City of Lawrence

Fleet Assessment

2014

Prepared for

City of Lawrence

Public Works Department

Submitted by

Central Maintenance

Fleet Management

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Summary

The purpose of this report is to provide a general assessment on the state of the fleet, to improve understanding for decision-makers on general operations that will assist them in allocating resources.

Central Maintenance has conducted a study based on historical data compiled from the City's current fleet software. It is in the City's best interest to find benchmarking data and use it to determine the best use of its fleet and the capitol associated to its operation. The City has a diverse fleet make up and has challenges associated with operating, maintaining, and replacement. Based on data collected, these assessments are made on: Fleet Size, Fleet Age, Fleet Utilization, Fleet Condition, Alternative Fuels, Operational Costs, and Facility Issues.

Key observations regarding the current City of Lawrence fleet management program and process:

- The City is not keeping pace with planned vehicle replacement schedules, which optimize the timing of replacement with maintenance costs.
- The results of not replacing equipment on a targeted or optimized schedule are
    - Overall increases in average age of fleet
    - Overall increases in maintenance costs
    - Overall increases in downtime for units
    - Likelihood of "fleet creep" to provide back-ups for units that are out-of-service.
- The City of Lawrence does not provide pre-determined or predictable funding for fleet replacements. As such, the optimized replacement cycles are unrealistic due to lack of funding for replacements.
- Future operating costs may be positively impacted by enforcement of anti-idle policy, route planning, replacement of older vehicles with more fuel efficient units, and standardization of fleet to reduce diversity of parts and downtime.

The fleet plays a critical role in operations and meeting the needs of our citizens. The City of Lawrence has to rely on a fleet to conduct daily operations associated with providing the services that the public depend on for a high quality of life in our city. Vehicles such as fire apparatus and law enforcement vehicles supply the services in emergency situations that citizens rely on. Public works vehicles help provide safe streets and sanitation services for a clean city. Utility fleets support efforts to supply our fresh water and sanitary sewer functions. Parks vehicles help keep our city's parks neat and clean for our citizens can have a high quality of recreation. The City cannot provide any of these services without a safe operating fleet.

The City must regularly review its fleet to make sure it is sized appropriately for its operation, provides safe operation for its employees, and fits the needs of jobs it is utilized for.

Fleet Size

The City fleet is comprised of a variety of vehicles and equipment. These vehicles are comprised from vehicle classification as follows:

Class	Vehicle Weight Rating	Total number of units
1	Under 6000lbs	232
2	6001-10,000lbs	30
3	10,001-14,000lbs	42
4	14,001-16,000lbs	16
5	16,001-19,500lbs	16
6	19,501-26,000lbs	20
7	26,001-33,000lbs	19
8	33,000+	79
Non-highway	Off road equipment	181
Attachments	Mounted attachments	5
Trailers	Trailer only	60
Trailer Mounted Eq.	Equipment mounted on trailers	48
Boat	Rescue boat	1
	Total	749

Units by Department

Department	Number of Units
Public Transit	1
Planning	1
Codes Enforcement	5
Building Safety	5
Water Collections	5
Information Systems	2
Police Administration	30
Police Patrol	58
Animal Control	3
Police Traffic	5
Fire and Medical	80
Parking Control	3
Parking Garages	1
School Resource	4
Street Department	77

Engineering	11
Traffic Engineering	11
Airport	4
Property Maintenance	11
Levee Maintenance	8
Central Garage	13
Farmland (Venture Park)	3
Solid Waste	61
Solid Waste Reduction	21
Storm Water	30
Parks and Rec.	136
Recreation	1
Recreation East Lawrence	1
Recreation Classes	1
Recreation Special Population	1
Recreation Special Events	1
Recreation Nature Center	2
Recreation Aquatic Center	3
Golf Course	23
Health facilities	4
Housing	2
Water Utility Engineering	4
Clinton Production	3
Kaw Production	17
Wastewater Treatment	21
Sanitary Sewer	26
Laboratory Services	4
Distribution Systems	43

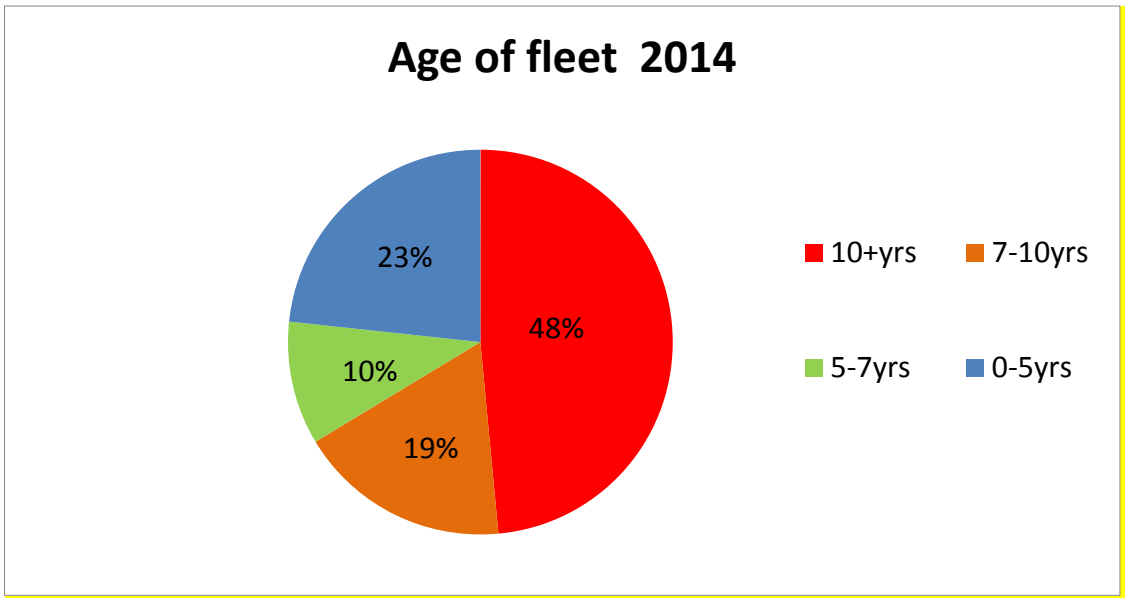
4.1

The City's fleet size is directly related to the diversity of services provided by the City. Although the City's growth can be correlated with the growth of the fleet, it does not mean that the fleet is right sized. This is a continual process that will include operations and the vehicle functions associated with it. The fleet has suffered from "Fleet Creep". Many vehicles have been taken out of service only to be reassigned to another department. This is not always the best practice. Many times these vehicles continue to be a high cost to the fleet and do not always justify the transition.

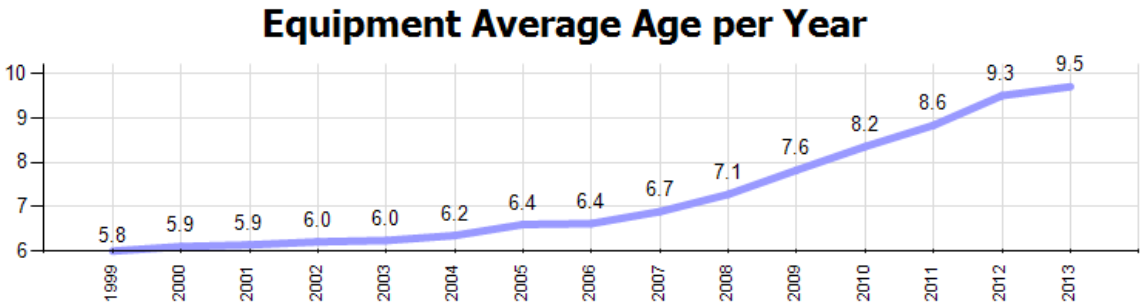
Age of the Fleet

The average age of the fleet is 10 years old. Of the 700 plus units that the city utilizes to perform operational functions, 48% are 10yrs or older. These numbers include, not only limited to passenger

vehicles but, specialty equipment that perform specific tasks and trailers to support other city operations.

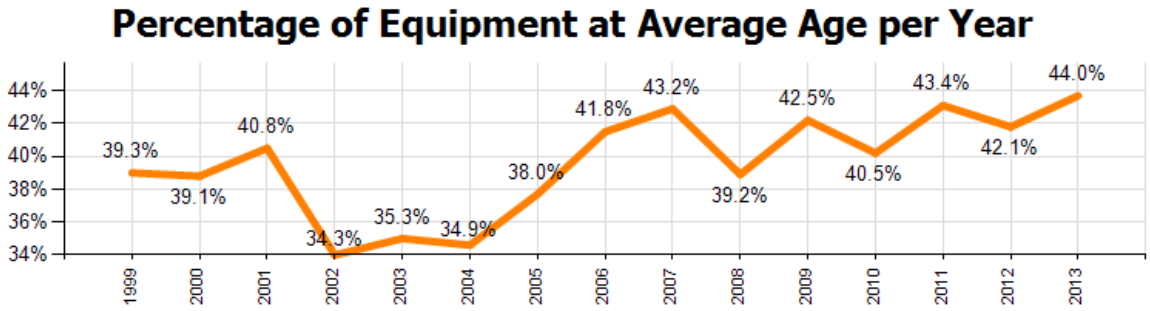


5.1

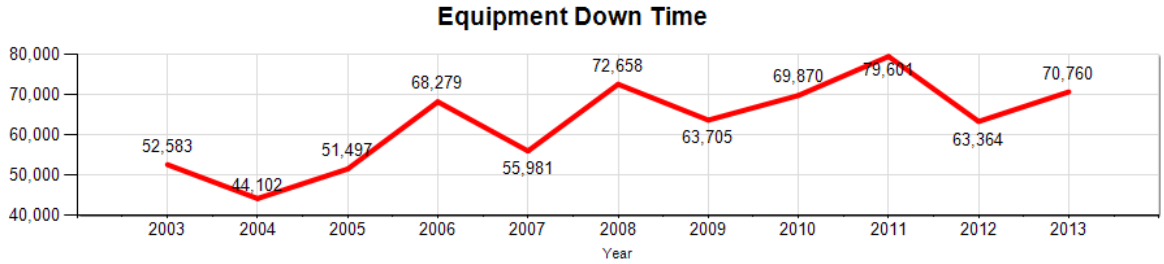


5.2

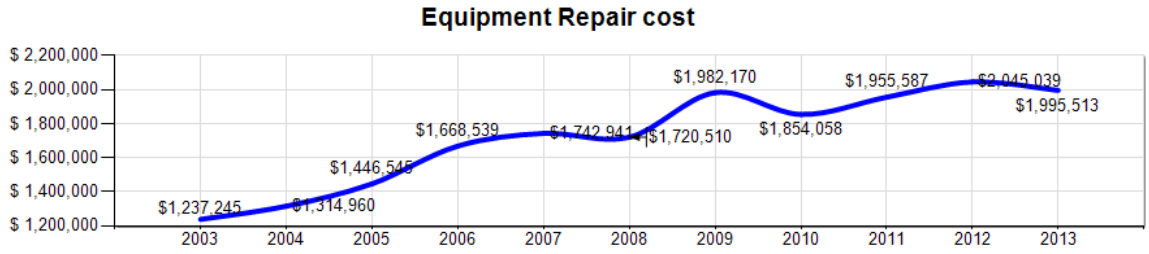
The average age of the fleet has had a steady incline from 1999 to 2013, as seen in chart 5.2. Unfortunately this will be compounded by the amount of the fleet that is at that average, as seen in chart 6.1. Not only is the average age increased but the number of vehicles at that age has also increased. This adds to overall maintenance and repair costs.



6.1



6.2



6.3

As expected with any operation, as the fleet ages, it's down time and repair costs will rise. The determining factor on equipment life cycle is usually the conditions of use and the duty cycle of its use. Charts 5.2 and 6.3 show, that as the average age is getting older, the repair cost rise in proportion with the age. Many factors also contribute to this: global economics, supply and demand, transportation of goods, etc.

Down time is usually affected as well. The fact that our industry is based on a rapid rotation of vehicles causes supply issues with older vehicles. Parts that are stocked by dealers and jobbers are usually the parts that are in high demand. The older the vehicle, the odds are that you will wait for parts longer because those parts are either obsolete or stored in a warehouse in different parts of the country. The question one would ask is if down time is considered a vital function of the operation. If down time is considered to be an important factor in operations then the age and the condition of the fleet has to be assessed on a regular basis. Regular maintenance intervals can only extend the life of a vehicle so long before repair costs overcome the residual value of the vehicle. This is known in the industry as **life cycle**

costs. Generally speaking, when the residual worth of a vehicle is lower than the operating repair costs the vehicle has exceeded its value to the organization.

Fleet Condition

As shown above, the fleets growing average age can contribute to its condition. The duty cycle of use and the environment of that use can play a major role on condition. Other conditions have a compounding effect on vehicles usage and conditions. As vehicles become older, the human nature of employees tends to lead to less care of the vehicle. When the new has worn off, employees tend to have the "it's not mine" or "it's worn out anyway" attitude that compound the equipment condition in a negative way. Management needs to be involved with their department's vehicles and develop positive attitudes with their fleets.

Several departments have vehicles that have exceeded the life cycle costs by 100% of the vehicles purchase price. This practice is often a result from either unrealistic replacement cycles or lack of funding for scheduled replacement cycles, or both. See chart 6.1 for examples.

Department	Unit	Purchas Price	Life to date R/M costs	Total R/M percentage
3515	489	$111,567.00	$229,191.00	205%
3515	456	$129,957.00	$163,992.00	126%
4010	511	$28,041.00	$32,852.00	117%
7610	2319	$21,212.00	$36,890.29	173%

7.1

Many departments have a significant percentage of that fleet that exceeds these life cycle costs.

Department	% of their fleet that exceed 100% of purchase price
3000 Streets	21%
3010 Engineering	36%
3020 Traffic Eng.	25%
3070 Levee Main.	22%
3515 Sanitation	11%
3530 waste reduction	23%
4010 Parks	14%
7310 Waste Water	23%
7610 Distributions	24%

7.2

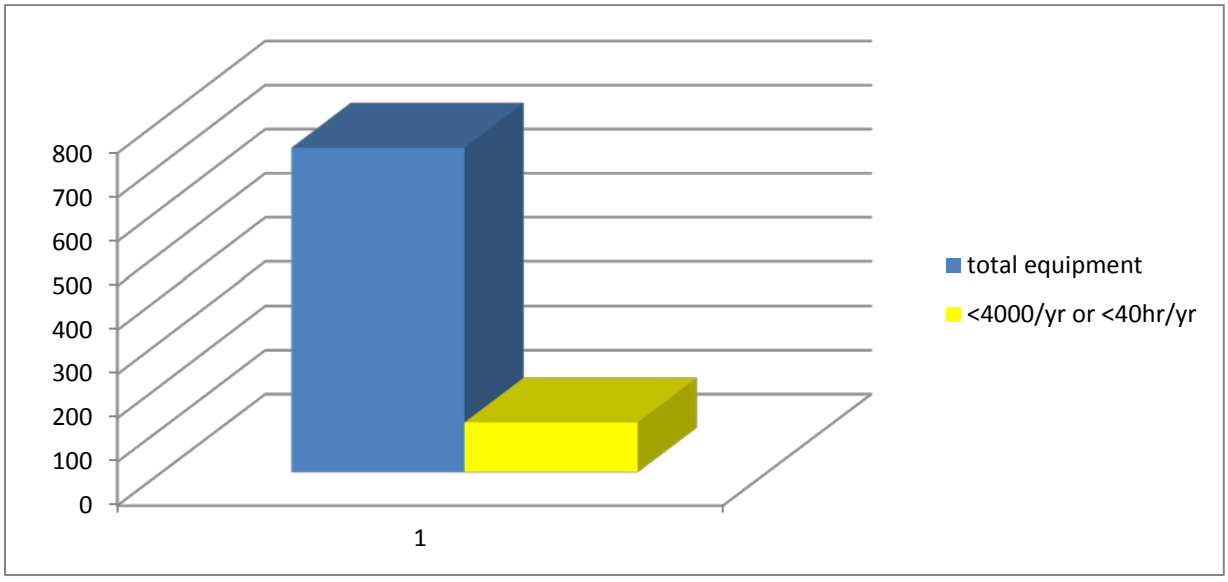
The fact that several of these departments have at or near 25% of their vehicles with extensive repair costs calls for a review of the replacement schedules and review its equipment needs. Questions to be answered would include is the vehicles in the department the right vehicle for the job? Is the vehicle sized appropriately? Does the conditions of use need to be evaluated?

City vehicles have unique situations of use. Their extreme conditions have differences from their public and private counterparts. Many of the time these vehicles could be subject to extensive idling, repeatedly stop and go environment, hazardous weather conditions, extremes of emergency vehicle usage, and repeated duty cycles of operational use.

Example: Take a sanitation truck for instance. Newer emission standards can lead to additional operational down time and/or repair costs. A sanitation truck usually has short duty cycles that cause increased soot levels to be generated. This results in more frequent regenerations cycles. Unfortunately, these trucks operate at levels where passive regeneration cannot be performed. This requires manual regeneration that increases down time because it is in a nonuse situation.

Utilization

Utilization can always be a problem with any government entity. A set factor such as miles and/or hours is usually implemented to justify if vehicles are utilized. Using a generic measurement of 4000 miles per year for vehicles and 40 hours per year for equipment and excluding public safety from the survey, close to 17% of the city's units are underutilized.



8.1

Here are examples of units that have low miles or hours of utilization associated to them.

Unit	Dept.	Year	Make	Model	Current Meter	Avg. miles/yr.	Miles last yr.
802	Lab services	1996	FORD	TAURUS	62,426 miles	3,468mi/yr.	4,356 miles
869	Codes	1998	CHEVROLET	LUMINA	37,190 miles	2,324mi/yr.	2,720 miles
594	Parks	1999	FORD	F-350	47,223 miles	3,148mi/yr.	2,962 miles
981	Traffic	1999	BOBCAT	773	242 hrs.	16 hrs./yr.	No meter info for 2013

9.1

Underutilization usually brings up conversations about motor pools and other shared resource measures. Unfortunately the city has a geographical hurtle to add to this conversation. Several of the underutilized vehicles are located sporadically around the city and do not have a central location. There may be some usefulness from further study on the vehicles located at city hall for possible shared resources and possible fleet reduction. CMG records indicate that 39 vehicles operate from the City Hall location. Issues that arise from share resources or motor pools are that someone usually has to manage this resource that makes sure vehicle gets serviced, washed, adequately fueled, and which department has precedence over another. This requires some department to have ownership of the vehicle to be responsible for the vehicles' care. This would require staffing or reassignment of duties that may negate the savings involved with it. CMG is currently looking into a possible software solution that would not require staff to manually operate it. Other possible solutions for intermittent travel would be an established mile reimbursement program or care allowance? This opens up issues with insurance issues, workers comp issues, personnel management issues, and maintenance record keeping related to personal vehicles and their operation. This practice is seen by some entities as a cost reduction, but can lead to higher costs when an accident happens.

Current Replacement Model

The current replacement system is based on an APWA model utilizing a points system. This model has been in place for several years and is under review to determine if it is a good benchmark for replacement.

Points Model

In general, this system is based on ten year life cycle or one hundred thousand miles of operation. There will be exceptions to this rule, refuse trucks and dump trucks are good examples, due to duty cycles.

Refuse trucks we have found save us significant amounts of money if traded after eight years of operation. When these trucks are kept longer than 8,000 hours of operation engine and transmission failures increase and packer body maintenance tends to double. Currently 32% of sanitation is at or above this mark.

Dump trucks on the other hand do not accumulate hours at the same rate as refuse trucks. The bodies can be sand blasted and painted to retard corrosion. Some of these trucks are kept in service fifteen years.

Points are given for the following:
Years of Service: 1 point for each year of chronological age based on in-service date.

Type of Service: 1, 3, or 5 points are assigned based on the type of service that vehicle receives. For instance, a public works vehicle may be given a 5 because it is in very frequent duty service In contrast; an administrative sedan that is part of the city pool may be given a 1.

Miles or Hours of operation: 1 point for each 10,000 miles or 300 hours of use.

Reliability: Points are assigned as 1, 3, or 5 depending on the frequency that a vehicle is in the shop for repair. A 5 would be assigned to a vehicle that is in the shop two or more times per month on average, while a 1 would be assigned to a vehicle in the shop an average of once every month or so.

M&R Costs: 1 to 5 points are assigned based on total life M & R costs (not including repair of accident damage). A 5 is assigned to a vehicle with life M & R costs equal to 80 % or greater than the vehicle's original purchase price, while a 1 is given to a vehicle with life M & R costs equal to 20% or less of its original purchase price.

Condition: This category takes into consideration body condition, rust, interior condition, accident history, anticipated repairs, etc. A scale of 1 to 5 points is used with 5 being poor condition.

Point Ranges

Under 19 points	Condition I	Excellent	Code = Exc.
20-25 points	Condition II	Good	Code = Good
26-29 points	Condition III	Qualifies for replacement	Code = QFR
30 points and above	Condition IV	Needs immediate consideration	Code = NIC

Currently any vehicle with a total of 28 points or higher qualifies for replacement base on its overall condition and operating costs. This is a similar model to use as a life cycle costs analysis. When vehicles start to reach 50% of their purchase price, the industry tends to lean toward the replacement of this unit. Several factors are included in vehicle replacement: original purchase price, depreciation, maintenance and fuel costs, etc.

One issue with the usage of miles as a factor in replacement is the fact that the City's operation does not provide the opportunity for miles to accumulate on vehicles. Realistically many of these judgments could be made by hours of operation. Many of the older city owned vehicles do not have hour meters present on them, so hours of operation can be difficult to determine. Most new vehicles are giving hours of key-on time as part as the vehicle reporting systems. Hours of use are a metering tool that would serve as a replacement guideline. Many of the city vehicles are in working environments that do not accumulate miles but are accumulating engine hours of operation. Idle conditions have lower peak

combustion temperatures that cause inefficient combustion. This will produce higher emissions, contribute to more acids to be produced by blow by gases, and add more stress on emission components.

Replacement schedules should utilize life cycle cost analysis, the importance to operations, utilization, and replacement funding. Strategic vehicle and equipment spec'ing between the department and central maintenance should help reduce undersized, oversized, or non-functional equipment replacement. This takes coordination between departments and good communication.

Other options in replacement scheduling to consider would be a residual value concept. Often government entities acquire vehicles to serve a purpose or value. The organization then proceeds to keep the vehicle and use its funds to keep the vehicle in service. These same funds could be used, with the vehicles residual value, to acquire a replacement vehicle. This requires shorter replacement schedules and closer monitoring of vehicles condition. Basically your funds go towards newer fuel efficient replacements vs. funding the repair of older units. This concept does have some drawbacks. If the vehicles are not kept in good condition, the residual value drops and the funding to cover the inflation of the replacement suffers.

However departments chose to replace vehicles and equipment, they must have a plan in place. Vehicle repairs costs, downtime, fuel usage, and overall performance all should be considered before replacing a vehicle. Accurate tracking of vehicle costs is crucial to decision making. A coordinated effort should be taken between the department and Central Maintenance to ensure good decisions are made with replacements.

VEHICLE REPLACEMENT MODEL GUIDELINES

MAKE	Ford	**Reference Number**	715
MODEL	F-250		
DEPARTMENT	3400		
YEAR PURCHASED	1999		
CLASSIFICATION	Truck		
e Remaining in Vehicle	$2,405	http://www.kbb.com/	*Kelley Blue Book (use trade-in value)*
General Infor			
rrent Number of Miles	109,599		
verage Annual Mileage	6,850	"Current Number of Miles" *divided by* "Age of Vehicle"	
Mileage After 12 Years	82,199	"Average Annual Mileage" *times* "Expected Life of Vehicle"	
ge of Vehicle (in years)	16		
rior/Exterior Condition	5	*Scale of 1-5, with 1 being excellent*	
Type of Use	4	*Scale based on type of service. Vehicles with the lightest use are rated 1, moderate use 3, and heavy use 5*	
Depreciation Information			
Original Purchase Price	$26,422		
ife of Vehicle (in years)	16		
al Depreciation (if any)	$1,651	*Straight-line depreciation*	
nt of Depreciation Left	$0		
Cost Information			
ntenance Cost-to-Date	$17,837	*Value is taken from fleet maintenance (less fuel & accident repair)*	
mber of Hours in Shop	1,167.00	*Value is taken from fleet maintenance records*	
ercent of Original Price	67.5%	"Maintenance Cost-to-Date" *divided by* "Original Purchase Price"	
Unused Mileage	-9,599	*Based on a* 100,000 *mile minimum*	
City of Lawrence Rating			
(see reverse for			
Age	16.00	*For every year of chronological age, .85 points are added*	
Miles/Hours	10.00	*For every 10,000 miles or 300 hours, .85 points are added*	
Type of Use	4.00	*Based on the* "Type of Use" *above*	
Reliability	1.00	*Based on the* "Number of Hours in Shop" *above*	
enance & Repair Costs	4.00	*Based on* "Maintenance Cost as a Percent of Original Price" *above*	
Condition	5.00	*Based on* "Interior/Exterior Condition" *above*	
Total	**40.00**		
Overall Rating	**Fair**	**Current CIP Replacement Schedule**	**2014**

12.1

Alternative Fuels

The city currently has four CNG vehicles in use conducting city operations. Three of the four are bi-fuel vehicles and one is a true dedicated CNG vehicle. These vehicles have used 4,093.6 gallon equivalents for a cost of $7,257.00. There have been issues with the CNG pilot program. The city's CNG pumps have had repeated failures and have contributed to significant down time for the one dedicated vehicle. As the city decides to move forward with any additional CNG projects it will require extensive planning to reduce operational down time and costs associated to that down time. In addition to down time, the city's forward movement to a CNG fleet will require facility issues when it comes to the repair and maintenance of these vehicles. Currently the Central Maintenance Facility is not in compliance to house these vehicles overnight. There are many additional costs associated with CNG that can lead to other in house issues such as tank recertification, high maintenance costs associated with pumps, training of technicians, operator training, facility compliance and vehicle resale issues. These costs will need evaluation as this project gains data established by the use of these vehicles over time.

The city currently has four hybrid Prius sedans and one hybrid electric boom truck. The city also has one fully electric car and one electric carryall truck that reduce the need for conventional fuels. These vehicles serve specific functions and have a limited operating range that can affect operations. The hybrid program has yielded positive numbers. Even with good numbers, the replacement cycles should be looked at to determine optimal replacement schedules. This would ensure costly battery replacements to be avoided. The hybrid cars are averaging 36.83 miles per gallon.

Hybrid Comparison

Unit 830 Toyota Prius Hybrid	Unit 851 Ford Taurus Sedan
Purchase price $20,995.00	Purchase price $15,091.00
Total repair costs $7635.99	Total repair costs $17540.00
Total Fuel cost $5398.78	Total Fuel cost $7135.13
Miles Driven 85,827	Miles Driven 71,727
Total cost $34,029.77	Total cost $39,766.13
Operating Cost per mile $0.40	Operating Cost per mile $0.55

13.1

It is the city's conscious decision to pursue alternative fueled vehicles when they are cost effective and fit the need of operations. Emissions reduction and reduced fuel usage should always be considered in the daily operation of city functions.

Operational Costs

Two of the highest costs to fleet operations are usually fuel and tires. The city operation consumed 197,708 gallons of unleaded and 470,340 gallons of diesel in the 2013 year. This totaled almost 1.7 million dollars in expense. The city's tire purchases were in excess of $205,000.00. An additional $693,000 was spent on repair parts to keep the fleet in operating status. Possible reductions in costs in the future of the city's fleet could include enforced idle restrictions, possible route planning, replacement of older less fuel efficient vehicles, expansion of alternative fuels, standardizing its fleet to reduce the diversity of the parts application and to reduce down time. Right sizing the fleet and possible shared asset utilization could also be a possible reduction in costs. The more diverse the fleets assets are the more costs are associated with them. Fluid specifications, tire sizes, specialty parts, specialized tooling and information services for vehicle applications are all additional costs consumed in the fleet operation.

As noted above the fleets age and size will affect operational costs in the future. Another added cost would be technology related. Higher emissions standards also have additional costs. New technologies in fleet vehicles will have higher repair costs associated with them. High tech computer networks found on newer vehicles can have high tech costs to repair. The costs associated with operating a fleet will usually always rise as we move into the future. It is in the city's best interest to try to control these expenses. This will require forward thinking and inputs from departments as our services evolve.

Facility Issues

Since constructed, the Central Maintenance Facility has experienced an expansion of the city's fleet. This has brought an expansion of size to the fleet to include vehicles physical size and number of the vehicles. As time has progressed the vehicles in the fleet have become a challenge to maintain and repair in a facility that was not constructed with these larger vehicles in mind. As emergency vehicles develop over time they become larger to carry the large amounts of emergency equipment need to provide service. Larger maintenance equipment has benefits of doing more work with less time associated with maintenance tasks. This size issue has become an efficiency and safety issue at the Central Maintenance Facility. Many of these vehicles are difficult to maneuver around once in the garage. These close quarters also pose a risk, not only to the confined repair space, but also to the technician if they need to get away from a vehicle quickly.

Fire apparatus in CMG for service

15.1

Aerial platform for repairs

15.2

This sanitation vehicle is in for a PM and has limited working space.

14.1

The lack of a true overhead hoist system makes heavy lifting repairs utilize make shift methods and increases the down time on repairs. The small bay space does not offer expansion for additional lifts that increase technician efficiencies. There is also an issue with bulk oil storage that hinders spill containment. The fact that there is not a true dedicated oil room causes additional methods be in place for the spill prevention plan. Although the parts carousel did make more efficient use of space, there is still limited space for adding parts into stock that would decrease downtime of the fleet. The carousel did free up enough space for a couple of offices to be move down stairs. This movement will free up a training room so that CMG can develop an in-house training program in the future. There is some concern with a separated tire facility. This poses a management challenge with a separate facility. It also can cause somewhat of a safety concern with only one staff member utilizing it. A possible addition of a reliable camera network could help reduce safety concerns with the separated facility. The main maintenance shop also lacks a strong reliable wireless network. The technician staff needs to be able to utilize online information resources at the vehicle. Currently staff has to share a computer station in the break room. This constant foot traffic causes decreased efficiencies in the shop. This lack of terminal access throughout the shop also causes redundancy with paper work related to shop ticket tracking. All of these factors equal reduced productivity and contribute to fleet down time. The Central Maintenance Garage also has compliance issues with the city's newly added CNG vehicles. These vehicles cannot be left over night or unattended because the facility is not protected for gas release. The current facility will require a substantial amount of capital to bring it into compliance. This will become an operational issue with the maintenance and repair of these vehicles.

Conclusion

Utilizing the replacement schedules developed previously to my arrival, it appears that the city's replacement funding has not kept pace with replacement requirements. The city does not utilize a funded amortization plan. Without replacement funding, departments will retain vehicles beyond their life cycle costs. This causes frontline vehicles to age and ultimately increase maintenance and repairs costs. These increased downtime costs have caused the city to hold on to vehicles that were targeted for disposal to cover downed equipment resulting in some fleet creep. This effect has increased the average age of the city's fleet. These aging vehicles typically do not get the fuel economy that newer vehicles benefit from. This can contribute to higher fuels costs over time.

Several departments should conduct a utilization study to see if their fleet is right sized. This may also include shared resources that could reduce fleet size. I have seen an idle policy in the city's records, but I have not seen enforcement by the departments.

The CMG facility is under sized for the fleet. This adds costs associated with down time. The diversity of the fleet adds to expensive training options. The size of the facility leads to low staff production due to limited space and limited resources.

The city should review regularly its fleet operations in the future. This is a continual process and could help to reducing costs associated with it. Does the size of the fleet meet the needs of the operation? Is the vehicle or equipment the right fit for the job? Can vehicles effectively be shared between departments to reduce underutilization? Are replacement schedules realistic? Departments should be accountable for their fleet and make sure it is utilized to justify the vehicles existence. These and more measures will help make sure that the city has a safe and productive fleet now and in the future.