-friendly set of policies and procedures, powerfully endorsed by the head of the entire organization.*

Fleet Business Plan

In addition to well documented policies and procedures, a fleet organization should develop an annual Strategic Fleet Business Plan and a comprehensive Business Continuity Plan.

The Fleet Business Plan is a tool that serves both the internal Fleet organization and the customers that the organization relies on for sustainability. A Fleet Business Plan should be a guiding document establishing goals and objectives, and creating a strategy and approach to achieving the objectives.

A well thought out Business Plan will have the following components:

Mission Statement - A mission statement defines the organization's overall plan in a succinct and interesting manner, with a tone reflective of the tone of the business itself. It should answer questions like [a] what needs does the business address; [b] what is the purpose of the business; [c] how does the business address those needs, and [d] what are the principles and beliefs that guide how the organization addresses the need. A sample mission statement follows:

> *"The Fleet Maintenance Division delivers a wide variety of efficient, effective, and trustworthy services to its fleet customers, essential for consistently successful and reliable fleet operations."*

Vision Statement - The statement should portray a visual image of the direction in which the company is headed. An organization's vision is a statement that identifies what that organization intends to produce and the manner in which the production is intended. A sample vision statement follows:

> *"The Fleet Management Team will be an independent, world-class provider of high quality, timely, reliable and reasonably priced fleet management services. This vision will be accomplished through the application of state–of-art technology and the hard work of a well-trained, enthusiastic, focused, and proud work force."*

Strategies and Goals - Having established fleet program goals a fleet organization must develop strategies aligned with those goals and then determine the tactics to implement that will ensure success. These are critical exercises for improving fleet services programs. The Plan should identify strategies and set goals intended to enable the organization to achieve implementation of best-in-class services. For example the fleet organization may identify a *strategy* to ensure a high degree of availability for the customer's fleet. The associated *goal* may be to maintain a 95 percent level of availability for the fleet.

With these parameters established, the appropriate tactical criteria can be formulated – examples include adding a technician to the staff, improving the

flow of work within the facilities, implementing a two-shift operation, outsourcing certain labor-intensive tasks, and/or adjusting maintenance priorities.

As/where applicable, the fleet organization may need to establish strategic responsibilities, commit to certain goals, and formulate dozens of tactical responses to achieve success - some of which are provided below:

- Ensure the availability of safe and modern vehicles and equipment.
- Ensure the proper mix of vehicles and equipment, appropriate for the mission.
- Ensure the customer's fleet is reliable and well-maintained.
- Ensure the customer's fleet is replaced on a timely basis.
- Provide a full range of fleet services to customers.
- Respond quickly and supportively when called on to provide services.
- Control costs, and avoid unnecessary costs.
- Report abuse, unsafe acts or conditions.
- Monitor and report fleet size and utilization.
- Relentlessly pursue and incorporate "best-in-class" fleet management practices.
- Seek ways to improve management of the fleet.
- Procure, maintain, provide fuel for, and dispose of the customer's vehicles and equipment in a manner that is cost effective and consistent with stated or known goals and objectives.
- Make positive mission-related contributions to customers, and provide full-service support.

A Business Continuity Plan often referred to as "disaster recovery" or "disaster preparedness plan", is a valid need in today's work environment for assured business continuity, to make preparations in advance to recover with relative ease from any interruption to business and/or computer operations specifically. The expeditious and efficient recovery of computer processing represents an opportunity to avoid a major catastrophe.

The primary purpose of a Business Continuity Plan is to establish written emergency procedures which can be followed to expedite the recovery process. These procedures will have been structured to provide the needed recovery steps.

Operational planning is frequently included in a formal Business Continuity Plan. For an organization such as the City's Fleet Maintenance Division, issues such as alternative fuel sites, agreements with commercial vehicle and equipment providers, and alternate work sites are commonly addressed.

If an organization has a Business Continuity Plan in place, the impact of a catastrophic event will be dramatically minimized. One of the greatest threat today is contamination or destruction of electronic files. Although most organizations employ virus detection software, new viruses are being introduced almost daily. One element of an electronic file continuity plan would include the positioning of all the information found on the server

to another computer, perhaps twenty miles distant from the fleet organization's shop, either in real time or on a routine basis – nightly downloads for example.

Depending on the magnitude of the disaster, the information could be collected and returned to the [e.g. replaced] server after a relatively short period of time, and with little or no loss of information.

Current Status

The Fleet Maintenance Division does not have a Strategic Fleet Business Plan or a Business Continuity Plan.

Recommendations

- *Develop a Strategic Fleet Business Plan and update annually. Produce an Executive Summary annually to distribute to user departments that identifies the goals of the fleet organization, major accomplishments for the previous year, and any new issues that the Fleet Maintenance Division will be addressing in the coming year(s).*

- *Develop a Business Continuity Plan that provides formal instructions for the Fleet Maintenance Division staff and user departments in case of an emergency. Emergencies can include physical emergencies such as contamination of the City's bulk fueling tanks to cyber emergencies such as loss of all electronic vehicle and equipment maintenance and repair data.*

Fleet Maintenance Facilities

Best Management Practices

Adequately sized, suitably configured, correctly equipped, and appropriately positioned facilities are the most remarkable contributor to efficient and effective fleet maintenance programs. Conversely, no amount of effort can fully overcome facilities that are outgrown, disorganized, lacking in equipment, and/or in the wrong place. Missions evolve over time. Technology changes, and fleet size and composition changes accordingly.

More often than not the quality, size and configuration of older facilities do not match the work to be done. Perhaps these facilities were adequate 10 to 15 years ago, but they are not today for a variety of reasons. Furthermore, the sites on which these facilities are positioned are often too small, as is the case with University City.

It is nearly always impossible to stay within the existing operational footprint and successfully compensate for facilities and sites that are too small, inappropriately configured, or poorly positioned according to the work processes. The most effective solutions include new facilities constructed on new, larger sites; renovating existing facilities; or acquisition of adjacent property; all programmed and planned from an operational perspective.

Lastly, it is important to note that the City has high expectations for the fleet – rightfully so because it is the backbone of the transportation services provided. The vehicles are to be maintained efficiently and effectively; reflect the major investment that they are; retain a high degree of reliability and availability, and bring top dollar at auctions when they are replaced. To do this, fleet staff must be given every opportunity to succeed, and that includes facilities situated on sites equal to the task. The facilities are a tool, and if the tools are not available, even the best mechanics cannot provide the expected level of service. In turn, the sites on which these facilities are positioned represent the environment which determines many of the efficiencies expected of best in class operations.

Current Status

During the conduct of this study, MAI accomplished a review of the existing fleet facilities. The goal was to determine the adequacy of the facilities[8], note any major deficiencies, and make recommendations that would ultimately help to improve the delivery of service.

---

[8] The facilities review was conducted to determine if they supported or hindered fleet maintenance and repair operations. Our review did not include any type of inspections to determine the structural, mechanical, etc. conditions of the facilities.

The shop appears to have been constructed at least forty years ago. The site is extremely tight, and the facilities are sandwiched between the MRF, the Streets Division, and the Solid Waste Division. Parks Division also occupies space on the site, to the North. A major portion of the site is consumed by vehicles that are domiciled there. Without major organizational repositioning, realignments, or space reallocations, we doubt that any construction solutions lie within the existing site boundaries.

The main shop is rectangular in shape, approximately 9200SF. Within this square footage is an extremely small administrative area (an office for the fleet manager, and two supporting rooms for business machines), an even smaller amenities area (a break room sized below 100SF), a modest shop support area (a tool storage area at the Northwest end (adjacent to the fluid distribution area); and a centrally-positioned Reference Library (perhaps 100SF), across the drive isle from a single light duty vehicle repair station.

The remainder of the facilities is used for general storage, and staging of tires, supplies, and equipment primarily positioned to the South – as close as possible to the heavy duty bay, described below.

Outside the 9200SF are adjacent restrooms/locker rooms, and a Parts room, located at the Northeast end of the facilities. A new addition was constructed reportedly in 1998-1999: a 1650SF heavy duty vehicle bay, positioned to the South of the older facilities.

The total square footage available for the fleet staff is enumerated below.

Space	Estimated SF
Older Fleet Facilities	9,200
New HD Shop	1,650
Parts Room	500
Restrooms (fleet only)`	150
Total	**11,360**

MAI uses several methods to assess the efficiencies and effectiveness of the facilities in question. For example, we often review the workstations by determining the quality of the "Adjacencies (the positioning of the workstations vis-à-vis other workstations)", the "Space Allocations (the size of the workstations)", and the "Work Area Assignments" (the positioning of the workstations vis-à-vis the facilities)".

For a review such as this one, we typically define the workstations so that they fall within five major **groupings:**

1. Administration
2. Amenities
3. Shop
4. Shop Support
5. Exterior

By combining these groupings with the workstations, and assigning a score of 1-5 to each (based on our experience across the nation: 1 being "extremely weak" and 5 being "extremely strong"), we can come to some conclusions about the efficiency and

effectiveness of the facilities – the positive and or negative contributions they make to the fleet maintenance process. The tables that follow reveal the results of our review.

FACILITIES QUALITY ESTIMATES

Grouping	Adjacencies	Space Allocation	Work Area Assignment	Total	Remarks
Administrative	3	2	2	7	Office and Business Machines are adjacent; the office is sized smaller than our standard; the rooms are positioned distant from the heavy duty vehicle bay
Amenities	1	1	2	4	Restroom is adjacent to shop area; break room is very small and overlooks the shop floor
Shop	1	1	1	3	Main shop floor to ceiling clearance is too low and unacceptable – well below virtually all we have seen; the heavy duty bay is distant from shop support areas; Other organizations enter/exit directly through the shop floor
Shop Support	1.5	2	1.5	5	Parts room is distant; tool room is distant; reference library is within tolerances
Exterior	1	1	1	3	Vehicle staging (deadline and readyline) is unmarked; employee parking is distant and unmarked; available space is severely limited
Totals	**7.5**	**7**	**7.5**	**22**	**Out of a possible 75 points**

FACILITIES QUALITY RESULTS

Grouping	Adjacencies	Space Allocation	Work Area Assignment	Total	Remarks
Administrative	3	2	2	7	9 = average and adequacy (avg/adeq)
Amenities	1	1	2	4	9 = avg/adeq
Shop	1	1	1	3	9 = avg/adeq
Shop Support	1.5	2	1.5	5	9 = avg/adeq
Exterior	1	1	1	3	9 = avg/adeq
Totals	**7.5**	**7**	**7.5**	**22**	**45 - 55 = avg/adeq**
Remarks	**12-15 = avg**	**12-15 = avg**	**12-15 = avg**		

So out of a possible 25 points for each of the major groupings, we recorded a total of 7.5 points for the quality of the "Adjacencies"; 7 for "Space Allocations"; and 7.5 for "Work Area Assignments". While subjective, we believe these ratings reflect the contributions made by the facilities, most of which in University City, MO are negative. It is important to review the primary cause of the problems within the existing facilities.

Ceiling Height within the Main Facilities

By far, the overarching weakness in the main shop is the ceiling height. The clearance for the overhead door at the North entrance is 10'6", too low for many of the heavy duty vehicles and equipment. Once inside the facilities, the estimated average clearance

above the floor is 11'6". Light vehicles can enter the facilities; however they cannot be lifted to an acceptable industry standard for undercarriage repairs[9].

By way of contrast, the MAI standards for floor to ceiling unobstructed clearance in the fleet shop in University City, MO is 16' for light duty vehicles and 24' for heavy duty vehicles. Anything less and the mechanics are reduced to accomplishing maintenance using a rolling device popularized in the 1950s called a "creeper", which allows a mechanic to lay on his/her back and look up at the undercarriage.

When the new facilities (HD shop) were constructed in 1998-1999, they were built to have a floor to ceiling clearance somewhere in the neighborhood of 20', considered adequate for University City at that time, but well below our standard for heavy duty fleets comparable to that owned and operated by University City (24'). However, there is no lift available in the heavy duty shop, so undercarriage maintenance is generally accomplished using a creeper, or by positioning jack stands and raising the vehicles accordingly.

Shared Facility

The layout of the facilities, specifically the amenities, has led to considerable pedestrian traffic through the shop. Access to the Streets and Solid Waste employee's locker room/restroom and primary meeting area is through the shop. The time clock where not only Fleet personnel clock in/out but also Streets and Solid Waste is positioned on a wall near the center of the shop. Vending machines are also located in the shop near the driveline. These create numerous distractions for the mechanics throughout the day. These also pose a serious safety and security issue. Absolutely no one except fleet employees should be allowed on the shop floor.

What is Needed – an Estimate of the (Virtual) Facilities

MAI has the ability to draw on our considerable experience to flesh out an estimated facilities size for our clients, by means of the major work groupings used above. In our work with nearly 500 fleet organizations over the last 25 years, we have discovered what works well and what does not.

For example, we know that there are approximately 225 vehicles, pieces of rolling stock, and small engine equipment maintained by the Fleet Maintenance Division. Using the Vehicle Statistical Reference System described elsewhere in this report, after careful review we can conclude that within this fleet are approximately 539.25 Vehicle Equivalency Units (VEUs). Based on these and other metrics, and given the associated work load, we can estimate that the University City Fleet Maintenance Division requires 2 light duty bays, 4 heavy duty bays, and one bay reserved for small engine repair.

Moreover, using these statistics and a host of others, together with our experience in planning and programming fleet maintenance facilities, we can provide very preliminary dimensions for a fleet shop that would serve University City well. Please note that the actual sizes would be established during a formal space needs assessment. These

[9] Unobstructed – 15'9"

represent an estimate of space needed for only the fleet maintenance and repair operation and could be adjusted based on a variety of operational factors.

Work Group[10]	Space Included	Total SF[11]
Administration	Vestibule, Reception, Mgr Office, Business Center	850-950
Amenities	Men's RR/Locker, Women's RR/Locker, Break/Training	750-850
Shop	Light Duty Bays (2); Heavy Duty Bays[12] (4); Small Engine Repair Bay	11,000-12,000
Shop Support	Parts Room; Tools; Fluid Distribution; Tires; Emergency Generator; Reference Library	3,000-4,000
Facilities Total		**15,600-17,300**
Exterior	Dumpster Area, Deadline Vehicle Staging, Readyline Vehicle Staging, Employee Parking, Visitor Parking, Vehicle Wash, Hardstand Wash Area, etc.	10,500-11,500
Site Size	Rough estimate: site size for University City Fleet Maintenance Division	2.25-2.75 acres

Conclusions

Unfortunately, the existing facilities interfere with the intended mission. The impact on the organization's efficiencies and effectiveness is direct – and negative. The restricted ceiling height in the main shop renders it useless for other than light duty vehicle maintenance and small engine repair. And for the light duty mission, keep in mind that there is no room overhead to raise the vehicle to the appropriate height, so the mechanics are reduced to using a creeper almost exclusively. Ironically, there is a single post lift in the main facilities, but the light duty vehicles can only be raised just high enough to change tires (while sitting on a stool with rollers). Most other maintenance procedures are accomplished from a creeper.

In spite of the fact that there is sufficient floor space available in the main shop to house three of the needed heavy duty bays, no heavy duty vehicle maintenance can be conducted therein. The unobstructed floor to ceiling height is simply too low. So all of the heavy duty vehicle maintenance must take place in the newer facilities, where there is just one bay. In fact, the bottleneck, the traffic jam, the primary efficiency-robbing

[10] This table represents a very rough estimate of space needs. Actual conclusions regarding the space needs require a more detailed assessment, based on [a] how the Fleet Maintenance Division operates, and [b] best practice across the nation.

[11] Circulation has been estimated based on our experience, and is included in this table.

[12] Although not tasked with developing a facilities master plan, typical light duty bay size is 15'x30'; typical heavy duty bay size for a fleet with fire trucks and refuse trucks is 24'x50'.

location for the Fleet Maintenance Division is right within the single heavy duty bay. And according to the VEUs, this is arguably the most important mission they have.

This, coupled with the fact that the parts room is so far away from the heavy shop, leads the mechanics to "stockpile" many of the parts and tools needed for heavy duty maintenance in the main shop, as close as possible to the heavy duty bay. The reasoning is simple: *there is essentially nothing else that can go on in the main facility.* To the casual observer this gives the impression that the mechanics have uncontrolled clutter at the southernmost end of the main shop – as close as possible to the one heavy duty bay. Granted, there is some clutter at this end of the main facilities. Granted, the area could be cleaned up, supplies and materials reorganized, and space assignments clarified. Overall however, we feel they have simply found ways to reduce the need to walk the length of the main facility to [e.g.] retrieve supplies and materials from the Parts Room.

A new parts room constructed within the main facilities at the Southeastern end would help. But it is important to note that this in and of itself would not add efficiency and effectiveness to the maintenance process. The two main deficiencies – the lack of ceiling height in the main facilities and the shortage of heavy duty maintenance bays – would remain, and continue to make glaring negative contributions. However, a centralized parts room would be more convenient for the mechanics, especially those working in the heavy duty shop. If the move of the parts room was done in conjunction with other facility improvements that would eliminate pedestrian traffic in the shop it would positively impact operations.

We have already noted that for this fleet 4 heavy duty bays are required. In fact, there is just one. This represents a bottleneck in workflow; more vehicles need to be in the shop than the number of bays (one) will allow. Therefore induction is often deferred because the queue of deadline vehicles accumulates faster than repairs can be accomplished. So at "crunch time", many maintenance procedures must take place outside, in an area adjacent to the heavy duty vehicle bay. Although desirable to many, the weather in University City does not always cooperate.

Is it possible to reallocate space within the existing facilities? MAI would vote "no". Without addressing the most critical issues - [1] ceiling height and [2] lack of heavy duty vehicle bays – any solution would fall well short of making positive contributions to efficiency and effectiveness.

Is it possible to raise the roof in the older facilities? MAI would vote "no". The cost would be extremely high, and the construction would involve major modifications to 45-year old facilities.

Is it possible to construct an addition to the existing facilities sufficient to accommodate 3 more heavy duty vehicle bays? MAI would vote "no". The cost would be extremely high because these new facilities would displace more than 10,000SF of vehicle staging. Other missions (i.e. Parks, Streets, and/or Solid Waste) would need to be removed from the site. More acreage would be required.

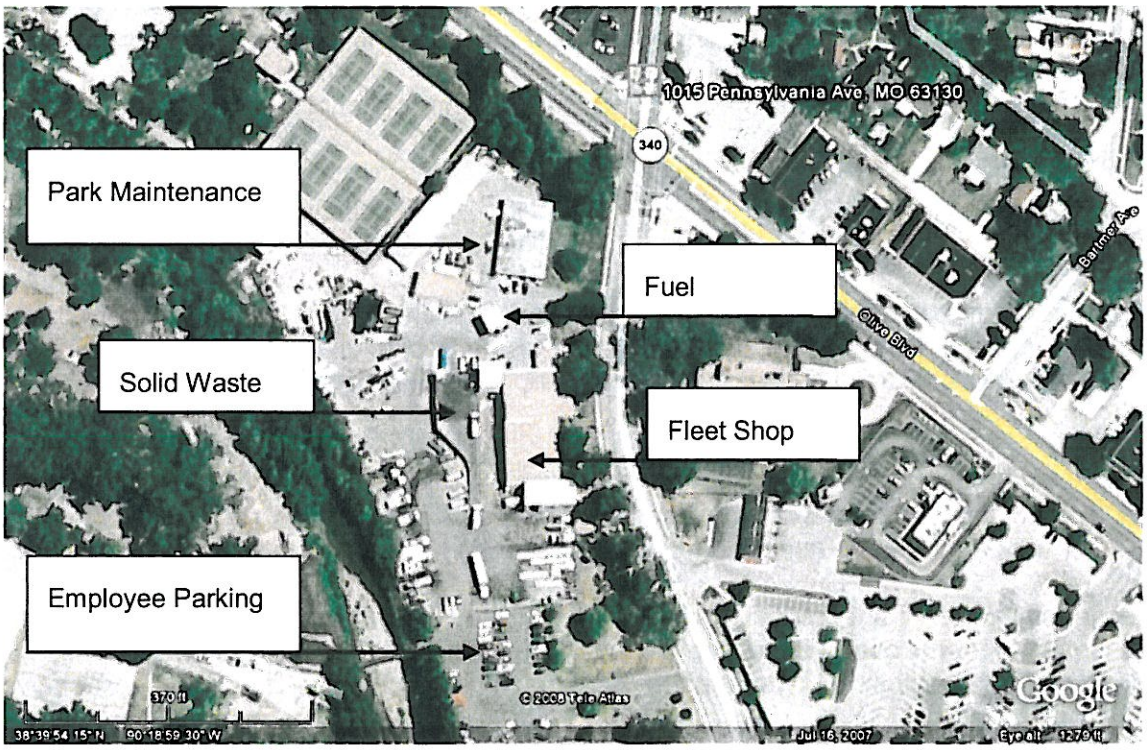
Recommendations

- *In general, MAI would like to see University City MO locate a new, larger site, and construct facilities for all the organizations: Fleet, Streets, Solid Waste, and Parks.*

- *Conduct a space needs assessment for each organization to determine the site requirements and develop the associated initial cost estimates. We have found that professional facilities programmers that are familiar with these types of operations can more accurately determine space requirements that general design firms that may have only designed a few municipal service facilities.*

- *Once the site requirements have been developed and approval to proceed is secured, the City will need to locate and procure an adequate site, develop a master plan for the new site, and ultimately design and construct the needed facilities.*

- *Consideration should be given to include an automated vehicle wash on the new site as well as a hardstand washout area.*



Conclusion

We commend the City for recognizing the challenges that the Fleet Maintenance Division is experiencing and welcoming the opportunity to make changes to the fleet program.

In order to transform the City's fleet program into a state of the art, best in class organization, change will be required. Expectations are now higher and the informal practices of previous years have to be replaced with formal policies and practices and accountability. Some changes will require complete reengineering of past practices (i.e., implementing and using a FMIS) while others will not be quite as intrusive (i.e., providing additional technical training for the mechanics).

In order to effect change it is important to recognize the reason for the change. For the Fleet Maintenance Division change is required to become a more cost effective and efficient organization. If staff is unwilling or unable to change, the alternative course of action is to privatize fleet maintenance and repair.

MAI is confident that if the Fleet Maintenance Division acts on the recommendations provided in this report and given adequate resources (e.g., adequately sized shop, FMIS, policies and procedures, etc.) that the in-house fleet operation can be successful in increasing service levels and lowering total fleet costs.

Important factors in preparing for organizational change include:

- Planning
- Communicating
- Achieving participation

The planning stage should include development of an implementation plan that establishes strategic goals and the tactical steps to achieve those goals. Target completion dates and responsibility assignments are key factors to staying on target and getting things done.

Effective communication is critical. Communication should be a two way street where all affected parties are encouraged to discuss the desired outcomes and the means to achieving them. It is never too early to begin the communication process.

Active participation will be paramount to the success of changing the Fleet Maintenance Division. Although the Fleet Manager will be the leader in the change movement, everyone (i.e., mechanics, the clerks, support departments, and the users) that is involved with the fleet program should be involved.

Common reasons for failure to change include:

- Poor communication
- Lack of support from top management
- Too many initiatives at one time

- Lack of focus
- Unclear rationale for change
- Lack of understanding of the urgency of change
- Inadequate employee involvement
- Complacency (resistance to change because of prior practices)

Recommendations

- *Develop Implementation Plan that documents and prioritizes changes in the Fleet Maintenance Division.*

- *Review the Fleet program in one year and then again in five years to identify improvement trends and areas that still need additional direction.*

Appendix

- Summary of Recommendations
- Recommended Performance Measures
- Replacement Cycle Table
- Tactical Replacement Guide for Light Duty Vehicles
- Sample Fleet Policies Table of Contents
- List of University City Staff Interviewed

Summary of Recommendations

The following table provides a summary of the major recommendations included throughout the report. Our rankings are based on our understanding of the current fleet management and maintenance and repair practices for the City and our assessment of which recommendations would yield net service and cost improvements on the whole to the City.

Opportunity for Improvement	Priority	Impact on Performance	Cost Savings Opportunity
Centralize all fleet management and maintenance activities within the Fleet Maintenance Division.			
Develop Service Level Agreements between Fleet Division and customer groups.			
Add Parts Clerk position to Fleet Maintenance Division.			
Reclassify one mechanic position to Lead Mechanic.			
Track direct labor hours for each mechanic.			
Compare mechanic task times to industry standards.			
Track key measures of performance such as comebacks, repair turnaround time, etc. using the FMIS.			
Establish tool replacement program for mechanics.			
Make PM program the most important element of the City's fleet program.			

Opportunity for Improvement	Priority	Impact on Performance	Cost Savings Opportunity
Formalize PM program through policies and procedures.			
Require all mechanics to obtain CDL with proper endorsements.			
Develop formal mechanic training program.			
Conduct physical inventory of parts, discard obsolete parts.			
Manage and report on inventory levels regularly using FMIS.			
Require parts to be dispensed by Parts Clerk.			
Continue to use commercial vendors for overflow and specialty work.			
Use commercial vendors for corrective repairs while in-house staff works to increase PM compliance.			
All sublet work should be managed by the Fleet Maintenance Division.			
Require accurate meter readings to be input into the fuel management system. Use system parameters to monitor input.			
Conduct formal fleet utilization study.			
Establish formal fleet utilization guidelines.			

Opportunity for Improvement	Priority	Impact on Performance	Cost Savings Opportunity
Document disposal practices in the fleet policies and procedures manual.			
Consider using on-line auctions for vehicle and equipment disposal.			
Develop formal replacement cycles (months in service and mileage/engine hours) for all vehicle and equipment classifications.			
Develop 20-year fleet replacement plan.			
Develop service based charge-back rates.			
Develop capital replacement rates.			
Separate Fleet operating and capital budgets.			
Work closely with vendor during system setup and implementation for the FMIS.			
Include mechanics in the configuration and implementation process for the FMIS.			
"Go live" with FMIS and all fleet staff fully trained on the use of the system.			
Develop comprehensive fleet policies and procedures.			
Top management must endorse the fleet policies and procedures manual.			

Opportunity for Improvement	Priority	Impact on Performance	Cost Savings Opportunity
Develop Strategic Fleet Business Plan.			
Develop Business Continuity Plan.			
Construct new fleet maintenance facilities that will support the operation.			
Conduct a space needs assessment.			
Develop facilities and site Master Plan.			
Consider adding automated vehicle wash system to the fleet facilities.			
Develop a Fleet Management Plan Implementation document to identify strategies and the tactics necessary to effect change.			
Review fleet program in 12 months and again in 5 years to document improvement trends and to identify areas where additional direction is required.			

Recommended Performance Measures

Focus	Measure	Target
Productivity	Average billable hours for mechanics	1,400 – 1,500 direct labor hours per year
Efficiency	Average repair service turnaround time	70% within 24 hours 80% within 48 hours
Efficiency	Rate of scheduled repairs	60-65% of all work
Efficiency	Parts fill rate	50% on demand 70% within 4 hours 90% within 24 hours
Effectiveness	PM compliance rate (completion of services before they are overdue)	95%
Quality	Rate of repeat repairs (comebacks)	Less than 2%
Customer Service	Customer satisfaction	90% rating of good or better service
Training	Annual training hours (M&R related) per technician	40 hours per year

Replacement Cycle Table

Major Vehicle and Equipment Classifications

Classification	MAI Recommended Replacement Cycles[13]	
	Months	Miles
Ambulance	60	125,000
Arrow Board	120	
Backhoe, Wheel, LD-MD	144	
Backhoe, Wheel, HD	180	
Brush Chipper	120	
Fire Truck, Aerial Ladder	180	150,000
Fire Truck, Pumper	120	125,000
Generator, Trailer Mounted	120	
Forklift	180	
Loader, Wheel, MD-HD	180	
Pickup, Compact	84	100,000
Pickup, ½-ton	96	110,000
Pickup, ¾-ton	96	120,000
Pickup, 1-ton	120	125,000
Sedan, Compact	60	80,000
Sedan, Intermediate	84	100,000
Sedan, Full	96	100,000
Sedan, Police Patrol	36	110,000
Sedan, Police Investigative	72	115,000
SUV, Compact	84	80,000
SUV, Full	96	100,000
Truck, HD, Aerial	120	100,000
Truck, HD, Dump	120	150,000
Truck, HD, Refuse, Automated	72	150,000
Truck, HD, Utility	144	150,000
Van, 7-9 Passenger	108	110,000

[13] The replacement cycles identified in this table are from our experience working with local government fleets across the country. Data to empirically calculate equivalent annual costing for the City was not readily available. Replacement is considered as an asset reaches either months in service or mileage/engine hours parameters.

Tactical Replacement Guide for Light Duty Vehicles

Factor	Points
Age	One point for each year that the unit has been in service.
Mileage	One point for each 10,000 miles of use.
Type of Service	1, 3, or 5 points assigned based on the type of service the vehicle receives. Assigned Vehicles = 1 point; Pool Vehicles = 3 points; Field Vehicles = 5 points.
Reliability	1, 3, or 5 points assigned depending upon the frequency that the vehicle is in the shop for repair. Vehicle in shop for repairs 0-2 times past 12 months = 1 point; 3-4 times = 3 points; 5 or more times = 5 points.
Maintenance & Repair Costs	1 to 5 points are assigned based on the total life M&R costs (not including repair of accident damage). 5 points is assigned to a vehicle with life M&R costs equal or greater to the vehicle's original purchase price. 1 point is given to a vehicle with life M&R costs equal to 20% or less of its original purchase cost. 2-4 points are assigned in a stair stepped approach.
Condition	This category takes into consideration body condition of the vehicle. Factors considered include rust, dents, paint, interior condition, etc. 5 points are assigned if significant body repair is needed. 1 point is assigned if the vehicle is generally free of body damage.

Point Ranges	Rating
0 - 18 points	Excellent
18 – 22 points	Good
23 – 27 points	Qualifies for Replacement
28 + points	Needs Immediate Replacement

Sample Fleet Policies Table of Contents

Section 1 -- General
- Introduction
- Using This Manual

Section 2 -- Administrative
- Fleet Organization
- Fleet Contacts List
- Vehicle Inspection, Licensing, And Registration
- Fleet Information Systems
- Vehicle Key Control
- Fuel Card/Key Control
- Fleet Department Performance Reports
- Record-keeping Requirements
- Public Complaints
- Internal Service Fund and Charge Back Procedures
- Garage and Facilities Maintenance and Security

Section 3 – New Vehicles and Equipment
- Lease Vs. Purchase Vs. Reimbursement Analysis
- Repair Vs. Replace Decisions
- Adding a Vehicle to the Fleet
- Demonstration Equipment
- Replacement Guidelines
- Developing Specifications
- Ordering Vehicles and Equipment
- Vehicle Delivery Status Reports
- Vehicle Receiving and Verification
- Preparation for Service
- New Vehicle Operator Training
- Alternative Fuel Vehicle Program

Section 4 – Vehicle Operation
- Fueling
- Use of Passenger Vehicles
- Vehicle and Equipment Utilization
- Driver and Operator Training
- Driver/Operator Responsibilities
- Operating Department Supervisor/Coordinator Responsibilities
- Equipment Misuse or Abuse
- Accident Claims/Risk Management
- Accident Procedures
- Temporary Vehicle Requirements
- Vehicle Loaner Pool
- Emergency/Inclement Weather Operations
- Emergency Procedures
- Driver Licenses And Driving Records

Section 5 -- Maintenance
- Preventive Maintenance
- Unplanned maintenance
- Field Breakdowns
- Warranty Repairs
- Contract repairs
- Vendor Performance Evaluation
- Body and Paint Work
- Repair/Rebuild/Remanufacture/Replace Analysis
- Vehicle Modifications
- Parts
- Labor Reporting Standards
- Emergency Road Service
- Management Training
- Mechanic Training
- Mechanic's Required Tools and Equipment
- Disposition of Unsafe Vehicles
- Documentation
- Occupational Safety and Health Program
- Quality Program

Section 6 – Equipment Disposal
- Authority for Disposal
- Preparing Vehicles and Equipment for Disposal
- Procedures for Disposal

Section 7 – Forms

List of University City Staff Interviewed[14]

University City Staff	Department/Division
Evelyn Shields-Benford	Public Works
Rich Pierce	Fleet Maintenance
Michael Martin	Fleet Maintenance
Don Willey	Fleet Maintenance
Dan Schroeder	Fleet Maintenance
Tom Heck	Fleet Maintenance
Larry Evans	Finance
Tina Charumilind	Finance
Gary Wilkinson	Street Division
Dennis Lucket	Sanitation Division
Steve Olshwanger	Fire
Don Miner	Fire
Charles Adams	Police
Carol Jackson	Police
Ewald Winker, Jr.	Parks
James Crowe	Parks
Bill Landrum	Community Development

[14] This list is representative of the people that we met with to specifically discuss the fleet maintenance operation. It is not necessarily a list of every City employee that we talked with during the study.