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City of Kawartha Lakes
Fleet and Transit Services Review

PREPARED BY RICHMOND SUSTAINABILITY INITIATIVES – FLEET CHALLENGE, TORONTO, ON

FINAL REPORT

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Terms and Abbreviations

BEV – Battery electric vehicle
BMPR – Best management practices review
CAFE – Corporate average fuel economy
Capex – Capital expense
Capital Replacement Ratio - Capital (for vehicle replacements) as a percentage of NPV
CMV – Commercial motor vehicle
Concession – Discount on new vehicle(s), pre-arranged and negotiated with auto manufacturers
CO_2 or CO_2e – Carbon dioxide, carbon dioxide equivalent. A gas that contributes to the greenhouse effect by absorbing infrared radiation
CVOR – Commercial Vehicle Operating Registry
Downtime – Period when a vehicle is unavailable for use during prime business hours
ECM – The electronic control module that manages a vehicle's computerized engine function
EDL – Electronic data logger
ELD – Electronic logging device
EVKT – Estimated vehicle kilometres traveled
FAR™ – Fleet Analytics Review (FC Excel software tool)
FC – Fleet Challenge
FMC – Fleet management company
FMIS - Fleet management information system
FTE – Full time equivalent (employee)
GHG – Greenhouse gas (carbon dioxide, as expressed in CO_2 equivalent tonnes)
GHG Intensity – a measure of GHG's produced relative to VKT
GL – General ledger
GVW – Gross vehicle weight
GVWR - Gross vehicle weight rating
HD or HDV – Heavy-duty vehicle (a class 7-8 truck)
HEV – Hybrid electric vehicle
HOS – Hours of Service
KPI – Key Performance Indicator
LCA – Life Cycle Analysis
LD or LDV – Light-duty vehicle
LTCP – Long Term Capital Planning
Maintenance Ratio – Ratio of dollars spent on reactive repairs to preventive maintenance
MD or MDV – Medium-duty Vehicle
MT – Metric tonne

Terms and Abbreviations *(cont'd.)*

NPV – Net present value
OEM – Original equipment manufacturer
Opex – Operating expense
Outlier – Vehicle with operating statistics outside of averages for similar fleet units
PHEV – Plug-in hybrid electric vehicle
PMCVI – Periodic Mandatory Commercial Vehicle Inspection
Retention Cycle – The period that a vehicle remains in active service
RNG – Renewable natural gas
ROI – Return on investment
SLA – Service level agreement, an agreement used to define client expectations
SOP – Standard operating practice
TCO – Total cost of ownership
Uptime – The opposite of downtime
Vehicle availability – See "Uptime"
VKT – Vehicle kilometers traveled
WACC – Weighted average cost of capital
ZEV – Zero-emission vehicle

Foreword

The report has been prepared in a manner intended for readers of all levels of fleet management and business experience. It describes, in detail, many best management practices employed by North America's leading commercial fleets.

Experienced fleet managers and senior-level staff may feel that some of the comments and information presented in the report are obvious, fundamental, over-stated – even superfluous ("we already do that").

While the information contained herein may seem basic to more advanced managers, we believe it's a good practice for even the most seasoned fleet managers to occasionally review, re-visit and re-think old fleet management paradigms, beliefs, practices, and procedures in the interest of continuous improvement. We hope readers of this report find our insights informative, inspiring, valuable, and thought-provoking.

RICHMOND
Sustainability Initiatives

Executive Summary

The City of Kawartha Lakes[1] is home to more than 75,000 permanent and 30,000 seasonal residents. Nearly 1.4 million people visit the City each year seeking the cottage lifestyle made possible by its 250 lakes and rivers.

Typical of communities everywhere, the City of Kawartha Lakes (the City, CKL) operates a diverse fleet of cars, pickups, vans, SUVs, medium- and heavy-duty trucks, and equipment. The City's fleet contains the types of vehicles and work equipment essential to serve its residents, their homes, and businesses. On March 17 2020, the City issued its Request for Proposals (RFP) 2020-008-OP for a Review of Services: Fleet Management Program.

Richmond Sustainability Initiatives (RSI) of Toronto, Ontario, was selected to complete the review. Richmond Sustainability Initiatives is a not-for-profit Canadian consulting firm based in Toronto, Ontario. Fleet Challenge (FC or RSI-FC) is our fleet management consulting arm, with offices in Canada and the United States. This report provides the details of our review and analysis of the City's fleet program, and our recommendations.

Objectives

The City sought an independent third-party review of its fleet management program inclusive of expenses and best practices for lifecycle optimization, service/maintenance best practices, use of contracted versus internal resource cost benefit, fuel management, vehicle use, procurement practices, and alternative fuel equipment potential and deployment.

Scope

The review is to examine both general and emergency service fleet inventories, and is to develop recommendations regarding program savings, efficiencies, service enhancements, staffing levels, maintenance locations and structures, and greenhouse gas emission reductions.

Approach

In completing the type of fleet projects and services sought by the City of Kawartha Lakes, RSI-FC employed our highly developed and comprehensive approach which we have developed and refined over the past 15+ years of fleet management consulting.

[1] Source: https://www.kawarthalakes.ca/en/living-here/about-kawartha-lakes.aspx

Our standard fleet review processes begin with current-day baseline determination, including costs and service levels, to determine the fleet's current state and to clearly establish the starting point. We then complete a detailed review of historical operating data with analysis and comparisons to other municipal fleets and their key performance indicators.

Our processes include a comprehensive review of fleet management practices; we complete vehicle lifecycle analysis (to determine optimal economic lifecycles for all vehicle types), long-term capital budget planning, and then we data-model go-forward scenarios and develop well-informed recommendations and green fleet strategies.

RSI-FC knows that stakeholder engagement is critical to the success of any go-forward fleet plans or any changes under consideration. For this reason, it is our standard practice to ensure that user group managers and supervisors, vehicle drivers and the union are consulted.

The City of Kawartha Lakes Fleet

Some quick facts[2] about the City of Kawartha Lakes fleet:

- 492 units including vehicles and equipment
- Original purchase price: $61,735,888
- Current-day book (depreciated) value: $28,240,340
- Replacement value: $78,030,965
- Kilometers-travelled: 3,787,692
- Fuel used: 1,517,469 liters
- Repair and maintenance costs: $3,884,827
- CO_2 emissions: 3,855 metric tonnes CO_2e
- Average age of the fleet: 8.3 years

Recommendations

Since 2006, Richmond Sustainability Initiatives – and our Fleet Challenge team – have completed more than 150 municipal fleet reviews across Canada and the United States. We reviewed the City of Kawartha Lakes Public Works, Transit, Fire Rescue, Paramedic and Police fleets, each fleet with its own unique operating environments. We observed all are performing at a high level; but in every fleet, there are enhancements that can take operations to the next levels of success.

[2] Data was compiled during a one-year fleet review period

This report goes well beyond the typical parameters of a fleet review – it can be a blueprint for the future in that it includes not just our observations and recommendations but also highly detailed guidance around the adoption of contemporary and proven best-in-class fleet management practices.

The recommendations set out in this Fleet Review are designed to help Fleet Services reach for and attain:

- Balancing of Fleet's capital budgets over the next 15 years
- Optimization of vehicle and equipment assets – extracting maximum value from each unit
- Mitigation of fleet size increases
- Alignment of labour and garage service bay requirements to maintenance demand
- Reducing vehicle collisions and protecting CKL's safety rating
- Optimization of fleet maintenance and spare parts inventory
- Ensuring legal compliance
- A pathway to viable, cost-effective 'green fleet' low-carbon solutions including electric vehicles and best management practices

Detailed recommendations follow each section of this report and a summary of twenty-one (21) key recommendations is found in Section 11.

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Section One

Review of Fleet & Transit Services

Introduction, Background & Scope

Section 1: Introduction, Background and Scope

The City of Kawartha Lakes[3] is home to more than 75,000 permanent and 30,000 seasonal residents. Nearly 1.4 million people visit the City each year seeking the cottage lifestyle made possible by its 250 lakes and rivers.

Introduction

Typical of communities everywhere, the City of Kawartha Lakes (the City, CKL) operates a diverse fleet of cars, pickups, vans, SUVs, medium- and heavy-duty trucks, and equipment. The City's fleet contains the types of vehicles and work equipment essential to serve its residents, their homes, and businesses. On March 17 2020, the City issued its Request for Proposals (RFP) 2020-008-OP for a Review of Services: Fleet Management Program (the Review, the Fleet Review).

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This report provides the details of our review and analysis of the City's fleet program, and our recommendations.

Background

As stated in its RFP, the City sought an independent third-party review of its Fleet Management Program, inclusive of expenses and best practices for lifecycle optimization, service/maintenance best practices, fuel management, vehicle use and deployment.

The Review is to examine both general and emergency service fleet inventories, and is to develop recommendations regarding program savings, efficiencies, service enhancements, staffing levels, maintenance locations and structures, and greenhouse gas emission reductions.

The Review is to conduct a comprehensive examination of the program with the aim of optimizing and modernizing the program through input resource efficiencies and service configuration improvements. More specifically, the review is expected to include but not necessarily be limited to the following items:

[3] Source: https://www.kawarthalakes.ca/en/living-here/about-kawartha-lakes.aspx

a) Review of comparable municipalities' fleet management programs at an executive summary level in terms of costs and funding, models and levels of service, staffing, facilities, equipment and policies;

b) Review and optimization of the fleet management program of the Fleet and Transit Services Division, an internal service provider to other City divisions, as well as corresponding programs of the following departments that provide for their own fleet needs: Fire Service Department, Paramedic Service Department and Kawartha Lakes Police Service;

c) Review and optimization of approaches to asset management (e.g. replacement, upgrade, expansion, standardization, etc.) and maintenance (e.g. preventive and unscheduled maintenance, licensing and CVOR, insurance, etc.) with the aim of minimizing long-run lifecycle costs of fleet assets;

d) Review and optimization of approaches to parts inventory, fuel, lease-purchase mix, asset tracking and reporting (e.g. GPS) and asset utilization with the aim of improving inventory, fuel and maintenance management, optimizing asset performance monitoring, maximizing fuel economy and minimizing asset idleness and greenhouse gas emissions;

e) Review and optimization of the mix and deployment of contracted and in-house resources, administrative structures, staffing levels and processes and inter- divisional synergies, and;

f) Review and optimization of approaches to cost accounting, cost recovery (charge-out rates paid by other City divisions), funding (e.g. fleet reserves) and growth and upgrade of the fleet inventory with the aim of improving cost management and stabilizing funding and budget impacts.

Section Two

Review of Fleet & Transit Services

Approach and Methodology

Section 2: Approach and Methodology

Approach

RSI-FC's approach began with information gathering. Our team's objective during this stage of the review process was to gain a thorough understanding of the fleet's current operational realities, financials, business processes and practices.

We conducted virtual meetings[4], engaged in discussions, and designed customized online surveys that were distributed to fleet staff, internal stakeholders and vehicle drivers inviting their feedback. We also initiated the process of collecting fleet statistical data to be used by our team for detailed analysis.

Methodology

For our review of the CKL Fleet and Transit Services, we used several proprietary fleet review software tools we have developed to aid in completing our assignments. The following business tools were instrumental to successfully completing the deliverables for the City of Kawartha Lakes fleet review:

(1) Fleet Analytics Review™ (our proprietary data-modeling software tool)
(2) Best Management Practices Review™ (a software-based review process)
(3) Life Cycle Analysis (LCA) (software-based)
(4) Long-Term Capital Planning tool (a module within FAR software)

Research

Research to gain familiarity with CKL's fleet operations, surrounding issues, and objectives was the first essential step toward fleet strategies and recommendations for the City of Kawartha Lakes. This process included six preliminary and exploratory steps:

(1) Data Collection. CKL's fleet data, including a list of vehicles and equipment to be reviewed, makes/models/years of each unit, including kilometers-travelled, fuel used, repair and preventive maintenance costs, and additional data points as available, were loaded into our Fleet Analytics Review™ (FAR) software.

[4] During the coronavirus pandemic in-person meetings and site visits were not possible. For this reason, GoTo Meeting, a leading virtual meeting service, was used extensively.

(2) Baseline Analysis. In Fleet Analytics Review™ (FAR)[5] we produced a baseline that identified the current-day status of the fleet and many Key Performance Indicators (KPIs) and positioning of the CKL fleet statistics relative to municipal peers.

(3) Exception Management and Internal Benchmarking. The calculation of category average performance for every vehicle and equipment type in the CKL fleet facilitated the assessment of each unit's performance relative to the average statistics for similar vehicles in the fleet. As a result, exception units were clearly identified – those with better or worse performance relative to similar vehicles in the fleet.

(4) Peer Fleet Comparisons: After establishing the FAR baseline, we plotted CKL's key operational statistics (KPIs) alongside the same data points for comparable municipal fleets from our fleet database. The objective of this step was to direct our review into areas having potential gaps and identify possible sub-standard performance. These results highlighted where opportunities for improvement may be feasible and underscored areas for further investigation.

(5) Fleet Stakeholder Discussions and Surveys: Our consultants held virtual meetings and distributed online surveys to ensure engagement with fleet stakeholders and staff. During our BMPR review process (see next bullet point), and by obtaining user-group and Fleet staff feedback via www.ConstantContact.com online surveys, we familiarized ourselves with all practices and procedures relative to our assignment.

We reviewed shop work practices, PM worksheets, driver reports, driver's daily vehicle inspections, fuel dispensing, vendor invoices/work orders, transactional data and other documentation as necessary for the review.

(6) Best Management Practices Review: We completed a 'best management practices review' by means of our proprietary BMPR™ business tool[6]. The BMPR consisted of four separate meetings with the fleet management personnel from Kawartha Lakes Fleet and Transit Services as well as the City's sub-fleets which included Paramedics, Fire Rescue and Police to learn the fleet's operational practices and procedures.

[5] Fleet Analytics Review™ (FAR) is a proprietary software tool developed by RSI for complex fleet analysis and data-modeling (see appendices for full description).

[6] Best Management Practices Review™ (BMPR) is a proprietary business tool developed by RSI (see appendices for full description)

For maximum efficiency and in consideration of staff time off-the-job to attend our research meetings, we used our BMPR software-based template thereby ensuring an effective and productive sharing of information. The BMPR discussions included 15 topics and ~200 questions. For thoroughness, we assigned three of our senior consultants to these sessions to ensure all information was accurately captured.

Next Steps

After successfully completing the above six preparatory steps, our team gained a well-informed working knowledge of Kawartha Lakes Fleet and Transit Services and the City's sub-fleets which included Paramedics, Fire Rescue and Police. This foundation supported the ability to develop strategies and recommendations.

In the next section of this report we will address each of many fleet management focal points. We will describe our approach and methodology, our findings; we will identify potential gaps, opportunities and challenges. At the end of each section of our detailed review, we will provide recommendations for the City of Kawartha Lakes.

In Section 11, *'Summary of Key Recommendations'*, key recommendations are listed in table format for easier reference.

Section Three

Review of Fleet & Transit Services

Fleet Profile

Section 3: Fleet Baseline and Profile

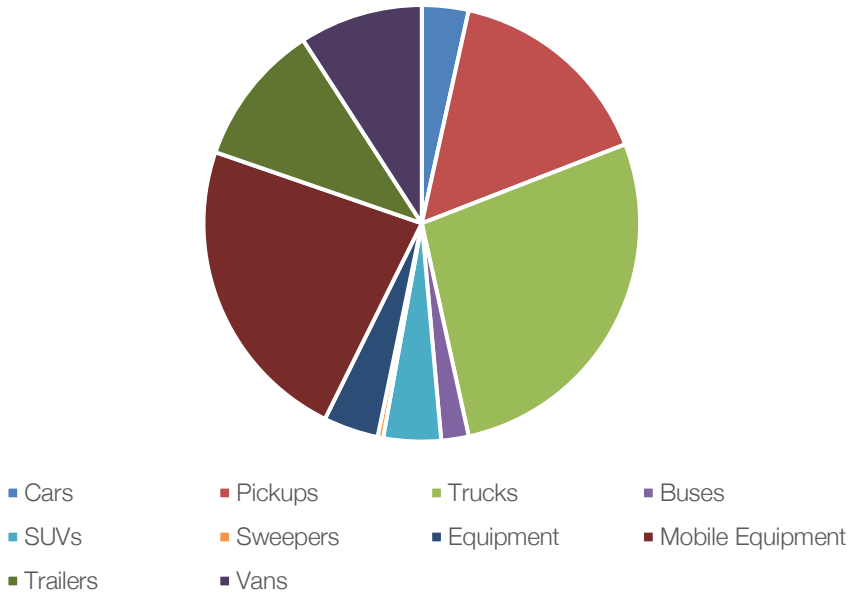
Background – Vehicle Categories and Counts

Municipal fleets everywhere include a diverse mix of vehicle categories and types, makes and models, and fulfil a wide range of services to their communities. Municipal fleets typically include many types of units, ranging from light-duty cars, pickups, SUVs, and vans to Class 8, heavy-duty tandem axle trucks as well as mobile work equipment.

To begin analysis and inform our recommendations around fleet vehicles and equipment and all other deliverables in this project, RSI-FC began by developing a baseline profile of the CKL fleet in our Fleet Analytics Review™ (FAR) data-modeling software. The analysis included the full City of Kawartha Lakes fleet including its sub-fleets: Transit, Paramedics, Fire and Police, as well as all work and mobile equipment. The total number of active units for our Review was 492.

In *Figure 1 - City of Kawartha Lakes Fleet - High Level Composition* (below), we see the high-level makeup of the City's fleet.

Figure 1 - City of Kawartha Lakes Fleet - High Level Composition



Within each of the ten high level categories shown in *Figure 1* are many sub-categories. For our analysis, we then identified and sorted all vehicle units using industry-standard vehicle categorization protocol.

The vehicle categorization is a numeric system; Classes 1 to 3 encapsulate light-duty vehicles such as cars, vans, SUVs, and pickups. Classes 4 to 8 are medium- to heavy-duty trucks, in that order.

Within Classes 1 to 3 are additional alphabetic identifiers (the letters 'a' to 'g') which indicate vehicle capacities, with 'a' being the lowest capacity and 'g' the highest.

Truck Classes 4 to 8 are divided by gross vehicle weight ratings (GVWRs). These groupings are shown in *Figure 2 - Standard Truck Classifications and GVWRs* (below).

Figure 2 - Standard Vehicle Classifications and GVWRs

Light Duty	Class 1	0–6000 lb. (0–2722 kg).
	Class 2	6001–10000 lb. (2722–4536 kg).
	Class 3	10001–14000 lb. (4536–6350 kg).
Medium Duty Trucks	Class 4	14001–16000 lb. (6351–7257 kg).
	Class 5	16001–19500 lb. (7258–8845 kg).
	Class 6	19501–26000 lb. (8846–11793 kg).
Heavy Duty Trucks	Class 7	26001–33000 lb. (11794–14969 kg).
	Class 8	33000 lb. and up (14969 kg).

This international classification method is used by all auto/truck makers, governments agencies, ministries of transportation and many fleets as a standardized way of identifying vehicle types.

For our research purposes, and by means of VIN (Vehicle Identification Number) decoding, we categorized all units in the CKL fleet in this manner in order to enable "apple-to-apples" benchmarking of cost, performance and service-levels for CKL and its peer municipal fleets.

In *Figure 3 - CKL Fleet High-Level Classes and Sub-Categories/Classes* (below), the diversity of the CKL fleet is evident, in that there are more 60 unique vehicle and equipment types.

It is important to know that each of the 60 sub-categories comes with its own set of costs (capital and operating), service level parameters (up/downtime and utilization), functionalities/purposes and operation, maintenance and safety procedures.

Figure 3 - CKL Fleet High-Level Classes and Sub-Categories/Classes

Bus	Car	Equipment	Mobile Equipment	Pickup	SUV	Sweeper	Trailer	Truck	Van
Class 4	Mid-size	Power Washer	ATV	Class 2E	Compact	Class 7	Asphalt	Class 3 Dump 1 Ton	Class 2E Full Size Cargo
Class 4 Limo style	Small	Steamer	Backhoe	Class 2E 4x4	Full size		Boat	Class 3 Rescue Fire	Class 2E Mini
		Tank, water	Chipper	Class 2F			Float, large	Class 4 Dump 1 Ton	Class 2F Full Size
			Compactor, landfill	Class 2G			Float, medium	Class 4 Mechanical Fire	Class 2F Full Size Cargo
			Double Roller	Class 2H			Small	Class 4 Rescue Fire	Class 2G Full Size
			Grader	Class 2H 4x4			Trailer	Class 5 Aerial	Class 2G Full Size Cargo
			Ice Resurfacer	Class 3				Class 5 Dump 1 Ton	Class 3 Cutaway
			Loader	Class 3 4x4				Class 5 Rescue Fire	Class 3 Full Size Cargo
			Mower					Class 7 Aerial	Class 4 Cube
			Sweeper					Class 7 Air/Light Fire	
			Tractor					Class 7 Rescue Fire	
			Tractor, large					Class 8 Aerial Fire	
			Tractor, medium					Class 8 Pumper Fire	
			Tractor, small					Class 8 Roll Off	
								Class 8 Single Axle Plow	
								Class 8 Tanker Fire	
								Class 8 Tandem Axle Plow	
								Class 8 Vac	

The 492 active units of the City of Kawartha Lakes fleet are grouped into, and operated by, four functional business units. These include Public Works and Transit, Fire Rescue Services, Paramedics, and Police Services.

Public Works and Transit

The Public Works and Transit sub-section of the full City of Kawartha Lakes fleet is large; it is diverse and specialized as typical for all municipal fleets, owing to the variety and range of municipal services which the vehicles support.

The Public Works and Transit fleet sections include 377 units shown in *Figure 4 - Public Works and Transit Fleet Units* (below).

Figure 4 - Public Works and Transit Fleet Units

Category or Type	Count
Aerial trucks	2
Backhoes	13
Chippers	6
Buses	10
Trailers (of all types, some with specialized mounted equipment)	40
Graders	13
Tractors and mowers, cutters	36
One-ton trucks with dump boxes	19
Steamers, culvert	9
Loaders	16
Cars, small	17
Pickup trucks and SUVS	68
Water tanks, dust control	11
Ice resurfacers	11
Single-axle plow trucks	11
Tandem-axle plow trucks	53
Vans, various configurations	25
Sweepers	3
Tractors, sidewalk	10
Truck, Class 8, vacuum and Wachs unit	2
ATVs	2
Total:	**377**

Fire Rescue Services

The Fire Rescue Services (Fire) section of the City's fleet includes 76 units. The Fire fleet is diverse and highly specialized in that it includes critically important units ranging from fire and rescue equipment, boats, trailers, all-terrain vehicles (ATVs), pickup trucks, SUVs, a van, and medium- to heavy-duty trucks from Class 3 up to 8, configured as rescue, pumper and tanker units.

Operating statistics for Fire vehicles differ greatly from data for Public Works, Police and EMS (Paramedics) vehicles because their capital acquisition cost is higher while their annual kilometers-travelled are lower, due to the highly specialized nature of their work.

To make our analysis and comparisons more relevant, CKL's Fire Rescue Services were treated separately.

The types and numbers of Fire Rescue Services vehicles are shown in *Figure 5 - Fire Rescue Services Units (below).*

Figure 5 - Fire Rescue Services Units

Type	Category	Application	Count
Mobile equipment	ATV		3
Trailer	Boat		4
Pickup	Class 2E		4
Pickup	Class 2F		4
Van	Class 2G	Full Size Cargo	1
Truck	Class 3	Rescue Fire	1
Truck	Class 4	Mechanical Fire	1
Truck	Class 4	Rescue Fire	1
Truck	Class 5	Rescue Fire	1
Truck	Class 7	Air/Light Fire	1
Truck	Class 7	Rescue Fire	1
Truck	Class 8	Aerial Fire	1
Truck	Class 8	Pumper Fire	20
Truck	Class 8	Tanker Fire	22
SUV	Compact		4
Trailer	Trailer		7
Total:			**76**

Paramedics

The Paramedics (EMS) section of the City's fleet includes 22 units, including 14 EMS ambulances. Paramedics units are shown in *Figure 6 - Paramedics Fleet Units* (below).

Figure 6 - Paramedics Fleet Units

Type	Category	Application	Count
Van	Class 2G Full Size Cargo	Logistics Vehicle (raised)	1
Pickup	Class 2H	Emergency Support Unit	1
Van	Class 3 Cutaway	Ambulance	14
Van	Class 3 Cutaway	Community Paramedic	1
SUV	Compact	Administrative Vehicle	1
SUV	Full size	Emergency Response Unit	3
SUV	Full size	Administrative Vehicle	1
Total:			**22**

Police Services

The Police Services section includes 17 specialized units which comprise another sub-set of the City's entire fleet. Police units are shown in *Figure 7 – Police Services Fleet Units* (below).

Figure 7 – Police Services Fleet Units

Type	Category	Application	Count
Pickup	Class 2E	Cruiser	1
Pickup	Class 2E	Drug Unit	1
Van	Class 2E Mini	CIB	1
Van	Class 2F Full Size	Court Security	1
Van	Class 2G Full Size	IDENT VAN	1
SUV	Compact	CIB	1
SUV	Compact	Admin Vehicle	1
SUV	Full size	Community Services	1
SUV	Full size	CIB (CECC)	1
SUV	Full size	CIB	1
SUV	Full size	Cruiser	5
Car	Mid-size	CIB	1
Car	Mid-size	Admin Vehicle	1
Total:			**17**

Section Four

Review of Fleet & Transit Services

Fleet Baseline Analysis

Section 4: Baseline Analysis

For our analysis, CKL Public Works and Transit fleet management provided records around the utilization, fuel consumed, and operating costs of all fleet vehicles, as did the other functional units including the Police, Fire Rescue and Paramedics sections. With this RSI-FC prepared baseline analysis of all fleet units.

VKT and EKVT

Annual vehicle kilometres-travelled (VKT) is a standard measurement of fleet performance employed by most fleets. Municipal fleets, whether urban or rural-operated do not typically travel high levels of annual kms due to the limited size of their service areas. For this reason, some fleet managers opt to track engine hours ("run-time") as this measurement enables more precise scheduling of preventive maintenance (PM) intervals and relevant cost comparisons.

CKL Public Works and Transit section monitors VKT for most of its fleet, but for Class 8 trucks – specifically snow plow and mobile equipment units – engine hours, being the fleet's preference for the reasons we have described, have been tracked for the past several years.

RSI-FC agrees that tracking engine hours for PM scheduling is more precise (versus VKT) and this practice can translate to improved cost-effectiveness. However, the majority of municipalities do not employ this method, which makes benchmarking challenging – engine-hour data is non-existent for other municipal fleets in our database. As a workaround, RSI-FC extrapolated CKL's engine hours by converting engine hours-operated to 'equivalent vehicle kms-travelled' (EVKT). We applied a business assumption that each one (1) engine hour equals forty (40) kms-travelled.

Baseline Performance Metrics for CKL

With CKL's fleet vehicles loaded into our FAR database, we prepared average cost and performance data for each category and sub-category of the CKL fleet during the one-year baseline period. The average cost and performance statistics for all City of Kawartha Lake's active-service vehicles and equipment are shown at a macro level in *Figure 8 – Fleet and Equipment Average Performance Metrics by High-Level Categories/Classes (Includes Fire)* (below).

Average performance data for sub-types/categories (micro level) of fleet units are shown in a series of charts in *Appendix "A" – Baseline Year Fleet and Equipment Average Performance Metrics by Sub-Types/Categories.*

Figure 8 – Baseline Year Fleet and Equipment Average Performance Metrics by High-Level Categories/Classes (Includes Fire)

Category	KMs or Hrs. Travelled	Qty. of Fuel Used (litres)	Downtime (Days)	Repair Cost	GHGs (tonnes, CO2e)	GHG Intensity (CO2/km)	L/100 km	Downtime Cost	PM as % of Parts & Labour	Fuel Cost	Cost of Capital	Total Controllable Cost	Cost per KM	Availability (%)	Unit Age (Years)
Total Fleet	7,699	3,993	19.2	$8,427	7.8	13.7	524.4	$3,491	n/a	$3,059	$2,267	$16,713	$2.17	92.6	8.3
Bus	31,515	13,754	42.2	$17,365	32.7	1.1	44.3	$16,885	n/a	$13,630	$3,823	$51,703	$1.64	83.8	4.1
Car	11,557	1,163	4.2	$1,834	2.6	0.3	10.5	$420	n/a	$1,085	$366	$3,597	$ 0.31	98.4	6.3
Equipment	100	67	2.4	$1,119	0.1	1.1	63.3	$245	n/a	$34	$263	$1,549	$15.49	99.1	9.5
Mobile Equipment	307	2,860	26.1	$11,890	5.2	21.3	808.7	$2,609	n/a	$1,961	$1,914	$17,216	$56.03	90.0	9.6
Pickup	18,522	3,642	9.2	$ 3,804	8.6	0.5	19.6	$925	n/a	$3,562	$578	$8,869	$0.48	96.4	6.6
SUV	20,771	2,679	7.4	$3,061	4.9	0.3	10.6	$744	n/a	$2,023	$864	$6,693	$0.32	97.1	4.5
Sweeper	147	1,768	21.5	$8,825	4.6	29.8	1,132.6	$4,291	n/a	$1,755	$7,145	$22,016	-	91.7	5.1
Trailer	0	209	1.4	$771	0.0	7.6	290.0	$281	n/a	$16	$266	$1,142	-	99.5	12.7
Truck	3,647	5,860	31.7	$13,335	14.9	26.4	1,003.8	$6,339	n/a	$5,646	$5,070	$30,094	$8.25	87.8	8.6
Van	19,652	1,617	15.3	$6,447	2.4	0.7	30.4	$6,130	n/a	$997	$1,652	$15,082	$0.77	94.1	5.3

Public Works and Transit

With CKL's fleet baseline performance metrics established, RSI-FC compared the fleet's operating statistics to Ontario peer municipal fleets. We began by compiling data for a number of past fleet reviews completed for Ontario municipalities.

Making Benchmark Comparisons

Municipal fleets can have wide variances in their operating statistics, which makes benchmarking challenging. Some are urban-based, operating in smaller operating areas while others function in large rural areas. Those in rural areas, serving larger geographical footprints, accumulate higher numbers of VKT each year and operating costs reflect that reality.

Some municipal fleets include EMS, refuse/recycling and fire trucks, and mobile equipment (fleet groupings with operating costs that are typically higher), while others do not. To ensure a "level playing field" and make our comparisons "apples to apples", we began by selecting fleets from our database which were as closely aligned with CKL's operations as possible, in terms of geography and fleet vehicle mix.

In every fleet, units with the highest operating cost are Class 4 to 8 trucks. Therefore, total operating expenses for fleets with a higher percentage of medium- and heavy-duty (MHD) trucks are higher than those with fewer MHD trucks. From baseline analysis, we determined that sixteen percent (16%) of CKL's fleet is made up of MHD trucks. For the fleets we selected from our database for comparison, we calculated the percentage of MHD trucks in each, seeking other fleets with vehicle mixes as similar to CKL's as possible.

Peer Fleet Match Factor

In addition to MHD trucks, other types of vehicles and equipment, such as mobile equipment, EMS, Police, Transit, Refuse Collection, Parks and Fire units characteristically have higher operating costs. Not all municipal fleets include these categories of units. Therefore, we further normalized the comparison data for each of the peer municipal fleets by applying a "fleet mix rating". To do this, we first tallied the percentage of MHD trucks in each of the peer fleets. To this tally, we added a points-value rating (one point for each of Public Works, mobile equipment, EMS, Police, Transit, Refuse Collection, Parks and Fire units managed by the fleets) to establish a "peer fleet match factor".

Fleet-Wide Comparative Analysis

The results of the analysis are shown in *Figure 9 – Municipal Peer Fleet Cost Cost Comparison* (below). One fleet (highlighted) of the 12 had a peer fleet match factor of 22 – identical to CKL – based on the approach we described earlier in this section of our report.

While comparing municipal fleets is admittedly an imperfect process for the reasons we have described, we have made every effort to do so logically. The closest peer match was an urban fleet, which serviced an area of just 148 KM^2. For this reason, this urban fleet's vehicles travelled, on average, just less than one-half the kms-travelled by CKL (~5k for the urban fleet versus >10k for CKL). CKL's fleet serviced a geographical area more than 20 times larger.

Key Performance Indicators

A number of key performance indicators (KPIs) were prepared for the CKL fleet with data from the one-year baseline period. The most relevant KPIs are circled in *Figure 9;* RSI-FC interprets the KPI data in a positive way. *Figure 9* is a macro-level view of the entire City fleet that includes Public Works, Transit, mobile equipment, Paramedics, Police, and Fire units.

Not surprisingly, due to the higher (double) annual kms-travelled by the CKL fleet during the one-year baseline period, total operating costs were almost exactly double. Despite this, when measured on a cost-per-kilometre basis, which is a more pertinent measure, operating costs were almost identical for the two peer fleets. Average operating costs were $1.75 per km for the peer (urban) fleet; for CKL, average cost/km was $1.71 during the baseline fleet review period.

The results from this study suggests to us that, despite CKL's fleet being, on average, one-year older – and although servicing an area 20 times larger – CKL's fleet management has been successful in maintaining total controllable operating costs in alignment with the less-demanding conditions of the urban peer fleet.

Of further note is that CKL's fleet average fuel consumption was ~ 3% better (lower) than the peer (36.9 l/100km versus the peer fleet's 38.3). Fleet average fuel consumption is an all-encompassing measure that is reflective of vehicle type (make/model) selection choices, vehicle ages (older units burn more fuel), maintenance, terrain, climate, driver behaviors and many other factors. Three percent is a relatively significant improvement when measuring fleet average fuel consumption, and translates to fuel cost reductions in the tens-of-thousands of dollars annually.

EMS (Paramedics) Fleet Comparison

In *Figure 10 - EMS (Paramedics) Fleet Comparison* (below) we show comparisons between three other Ontario EMS (Paramedic) fleets from RSI-FC's database. Two of the three peer fleets for our comparison are county/rural operations and one is urban. RSI-FC reviewed the areas served by CKL Paramedics and confirmed that Haliburton manages their own service/fleet/equipment. There are times that CKL Paramedics Service may have to cross borders to respond to calls, but only when Haliburton call volumes exceed available resources. Kawartha Lakes Paramedic Service has just entered into a shared service agreement with Peterborough County, but as it stands not sharing vehicles at this time.

In *Figure 10*, we have circled three KPIs which we determined to be the most indicative of overall performance for the Paramedics section of the City's fleet.

Of the four peer EMS fleets, and owing to the much larger geographical area served by CKL's Paramedics fleet, average utilization for CKL Paramedics section is the highest of the fleets in our comparison – double that of the urban-based fleet.

We note that CKL's fleet average operating costs-per-km are the lowest of the peer EMS/Paramedics fleets[7].

Police Fleet Comparison

In *Figure 11 - Police Fleet Comparison* (below) we show comparisons between two other Police fleets from RSI-FC's database. One of the two peer fleets are county/rural operations and one is urban.

For the Police Services section of the CKL fleet, the KPIs which we felt were most indicative of the fleet's overall performance are circled in *Figure 11*.

CKL Police Services provides policing for Lindsay and Ops Township. We estimate[8] its service area to be 256.41 km^2.

Of the three peer Police fleets, the CKL Police fleet's average annual cost of repairs are the lowest. We further note that CKL's Police Services fleet average operating costs-per-km are at the mid-point between the Ontario peer fleets[9] in this study.

[7] Data was unavailable for the urban EMS fleet
[8] Source: https://www.canadiangenealogy.net/ontario/victoriacounty/township_ops.htm
[9] Data was unavailable for the urban EMS fleet

Figure 9 - Municipal Peer Fleet Cost Comparison

Municipality	PW Mobile Equip.	EMS	Police	Transit	Refuse	Parks	Fire	Fleet Mix Tally	Fleet Mix - M and HD Trucks (%)	Peer Fleet Match Factor	Urban or CR	Total Fleet Size	Population	Municipal Area (KM2)	Average Utilization (kms)	Population Ratio (population: vehicle)	Area Ratio (units:km²)	Fleet Average Age (years)	Average Availability (%)	Average Downtime (days)	Average Fuel Consumption	GHG Intensity (CO2/km)	Average Repair Cost (fleet wide) (may include PM if data not provided)	Total Fleet Controllable Cost for Period (R&M, Fuel, Capital & Downtime)	Average Controllable Costs per Unit	Maintenance Ratio (preventive: reactive) (%)	Average operating costs (¢/km)
Halton Region	1	1	1	1		1		5	6.7	12	CR	170	439,526	967	13,609	2,585	5.7	80.1	4.8			24.8	0.63	$5,079	$1,169,597	$6,880	$0.73
Niagara Region	1	1				1		3	10	13	CR	173	427,421	1,896	22,039	2,471	11.0	6.1	97.5	6.5	17.3	0.52	$8,172	$1,881,760	$10,877	6	$1.29
Simcoe County	1	1	1			1		4	11	15	CR	110	422,204	4,841	33,948	3,838	44.0	5.6	98.9	4	22	0.65	$5,270	$1,661,511	$15,105	64	$0.47
Town of Aurora	1	1				1		3	13	16	CR	120	55,545	50	8,421	463	0.4	6	99.4	1.6	40.9	1.00	$1,507	$462,711	$3,856	41	$0.46
City of Hamilton	1	1			1	1		4	12	16	U	1307	579,200	1,138	8,455	443	0.9	7.5	94.6	14.1	36.1	0.90	$6,865	$19,911,820	$15,235	31	$1.80
Grey County	1	1						2	14	16	CR	56	83,378	4,426	31,962	1,489	79.0	5.8	94.5	8.5	30.4	1.12	$10,443	$1,531,495	$27,348	29	$0.86
Halton Hills	1	1						2	15	17	CR	45	55,289	276	15,497	1,229	6.1	5.2	98.2	5.2	48.8	1.14	$4,656	$693,840	$15,419	47	$0.99
Lanark County	1	1						2	19	21	CR	23	63,785	2,979	46,860	2,773	129.5	5.2	91.5	13.7	16.7	0.44	$8,930	$503,032	$21,871	63	$0.54
Town of Whitby	**1**	**1**			**1**	**1**	**1**	**5**	**17**	**22**	**U**	**308**	**135,000**	**146**	**5,005**	**438**	**0.5**	**7.3**	**96.3**	**9.6**	**38.3**	**1.00**	**$3,937**	**$2,703,196**	**$8,777**		**$1.75**
City of Kawartha Lakes	**1**	**1**	**1**	**1**		**1**	**1**	**6**	**16**	**22**	**CR**	**492**	**75,000**	**3,059**	**10,068**	**152**	**6.2**	**8.3**	**92.6**	**19.2**	**36.9**	**0.50**	**$8,426**	**$8,453,827**	**$17,183**		**$1.71**
Durham Region	1	1	1	1	1	1		6	18	24	CR	1247	645,862	2,523	25,560	518	2.0	5.5	93.8	16	30.2	0.80	$6,087	$27,721,089	$22,230	10	$0.87
Frontenac	1	1	1				1	4	20	24	CR	19	143,865	3,673	33,815	7,572	193.3	2.7	95.4	16	21.7	0.55	$10,681	$495,726	$26,091	32	$0.65

Peer fleet match factor = 22

CKL service area is 20 x larger than peer urban fleet and utilization double

CKL fleet is one-year older than peer

CKL fuel consumption 3% lower

Closely aligned average operating expenses

Figure 10 - EMS (Paramedics) Fleet Cost Comparison

EMS Fleet	Urban or CR	Fleet Size	Population	Area (KM2)	Population ratio (pop.: vehicle)	Area Ratio (km^2:unit)	Fleet Avg. Age (years)	Avg. Utilization (kms)	Avg, Availability (%)	Avg. Downtime (days)	GHG Intensity (CO_2/km)	Avg. Annual cost of repairs	Maintenance Ratio (PM: reactive)	Average operating costs (¢/km)
CKL	CR	14	75,000	3,059.0	3,409	218.5	2.8	38,836	88	31.3	n/a	$12,870	n/a	$0.75
Halton Region EMS	CR	40	439,526	967.2	10,988	24.2	4.1	34,445	n/a	n/a	0.58	$20,196	17.6	$0.86
Durham Region	CR	88	645,862	2,523.0	7,339	28.7	2.6	35,035	87.6	32.2	0.8	$10,552	n/a	$1.19
Thunder Bay EMS	U	27	109,140	328.0	4,042	12.1	4.6	19,857	99	3.6	0.88	$940	27	n/a

Figure 11 - Police Fleet Cost Comparison

Police Fleet	Urban or CR	Total Fleet Size	Population	Area (km^2)	Population ratio (pop.: vehicle)	Area Ratio (km^2:unit)	Avg. Age (yrs.)	Avg. Utilization (kms)	Avg. Availability (%)	GHG Intensity (CO_2/km)	Avg. Cost of Repairs	Maintenance Ratio (PM: reactive)	Total of Fleet Due for Replacement (%)	Average Op. Cost (¢/km)
CKL	CR	16	75,000	256.4	4,411	191	3.4	19,834	n/a	0.35	$2,091	n/a	19	$0.59
Halton Region Police	CR	338	439,526	967.2	1,300	3	2.9	20,037	n/a	0.42	$3,945	14	24	$0.77
Thunder Bay Police	U	64	109,140	328.0	1,705	5	4.1	28,439	99.5	0.54	$3,148	43	28	$ 0.39

Fleet Vehicle Mix

Determining the right mix of vehicle types in a fleet as well as maintaining the right numbers and the right sizes/capacities of units are three challenges faced daily by fleet managers everywhere. It is a universal issue – line user-group managers want to ensure they have enough vehicles for their staff to complete their work with some spare vehicles for peak periods and "just in case". Some user-group managers may press fleet management for larger-than-necessary vehicles; others may insist on vehicle attributes or options of questionable practicality. Fleet managers must employ a combination of sage reasoning, statistical data, and diplomacy to successfully manage these requests and in doing so, prevent runaway, unrestrained fleet size – and operating cost increases.

RSI-FC does not profess to have a full working knowledge of the operations of City's Public Works, Transit, EMS, Police, Fire, nor any sub-sets of the overall fleet. As so, it would be foolish for us to attempt to rationalize or make any sort of determinations around the value of any of the City's fleet vehicles toward attainment of departmental objectives. RSI-FC's analysts are, however, highly proficient at fleet data analysis. We know that the outliers in any fleet – units with particularly low (or high) statistical data (such as kms-travelled or operating costs) – may be "red flags" for further investigation. For example, if some vehicles are chronically under-utilized they may be stranded assets incurring costs to the municipality for their maintenance without serving a corporate purpose.

The types of fleet vehicles and equipment that staff are assigned to help carry out their duties are (usually) aligned with vocational requirements of the work they are required to complete. For example, compared to a pickup truck, a passenger sedan would be unsuitable for carrying loads of much anything other than people – fleet vehicles types are matched specifically to the tasks at hand. If vehicles are unsuitable for the jobs-at-hand, they may be under-utilized.

In *Figure 12 - Vehicle Mix by Category* (below), are the percentages of each of the primary categories/classes of vehicles in CKL's fleet relative to Ontario municipal rural fleets.

As shown in *Figure 12,* CKL's fleet is made up of the typical mix of vehicles in all Ontario municipalities. However, there are differences in the total numbers of units within each of the categories, relative to vocational differences between the applications of the vehicles in the fleets in the study group.

CKL's fleet mix includes 49 Fire Rescue Services units. None of the other eight rural municipal fleets in the study group included Fire units. For this reason, we excluded Fire from the analysis shown in *Figure 12.* Despite normalizing the data in this way, CKL's fleet has a higher percentage of Class 4 to 8 trucks.

Figure 12 - Vehicle Mix by Category

Category	CKL Fleet (%)	Ontario Rural Municipal Fleet Average (%)
Cars	5.8	24.9
Pickups	26.1	24.1
Vans	15.3	23.0
SUVs	7.1	5.0
Trucks* (Classes 4 to 8)	29.2	22.9

* Does not include Fire Rescue Services trucks

Fleet Size Relative to Population

In general, there is a correlation between municipal population and the number of vehicles required to serve the municipality: more residents to serve = larger number of municipal fleet vehicles. However, in municipalities with smaller populations, such as CKL with 75k permanent residents, the number of vehicles required to serve the public is more directly tied to the number of full-time equivalent (FTE) staff members required to complete specific job functions. For this reason we present the population ratios shown in *Figure 9* for information purposes only; it is not intended to be a relevant performance indicator for CKL.

Fleet Service Area by Vehicle Type

We calculated the number of square kilometers that are served by primary vehicle types of the City of Kawartha Lakes fleet. We compared the statistics to data for Ontario rural municipal fleets.

As shown in *Figure 13 - Km^2 Served per Fleet Vehicle* (below), on an overall basis, with the exception of the category of cars, the City's vehicles serve less area, in square kilometres, than the average of the eight rural municipal fleets in our study group.

Figure 13 - Km² Served per Fleet Vehicle

Category	CKL	Ontario Rural Municipal Fleets
Cars	180	98
LD & MD Pickups	40	101
Vans	68	106
SUVs	146	483
Class 4 to 8 Trucks*	36	106

* Does not include Fire Rescue Services trucks

Fleet Utilization

Making informed assessments of the metrics to define the levels of utilization for a municipal fleet is a daunting task. There are few, if any published statistics, nor are there clear definitions or guiding protocols regarding utilization levels for municipal fleet vehicles. Given this reality, most often it is left up to the best judgment of municipal departmental managers to make their own assessments as to whether their assigned fleet vehicles are being utilized fully, based on their personal definitions of acceptable usage.

Obviously, kms-travelled would be a meaningful statistic for a fleet of commercial over-the-road transport trucks which derives its revenue by charging their customers on a ton/kilometer or some other distance-based rate formula. Kms-travelled each year is far less meaningful, or possibly even non-applicable, to municipal fleet vehicles. For example, vehicles may be used to move a crew of workers, their gear and job materials to a worksite just a few kilometers from their base of operations, where the unit may remain parked for the remainder of the day. Vehicles used in this way may only travel a few kms per day and applications like this are abundant in all municipal fleets. Despite low kms-travelled, these units are every bit as valuable as vehicles that are used in high kms-travelled applications such as the commercial transport fleet vehicle example we've described.

With this conundrum in mind, we cautiously present the data with the caveat that making assessments of municipal utilization, measured by kms-travelled, must be kept in context. We believe that reports and statistical information highlighting vehicles with chronically low kms-travelled should serve as alerts to management of low-usage fleet vehicles. Such information should initiate further management review around the value of low usage units to fulfillment of the corporate mission.

We analyzed each of the primary categories of the CKL fleet. The results of our fleet utilization study by kms-travelled are shown in *Figure 14 - Fleet Utilization by Kilometres-Travelled* (below).

In this study we totaled the average annual utilization by kms-travelled for CKL's primary categories of vehicles. We plotted this data alongside our study group of eight Ontario rural municipalities. We then calculated the number of CKL units with 50% or less utilization (by kms-travelled) than similar vehicles in the CKL fleet.

Figure 14 - Fleet Utilization by Kilometres-Travelled

Category	CKL Average Annual Utilization (KM)	Municipal Rural Average Annual Utilization (KM)	No. of CKL Units in Category	No. of CKL Units 50% or less than Average Utilization	Percentage of CKL Fleet with Utilization < 50%
Bus	31,515	4,596	10	6	60
Car	11,557	27,471	17	14	82
Pickup	18,552	25,484	77	58	75
SUV	20,771	28,964	21	16	76
Truck (Class 4 to 8)	12,281	22,601	135	111	82
Van	19,652	22,177	44	28	64

Utilization by KMs-Travelled – CKL Fleet Summary

As shown in *Figure 15 - CKL Fleet Category Average Statistics* (overleaf), during the one-year fleet review period, CKL's total fleet utilization was 10,068 km/yr. By comparison, the average utilization for the eight rural municipalities in our *Utilization by KMs-Travelled* study was 21,882 km/yr.

Again, we emphasize that kms-travelled is not a good indicator of fleet utilization for municipal fleets. However, it may be a red flag for further investigation, one that alerts management to exceptions, in this case lower than average usage rates for CKL's fleet.

Figure 15 - CKL Fleet Category Average Statistics

Fleet Analytics Review©

FAR©

CATEGORY with SUB-CATEGORY BASELINE AVERAGES

Select Report: Total Fleet **Unit Age (inclusive):** 0 **to** 99 (Fractions are dropped, so age 6.9 is included at age 6)

Category	Review Period - Average Annual KMs or Hrs. Travelled	Review Period - Quantity of Fuel Used (liters of fuel consumed in review period)	Review Period - Downtime Days	Review Period - Preventive Maintenance (PM) costs for review period (PM includes oil changes and lubes, inspections)	Review Period - Repair Costs (reactive, unplanned repair costs for period)	Review Period - Annual GHGs produced (tonnes, combustion)	Review Period GHG Intensity	Review Period - L/100 km	Review Period - Downtime Cost per Day	Review Period - Downtime Cost for Period	Review Period - PM as % of All Parts/Labour	Review Period - Annual Fuel Costs	Review Period - Cost of Capital	Review Period - Total Cost for Period (R&M, Fuel, Capital & Downtime)	Review Period - Cost per KM	Review Period - Availability (%)	Review Period - Unit Age (Months)	Review Period - Unit Age (Years)
Total Fleet	**10,068**	**3,993**	**19.2**	**$ -**	**$ 8,426.96**	**5.4**	**5.3**	**233.4**	**$ 203.86**	**$ 4,118**	**0%**	**$ 2,901.42**	**$ 2,267.26**	**$ 17,182.58**	**$ 1.71**	**92.6**	**99.8**	**8.3**
Bus	31,515	13,754	42.2	$ -	$ 17,364.60	4.9	0.2	44.3	$ 100.00	$ 4,221	0%	$ 11,415.82	$ 3,822.65	$ 36,824.33	$ 1.17	83.8	49.0	4.1
Car	11,557	1,163	4.2	$ -	$ 1,834.25	0.6	0.1	10.5	$ 100.00	$ 420	0%	$ 922.41	$ 366.44	$ 3,434.87	$ 0.30	98.4	75.4	6.3
Equipment	100	67	2.4	$ -	$ 1,118.83	0.1	1.1	63.3	$ 100.00	$ 245	0%	$ 33.86	$ 262.89	$ 1,548.48	$ 15.48	99.1	113.8	9.5
Mobile equipment	307	2,860	26.1	$ -	$ 11,890.24	4.6	19.1	808.7	$ 100.00	$ 2,609	0%	$ 1,954.00	$ 1,913.56	$ 17,209.45	$ 56.00	90.0	115.3	9.6
Pickup	18,522	3,642	9.2	$ -	$ 3,804.35	1.9	0.1	19.6	$ 100.00	$ 925	0%	$ 3,027.15	$ 577.60	$ 8,333.93	$ 0.45	96.4	78.7	6.6
SUV	20,771	2,679	7.4	$ -	$ 3,061.23	4.5	0.2	10.6	$ 100.00	$ 744	0%	$ 1,939.69	$ 864.43	$ 6,609.52	$ 0.32	97.1	54.6	4.5
Sweeper	147	1,768	21.5	$ -	$ 8,825.00	3.9	24.9	1,132.6	$ 200.00	$ 4,291	0%	$ 1,749.83	$ 7,144.81	$ 22,010.28	$ 150.24	91.7	61.0	5.1
Trailer	0	209	1.4	$ -	$ 771.47	0.0	7.6	290.0	$ 300.00	$ 422	0%	$ 15.92	$ 266.32	$ 1,282.81	$6,670.60	99.5	152.4	12.7
Truck	12,281	5,860	31.7	$ -	$ 13,335.37	13.4	1.9	80.0	$ 300.00	$ 9,509	0%	$ 5,624.09	$ 5,069.89	$ 33,242.23	$ 2.71	87.8	102.9	8.6
Van	19,652	1,617	15.3	$ -	$ 6,446.87	0.7	0.2	30.4	$ 400.00	$ 6,130	0%	$ 861.75	$ 1,652.12	$ 14,947.00	$ 0.76	94.1	64.2	5.3

Synopsis – Fleet Utilization

Assessing utilization by kms-travelled is not an ideal method of tracking utilization for a municipal fleet as we have described. It is, however, a way of flagging, or alerting management to potentially under-utilized fleet assets.

Given the conditions we have described, and the limitations of measuring utilization by kms-travelled, CKL's fleet utilization, for some categories of vehicles appears to be lower than peer fleets, giving rise to the need for an internal review.

Recommendations – Fleet Utilization

- Departmental Managers with low-utilization units should be required to review their assigned units case-by-case to confirm the vehicles serve valid purposes.
- A corporate level of minimum utilization standard should be established.
- For maximum effectiveness and enforceability, the corporate level of minimum utilization standard should be a top-down driven corporate policy or directive that is initiated and supported by the highest levels of the City's management (CAO, CFO, or Mayor/Council).
- For chronically under-utilized units in the City's fleet, consider ownership alternatives such as short-term rentals and/or the use of employee-owned vehicles.
- Fleet Services Department should regularly monitor the fleet for chronically under-utilized units, and request department managers to take action(s) to remedy the situation, as per a corporate minimum utilization policy/directive.

Customer Satisfaction Survey - Fleet and Transit Services

Stakeholder Survey Process

RSI-FC understands the importance of hearing the opinions of all stakeholders including both management and unionized staff. With that necessity in mind, we prepared and distributed user-group online surveys. One survey was targeted at the management group, a second survey was for all drivers of vehicles and operators of equipment. It was clearly communicated to all survey recipients that their responses were confidential and anonymous; as so, they were encouraged to express their opinions freely.

Online surveys typically yield an industry-average 10 to 15% response rate. We sent the survey out twice to ensure successful contact with the group, assuming managers and supervisors were at that time preoccupied with the changing realities, competing priorities and uncertainties due to Covid-19.

For our management survey we received a total of sixteen (16) responses. Four our user group survey of management and unionized personal we received a large response rate of forty-nine (49).

Stakeholder Survey Results

In our surveys we asked both of the groups (unionized and management) specific and targeted questions relating to the matters of right-sizing and selection of vehicles and equipment.

When asked whether they were consulted during the processes around selection and specifications for new vehicles, a total of fifteen (15) respondents, who indicated they were in the management group, responded that they were satisfied with the process (score was 3.0 out of 5).

Qualitative Survey Questions

We asked the user group (unionized and management) a number of qualitative questions regarding fleet vehicles provided by the City of Kawartha Lakes Fleet Services. The 43 respondents replied very positively as shown below in *Illustration 1 - User Group Survey Responses*.

Responses were from 3.2 to 3.5 (out of a possible 5), which is very high qualitative index showing a high degree of satisfaction with Fleet and Transit Services department.

Illustration 1 - User Group Survey Responses

Question or Topic	Number of Responses	Score/Rating (out of 5)
Customer service	43	3.5
Professionalism	43	3.4
Dependability (promises-kept)	43	3.5
Understanding fleet customer's needs	43	3.4
Sensitivity to urgent needs	43	3.6
Attention to detail (doing it right)	43	3.4
Quality of preventive maintenance	43	3.4
Timeliness of repairs and maintenance	43	3.3
Quality of modifications or upgrades to fleet units	43	3.2
Quality of repairs to fleet units	43	3.5

We asked management group representatives for their feedback regarding the City of Kawartha Lakes Fleet and Transit Services. As shown in *Illustration 2 - Management Group Fleet Survey* (below), 15 respondents indicated very positive satisfaction levels with responses well above the median point (3.7 to 4.3 out of 5).

Illustration 2 - Management Group Fleet Survey

Question or Topic	Number of Respondents	Score/Rating (out of 5)
Customer service	15	4.3
Professionalism	15	4.4
Dependability (promises-kept)	15	4.1
Understanding fleet customer's needs	15	4.0
Sensitivity to urgent needs	15	4.0
Attention to detail (doing it right)	15	4.0
Quality of preventive maintenance	15	4.3
Timeliness of repairs and maintenance	15	3.7

Question or Topic	Number of Respondents	Score/Rating (out of 5)
Quality of modifications or upgrades to fleet units	15	3.8
Quality of repairs to fleet units	15	4.2

Synopsis – User Group Customer Satisfaction

A high level of satisfaction with CKL Fleet and Transit Services department is evident from our user group surveys.

Recommendations – User Group Customer Satisfaction

- Consider regular follow up surveys to gauge user group customer satisfaction.
- Take prompt corrective action(s) to address areas if dissatisfaction is evident.

Section Five

Review of Fleet & Transit Services

Life Cycle Analysis

Section 5: Life Cycle Analysis

Lifecycle Methodology and Approach

Most automobile drivers know from personal experience that older vehicles are often less reliable, break down more frequently, cost more to repair, and burn more fuel. Multiply that reality many times over as in a commercial fleet, and the impacts can be monumental. In general, as commercial vehicle fleets age, higher operating expenses are incurred due to increasing levels of reactive repairs (unplanned, breakdowns). As well, due to decreased reliability, downtime costs for spare/loaner vehicles also increases as does the cost of loss of productivity for the drivers who are dependent on fleet vehicles to perform their daily work routines.

The City of Kawartha Lakes strives to maintain its fleet in a safe and reliable condition and, in doing so, reduces its downtime costs. Nevertheless, even when minimized, downtime costs are unavoidable; for a municipality, they can be substantial. Ongoing, uninterrupted capital re-investment in modernizing the fleet is critical to any organization that depends on a reliable fleet of vehicles to achieve its objectives and mission, as is the case for all municipalities, including the City of Kawartha Lakes.

As shown in *Illustration 3 - Fleet Management Juggling Act* (below), fleet management is a complex juggling act. Capital investment, operating expenses, depreciation, preventive maintenance levels, fuel consumption, aging of the fleet, availability, utilization, emissions, and inflation are interconnected issues. Making a change to any one of these critical considerations impacts all of them.

Illustration 3 - Fleet Management Juggling Act

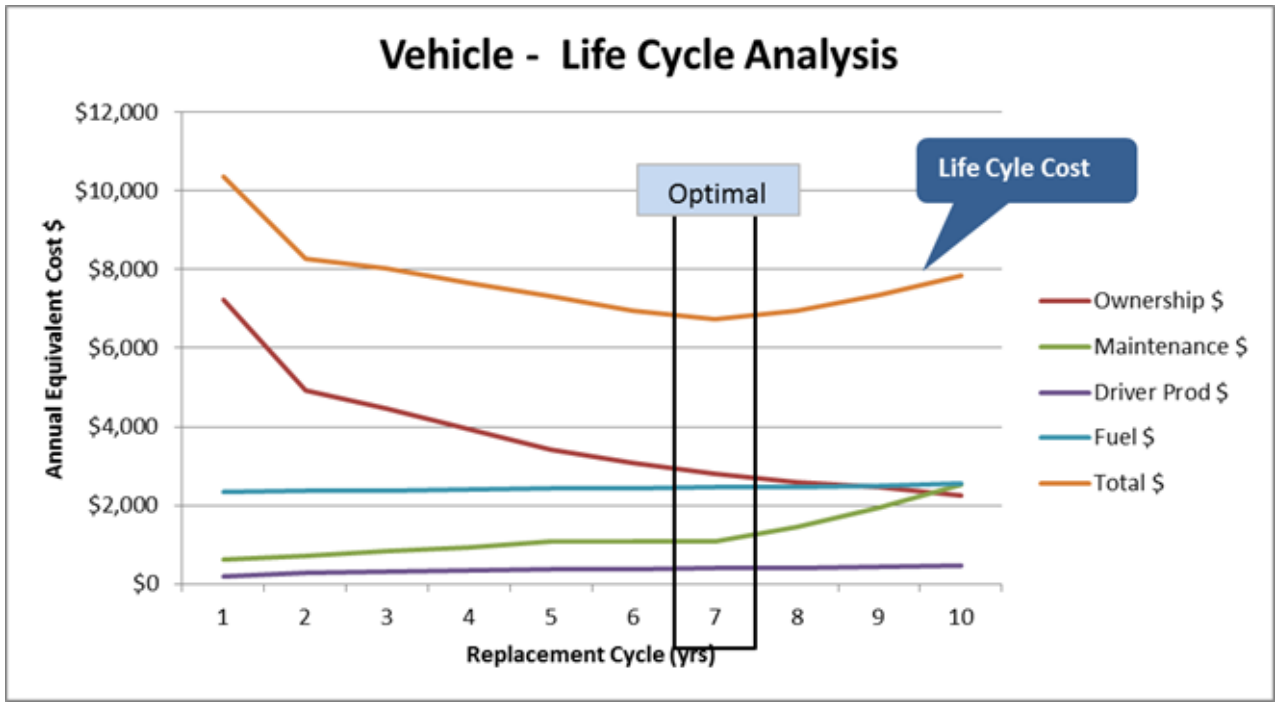
Deferred capital spending will age the fleet. A fleet that is excessively aged will result in higher reactive repair rates, more downtime, higher fuel consumption, increased operating costs, and, ultimately, a larger overall fleet size to allow for more spare vehicles to compensate for the reduced reliability of primary vehicles. Counter to this, if vehicles are replaced too soon, the value may be lost.

RSI-FC believes that the key to success is knowing the optimal economic lifecycle for each type of vehicle in the fleet. With that information, fleet managers can then balance their go-forward capital spending to align with service level (uptime) and operating expenses and other essential success measures.

Life cycle analysis (LCA) is a structured approach to determine the best time to replace vehicles and equipment in terms of age, mileage, or other pertinent factors. LCA provides the empirical justification for replacement policies and facilitates the analysis and communication of future replacement costs.

Figure 15 - Life Cycle Analysis Example (below) illustrates the concept of LCA. As a vehicle's age at retirement increases, ownership costs decrease and operating costs increase. The ideal time to replace vehicles is when the rise in operating expenses begins to outweigh the decline in ownership costs.

Figure 15 - Life Cycle Analysis Example



LCA is based on average costs and utilization rates for each category of vehicles and as so provides a credible guideline to optimal vehicle replacement cycles.

LCA does have limitations since its outcomes are based on average cost data for each category of vehicles. Some vehicles that are in poor or unsafe condition may require replacement before the LCA-calculated age criteria are met. Conversely, some vehicles that exceed the criteria may still be in good condition and not warrant replacement due to low usage, or recent refurbishment. Therefore, the LCA-recommended replacement criteria should be used as a guideline and not an absolute rule.

By following the LCA guidelines, the physical condition of each unit should be assessed by trained and knowledgeable staff, familiar with the unit's usage and maintenance history before replacement decisions are finalized.

Data Challenges

The discipline of completing fleet lifecycle analysis is dependent on historical cost data. LCA modeling software was designed and intended to be populated with the fleet's actual historical cost data. Without having cost data and LCA, vehicle replacements decisions may be based solely on intuition and personal observations – essentially the sentiments of someone who has a high degree of familiarity with the fleet. Often, we have observed that "guesstimates" made by seasoned fleet managers can have a high degree of accuracy. Unfortunately, today's business world 'gut' feelings do not stand up to scrutiny and must be backed up by analytical data.

The City of Kawartha Lakes maintains records and operational cost data for its fleet. Despite good record-keeping, for some categories of vehicles in the City's fleet, data was insufficient for analysis. More data means larger sample sizes that are essential for completing lifecycle analysis. As a workaround, RSI-FC filled gaps in the City's data with that of the same vehicle categories from our municipal fleet database. This data has been collected by our team over more than 15 years and represents the results of fleet reviews and analyses we have completed for dozens of Canadian cities, Citys, and regions. Being the amalgam of data from almost 50,000 municipal vehicles, our database was determined to be a suitable proxy for the City's actual information. Unfortunately, for some categories of vehicles, specifically Fire Rescue Services, insufficient data was available to complete LCA, and not enough peer fleet data was available.

Modern Vehicles

Today's vehicles are built better and last longer than ever before. With the right levels of preventive maintenance, operating conditions, and driver behaviors, vehicle service lives can often be extended longer than in the past. The lifecycle analysis completed in this report optimizes vehicle lifecycle costs based on vehicle age. Vehicle age is the best replacement criteria, as opposed to kilometers-driven, for CKL, given its relatively low average utilization rates.

For higher annual mileage vehicles in the fleet, it is recommended that CKL fleet management should review the condition of high mileage vehicles at thresholds of 20,000 km/yr for light-duty vehicles and 25,000 km/yr for medium and heavy-duty vehicles for potential early replacement. This should take place on a case-by-case basis as vehicles approach maximum age and km thresholds.

The recommended vehicle replacement age was multiplied by these values for mileage thresholds. For example, if the recommended life cycle is ten years for a vehicle type, the recommended replacement mileage is 10 x 20,000 = 140,000 km. It is noteworthy that most CKL fleet vehicles do not travel these annual distances, but that reality could change if, for example, the fleet began to be utilized more fully.

The Life Cycle Cost Curve

The "Life Cycle Cost Curve" and the ideal replacement cycle will be different for various types of vehicles and possibly even individual vehicles of the same kind. Differences in the vehicle make can cause this variability, including model year, equipment design, operating environment, or even by how the operator uses the vehicle. Recommended replacement cycles for a class of vehicles is thus an approximation of the optimal time to replace most units within that class.

Replacement cycles should be considered as a guideline only, as some vehicles that are in poor or unsafe condition may require replacement before the criteria are met. Conversely, some vehicles that exceed the criteria may be in good condition and may not warrant replacement. Fleet managers need to exercise judgment and fleet management principles in either advancing replacement or delaying replacement for individual vehicles case by case.

Lifecycles for vehicles are determined by modeling the expected cash flows for owning and operating the vehicle. The approach involves forecasting a stream of costs over a study horizon (future period) for each type of vehicle and determining the replacement cycle that results in the lowest total cost of ownership.

For the City of Kawartha Lakes fleet, discounted cash flow analysis was completed for each vehicle class to complete the LCA. Net Present Value (NPV) was calculated for outgoing cash flows (vehicle purchase cost, maintenance cost, the impact of downtime on driver productivity cost, improved fuel efficiency of a new vehicle compared to the old vehicle) and incoming cash flows (vehicle residual value) to calculate the total life cycle cost for various vehicle retention periods.

The NPV amounts for cash flows were converted to Annual Equivalent Cost (AEC) to provide a dollar amount, which is easy to relate to and compare alternative life cycle costs. AEC is the fixed annual payment that that would be required to pay back the total of capital and operating costs over the study period. The AEC can be viewed as an average annual cost that considers the time value of money for future cash flows.

Environmental Considerations

LCA is used to evaluate whether the increased costs of capital for newer, more modern and fuel-efficient vehicles will be offset by lower fuel, repair, and downtime costs for newer vehicles. In a low kms-traveled environment such as CKL, like all municipalities, the amount of fuel saved may be minimal, often resulting in protracted lifecycles being the better option financially. Aging the fleet to extract full value from each fleet asset may impede the fleets progress toward modernization and reduced GHG emissions. The net effects of fleet aging and fuel used versus GHG emissions should be evaluated, as is possible using our FAR software.

Key Parameters and Assumptions

The key LCA parameters used for all vehicle classes are listed in *Table 1 - Key LCA Parameters and Assumptions* (below).

Table 1 - Key LCA Parameters and Assumptions

Parameter	Value	Description
Net Acquisition Cost	Varies by vehicle class	Average vehicle acquisition cost provided by CKL management
Cost of Capital/Lease Rate	2.45%	Cost of funds for vehicle acquisition (the prime interest rate at the time the LCA)
Discount Rate for NPV	1.75%	Rate used to discount cash flows
Sales Tax Rate %	0%	HST assumed to be zero as a pass-through
Tech Prod Loss Hrs./Touch	2.5	The average loss in driver productivity each time a fleet technician services a vehicle. Work orders were deemed to be equivalent "of touches."
Tech. Labour Rate $/Hr.	$35.31	Burdened hourly labour rate provided by CKL
CIF[10] on Maintenance	2.27%	Cost increase factor or inflation on parts and mechanic labor
CIF on Driver Rate	0%	Cost increase factor or inflation on driver loaded labor rate
CIF on Vehicle	2.27%	Cost increase factor or inflation on vehicle replacement prices.
CIF on Fuel	2.27%	An assumption based on market trends
Annual Vehicle Efficiency Improvement	2%	Fuel efficiency improvement factor for new vehicles compared to the vehicles being replaced (estimated by Fleet Challenge).
Average Km/Yr.	Varies by vehicle class	Annual distance traveled. Assumption that the new vehicle will travel the same distance as the old vehicle.
Cash Flow Horizon (yrs.)	Varies by vehicle class	The discounted cash flow study period. The period was adjusted based on vehicle class (up to 20 years) and years of data that was available.

[10] CIF = Cost Inflation Factor

Life Cycle Analysis (LCA) illustrates the total lifecycle cost of fleet vehicle types/categories. LCA can help determine:

- The age at which units should be considered for replacement
- When replacement should occur (ideally before costs rise and reliability/safety reduced, and before significant capital expenditure or refurbishment is necessary)

As LCA identifies capital strategies that will optimize vehicle life cycles and return on investment, it should be the first step in long-term capital budget planning.

Approach: Using Fleet Analytics Review™ (FAR) baseline data, an LCA model was completed that included all of the City's primary vehicle and equipment categories. From data provided to RSI-FC by CKL, LCA was compiled for vehicles up to 20 model years of age if data was available. Unfortunately, insufficient sample size (not enough units) prevented LCA being completed for Fire Rescue Service units.

LCAs were successfully completed by our team for these vehicle categories:

- Cars
- Pickups
- Vans
- SUVs
- SUVs (Police)
- Medium-Duty Trucks (Classes 3, 4 and 5)
- Heavy-Duty Trucks (Classes 7 and 8)
- HD Plow Trucks (Class 8)
- Bus, Transit (Class 4)
- Ambulances

Life Cycle Analysis Results

Life Cycle Analysis (LCA) was calculated for each category of vehicles in the fleet where data was available. The LCA findings and recommended tactics presented are based on actual historical data compiled by units and by ages for the review period.

The LCA took into consideration the cost of downtime (as caused by reduced reliability). LCA also considered the year-to-year "rollup" of WACC, inflation, worker cost/hour, salvage and market values, inflation, and average kilometers-driven data. The results are summarized in *Table 2 - Life Cycle Analysis Results Summary* (below). LCA charts for each category are in Appendix "B".

Where recommendations are made to consider extending lifecycles, we suggest a cautious approach. In reviewing these lifecycles, one should bear in mind that in many cases, LCA was based on small sample sizes. In many cases, data for only a single vehicle was available. For this reason, if extending lifecycles is being considered, it should be approached cautiously. The operating expense impacts of LCA-optimized lifecycle is discussed on page 61 of this report.

Vehicle Condition Assessments

We recommend the practice of completing vehicle condition evaluations during every preventive maintenance inspection. In this way, decisions around extending vehicle lifecycles can be founded on data and with a solid understanding of each vehicle's actual condition.

Vehicles approaching their end of the lifecycle should be assessed case by case. A thorough ground-up and top-down physical assessment of each vehicle's condition, possibly in conjunction with routine shop visits for PM inspections, will serve to inform decisions around extending vehicle life cycles.

CKL Fleet and Transit Services management now makes it standard practice to complete these assessments when vehicles approach the end of their lifecycles.

Recommendations – Lifecycle Analysis

- Adopt the lifecycle recommendations determined through lifecycle analysis in this report.
- Regularly (annually would be ideal) review the lifecycles of units as more data becomes available.

Table 2 - Lifecycle Analysis Results Summary

Category	Optimal Replacement Lifecycles (years)	Current Lifecycles (years)	Recommended Change (+ or -) (years)	Notes
Cars	8 to 9	10	-1 to -2	The decision to extend lifecycles should be based on condition assessment of units.
Pickups	13 to 14	10	+ 3 to 4	Based on rolling average lifecycle costs optimal replacement is 13 to 14 years (no data was available past this age) The decision to extend lifecycles should be based on condition assessment of units.
Vans	13 to 14	10	+3 to +4	Optimal replacement in year 13 to 14. The decision to extend lifecycles should be based on condition assessment of units.
SUVs	8	10	- 2	Optimal replacement in year 8. The decision to extend lifecycles should be based on condition assessment of units.

SUV - Police	6	3	+ 3	Optimal replacement in year 6. The decision to extend lifecycles should be based on condition assessment of units
Class 3 Trucks	11 to 13*	12	-1 to +1	Optimal replacement in year 11 to 13 * This LCA was based largely on peer fleet data. Should be reviewed as more CKL data becomes available. The decision to extend lifecycles should be based on condition assessment of units.
Class 4 Trucks	12	12	No change	Optimal replacement in year 12. The decision to extend lifecycles should be based on condition assessment of units.
Class 4 – Transit Buses	8	10	-2	Optimal replacement in year 8. The decision to extend lifecycles should be based on condition assessment of units.

Class 5 Trucks	9 to 10	12	-2 to -3	Optimal replacement in year 9 to 10. The decision to extend lifecycles should be based on condition assessment of units.
Class 8 Trucks	11	12	-1	Optimal replacement in year 11. The decision to extend lifecycles should be based on condition assessment of units.
Class 8 Trucks – Plow Units	11	12	-1	Optimal replacement in year 11. The decision to extend lifecycles should be based on condition assessment of units.
Ambulances	6 to 7*	6	No change to +1	Optimal replacement in year 6. * Year 7 was based on peer fleet data, not CKL. The decision to extend lifecycles should be based on condition assessment of units.

Section Six

Review of Fleet & Transit Services
Long-Term Capital Budget Planning

Section 6: Long-Term Capital Budget Planning

In every commercial fleet, fleet managers must make tough decisions around which vehicles can be replaced in a given fiscal year within the annual capital budget, and which must wait until another point in time for replacement. Oftentimes, replacement of "past-prime" vehicles in sub-optimal condition must be pushed back because of insufficient capital. Doing so can lead to an aging fleet with less reliability, higher operating costs, and other negative consequences.

RSI-FC is of the belief that annual long-term capital budget planning should be approached methodically and strategically, based on data-driven decisions to replace vehicles at the optimum time in their lifecycles – and based on positive return on investment (ROI) – unit by unit. Using our recommended approach, long-term budgets can be balanced over budget horizons from five to fifteen years, and in consideration of the impact of inflation. The process begins with completion of lifecycle analysis (LCA) as we have done for CKL (see previous section of this report.)

With optimal lifecycles calculated for CKL, RSI-FC employed our Fleet Analytics Review™ (FAR) software to prepare baseline analysis. We then data-modeled three Capex planning scenarios to demonstrate the impacts of long-term capital planning.

Baseline Analysis

The FAR software tool was used to plot CKL's current-day baseline relative to the fleet's age and operating statistics in a one-year review period. This baseline included data on service levels (uptime and utilization), operating costs, fuel consumption, and GHG emissions.

Scenario One: Business-as-Usual Lifecycles

FAR modeling was used to forecast go-forward outcomes based on CKL's current-day vehicle and equipment replacement thresholds (see *Table 2* in the previous section of this report.) We refer to this scenario as "business-as-usual" (BAU) because it is based on CKL's current-day vehicle replacement cycles. In the FAR BAU data-model we calculated the vehicle/equipment replacement capital requirements over a fifteen-year horizon (2020 to 2035), the operating expense impacts, GHG reduction, and service levels that would result.

Based on present-day (BAU), current replacement cycle practices, 120 units or 25% of all vehicles and work equipment are either *due or past-due* for replacement, in that they exceed the age thresholds for replacement.

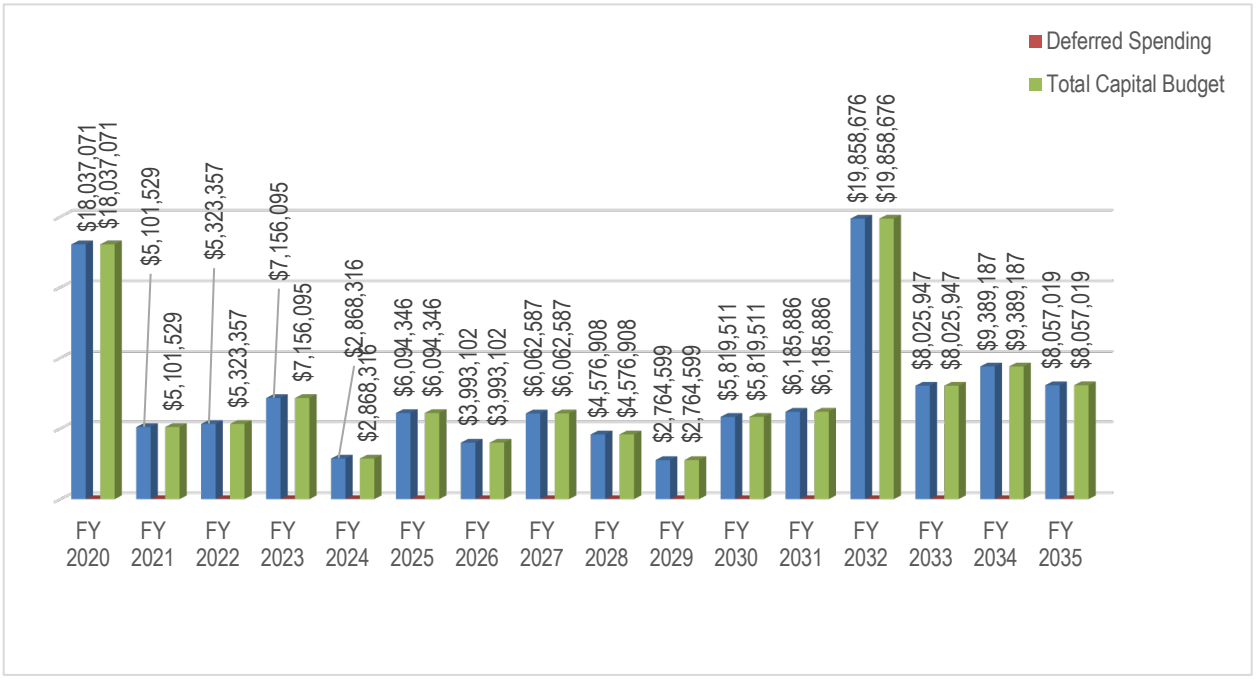
To replace all 120 of these units would require capital funding of more than $18m in 2020.

Most significant in this group, and radically driving up the total capital amount required, are costly Fire Rescue Services units. Many other high-value units are due for replacement at this time based on current BAU retention practices.

In *Figure 16 – Scenario One - Business-as-Usual Lifecycles - Long-Term Capital* (below), the amount of capital required for fleet vehicle and equipment replacements is shown for Scenario One, Business-as-Usual. If all 120 vehicles and equipment units that meet the current replacement age threshold were to be replaced in 2020, the total cost would be more than $18m. In the unlikely event that all 120 units were indeed replaced, we forecast an annualized operating cost reduction of $687,457 would result once all units were in service.

Take note that the blue bar shown in each year is the amount of capital required to replace all units due/past-due for replacement. The red bar shows any deferred capital (in this case, zero), and the green bar is the net amount required, after any deferrals. As shown, the "sawtooth" effect illustrates that a balanced approach to vehicle and equipment capital budgeting is required.

Figure 16 – Scenario One - Business-as-Usual Lifecycles - Long-Term Capital



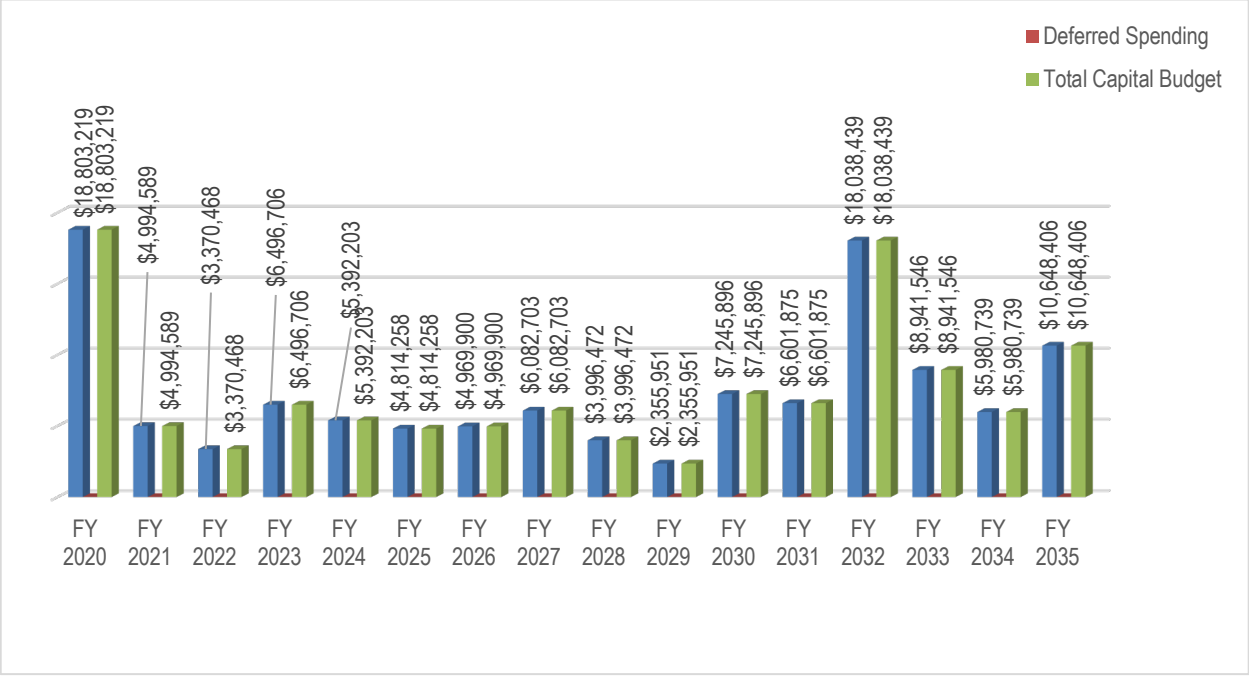
Scenario Two: LCA Optimized Vehicle Replacements

RSI-FC completed a second FAR scenario for all CKL fleet vehicles and equipment. This time we substituted CKL's current-day (BAU) replacement thresholds with the LCA-optimized economic lifecycles which we had calculated (see previous section of this report). The multi-year impacts of optimized lifecycles determined through LCA modeling are shown in *Figure 17 – Scenario Two - Optimized Lifecycles* (below).

Using optimized LCAs, 99 units were due/past-due for replacement. In this scenario, in year one of the 15-year plan, Capex would increase by $766k over the business-as-usual (BAU) scenario, to $18.8m. In the unlikely event that all 99 units in Scenario Two were replaced, we forecast an annualized operating cost reduction of $ 797,557 would result once all units were in service.

As in the BAU scenario (Scenario One), there is no deferred spending to later budget years in this scenario. Also, as in BAU, there is a very uneven long-term budget plan due to the numerous units now meeting or exceeding replacement thresholds.

Figure 17 – Scenario Two - LCA Optimized Lifecycles



Scenario Three: Return on Investment

Because of the large number of fleet units due/past-due for replacement at the time of our review, and regardless of whether CKL applies current-day replacement cycles or our optimized cycles calculated using LCA, we set out to demonstrate how go-forward annual capital budgets could be better-balanced year-to-year and made more financially attainable given budget restraints. We sought to determine how the massive first-year capital spend for due/past-due unit replacements could be reduced to a more reasonable, and potentially achievable, amount.

FAR was used to calculate the potential return on investment (ROI) for each fleet vehicle due for replacement. This determination was made by comparing the cost of similar one-year older vehicles (using model-year and vehicle type data from RSI-FC's peer fleet database) to the projected operating costs of new, replacement vehicles.

For Scenario Three, our objective was to demonstrate the process of balancing year-over-year long-term budgets based on ROI. The objective was to reduce the overall capital required in fiscal year one (2020), by deferring any units that did not show a reasonable amount of positive ROI over their baseline to following year(s). The same process was repeated for each fiscal year from 2020 to 2035.

Readers are advised that, to undertake this step, staff with the responsibility of making final determinations as to which vehicles ultimately should be replaced, and which should be deferred to another year, must know the condition of each unit. With this knowledge, units in good condition can be deferred to subsequent years to balance long-term budgets.

As third-party consultants, RSI-FC does not have access to vehicle condition information and as so, to reduce and apportion the required capital over a more extended period, we opted to defer:

- Units with low/no ROI
- Units that recently became due for replacement (ensures past-due units are prioritized)
- Lower-mileage units (to ensure higher-mileage units are prioritized)

By our team selectively and strategically deferring the purchase of units to later years using the prioritization protocol (above), the capital budget requirement was reduced to $6.8m in year one of the fifteen-year (2020 to 2035) capital plan. All ensuing years were balanced in the same way.

In Scenario Three we forecast an annualized operating cost reduction of $818,188 would result once all units were in service.

As shown in *Figure 18 – Scenario Three - Example of Balanced Capital Budgets 2020 to 2035 (for illustration purposes only)* (below), a more balanced long-term budget is shown to be possible, in consideration of ROI, vehicle condition, and total kms-traveled. We reiterate that this is only a hypothetical example prepared by our team to demonstrate long-term capital budgeting using a business-case approach.

Reality-check... A simple "back of the envelope calculation" shows that, given the current replacement cost of the CKL fleet, which is $78m, and with an average lifecycle of ten years/unit, then $7.8m would be required in each of the next ten years for vehicle replacements.

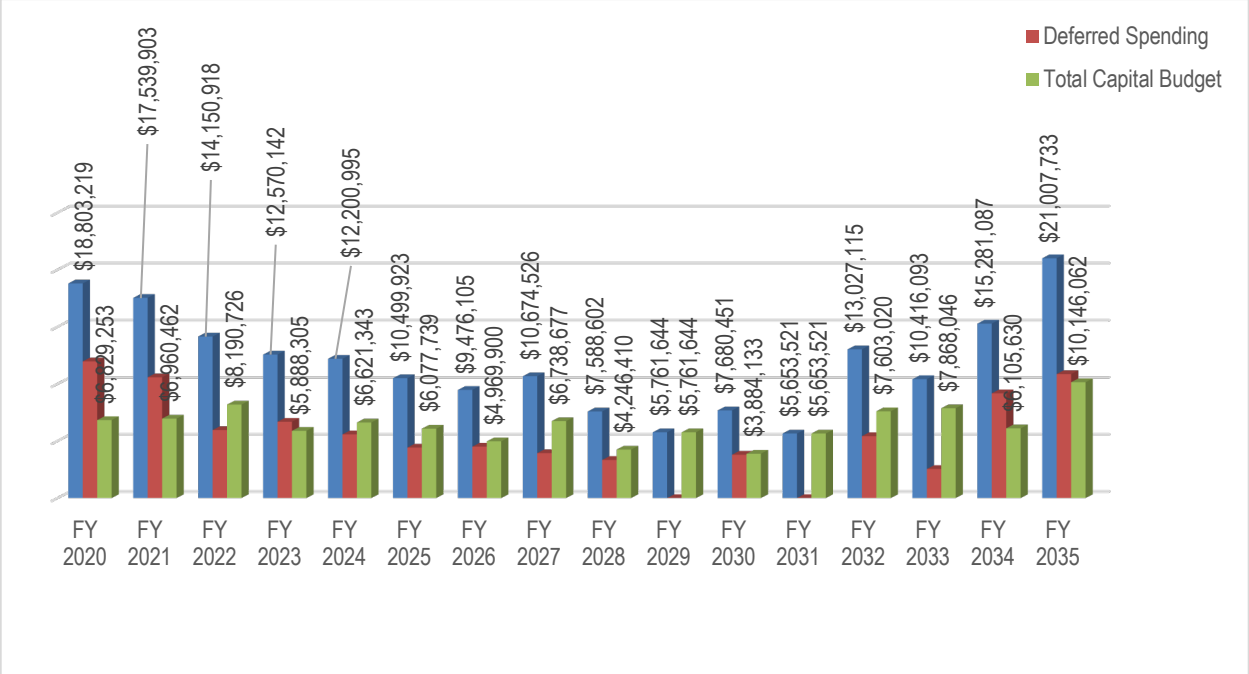
Assuming that, based on LCA-optimized economic lifecycles and positive unit condition assessments resulting from proper vehicle maintenance practices over the units' duty cycles, CKL fleet management may opt to extend lifecycles beyond 10 years in many cases. In doing so, the total annual capital required would be reduced.

To put this approach into practice requires the skilled assessment of vehicle condition for all units due for replacement by CKL Fleet & Transit Services personnel who are knowledgeable about the units for which they are responsible.

The blue bar in *Figure 18* represents the amount of capital required for fleet replacements each year based on lifecycle age thresholds. Each time a unit's replacement is deferred to an ensuing year, the value of these deferrals is tallied in the red bar.

The final budget requirement for each year is shown in the green bars (at right). As demonstrated, by making deferrals based on historical data, LCA, ROI and vehicle condition information, capital budgets for each year from 2020 to 2035 can be better-balanced.

Figure 18 – Scenario Three - Example of Balanced Capital Budgets 2020 to 2035 (for illustration purposes only)



Important Note Regarding Scenario Three

Scenario Three was prepared to demonstrate the concept of long-term capital planning based on ROI. RSI-FC prepared this scenario without any degree of knowledge regarding the mechanical condition of Kawartha Lakes vehicles.

In preparing Scenario Three in FAR, our analysts deferred replacement of vehicles where the business case for replacement was low or non-existent. We deferred (a) units that most recently became due for replacement and (b) units with lower mileage. Therefore, the amount of capital required for vehicle replacement in Scenario Three is reflective of vehicles due/past-due for replacement for which the investment in replacement vehicles would potentially provide optimal ROI.

It is important to be aware that LCA is not a guarantee of performance. It is only an averaging of operational costs by model year for groups of like vehicles within a fleet, to enable fleet managers to assess average annual economic costs by vehicle age. Within a fleet, some vehicles may have had lighter usage than average; other units may have recently been refurbished – either of these situations may enable extending life cycles beyond the optimal life calculated by LCA.

For this reason, we recommend that long-term vehicle replacement planning should be a two-step process. It should begin with (1) determining an initial list of units due/past-due for replacement via LCA-optimized life cycles. Then, (2) the actual condition of each vehicle due for replacement should be assessed case-by-case by fleet personnel who are knowledgeable and familiar with the condition of each unit. This process may allow safely extending vehicle lifecycles by deferring replacement of some units to ensuing years, thereby enabling the balancing of long-term capital plans.

Synopsis – Long-Term Capital Planning

Long-term capital budget planning can be balanced year over year using the approach we have described.

Recommendations – Long-Term Capital Planning

- Assess the condition of each vehicle approaching its end-of-lifecycle (as determined through LCA) by undertaking a thorough ground-up and top-down physical assessment.
- Prepare annual and long-term capital budgets based on: (1) the optimal economic lifecycles determined by lifecycle analysis for each vehicle category; and (2) condition assessment of each unit approaching its end-of-lifecycle.
- Balance long-term capital budgets by replacing only units that demonstrate the potential for providing return on investment (via FAR™ software). If there is no/low ROI, defer to a later budget year with a goal of evenly balancing multiple budget years.

Section Seven

Review of Fleet & Transit Services
Best Management Practices Review

Section 7: Best Management Practices Review

About Best Management Practices Review™ (BMPR)

Over the past 15 years, RSI's Fleet Challenge management consulting team has completed dozens of fleet reviews for Canadian and U.S. corporate and government entities. In doing so, we repeatedly observed many successful and effective Best Management Practices (BMPs) and Standard Operating Practices (SOPs) that are applicable and potentially beneficial to fleets in all business sectors. These practices range from business structure, human resources, safety, and maintenance practices through to operational policies. Our team concluded that proactive fleet managers would value an impartial, third-party, ground-up, and holistic review of their operations to identify gaps and opportunities for improvement. In response to this defined need, that is how BMPR™ (pronounced: bump·er ['bəmpər]) evolved. Beginning in 2014, and since that time, numerous fleets have participated in, and benefitted from, the BMPR program.

BMPR™ is RSI-FC's way of becoming 'up to speed' regarding our client's fleet operations in advance of completing a comprehensive fleet review. The comprehensive BMPR process is comprised of approximately 200 fleet management focal points grouped within the following specific areas of interest:

1. Asset Management
2. Vehicle Specifications
3. Finance
4. Operating and Capital Budgeting
5. Information Technology
6. Human Resources
7. Fleet Operations
8. Preventive Maintenance
9. Fuel (minimizing the use of)
10. Accidents, Safety & Risk Management
11. Environment
12. Policies & Procedures
13. Fuel Procurement and Distribution
14. Performance Management
15. Communications

7.1 Asset Management

Asset management has been described as "a systematic process of deploying, operating, maintaining, upgrading, and disposing of assets cost-effectively." Doing so effectively depends on having ready access to operating data, then making wise asset-management decisions based on and informed by that data. In the BMPR section of this report, the Fleet Challenge team reviewed specific topics regarding the City of Kawartha Lakes fleet management team's access to unit-by-unit data regarding the current state of its vehicle asset base and their "big picture" future vision, all the way through to the end-of-lifecycle for each of those assets.

City of Kawartha Lake's Objectives

A review and optimization of approaches to asset management (e.g. replacement, upgrade, expansion, standardization, etc.) and maintenance (e.g. preventive and unscheduled maintenance, licensing and CVOR, insurance, etc.) with the aim of minimizing long-run lifecycle costs of fleet assets.

On Fleet Baseline and Data Management

In its *Guide for Communities of All Sizes*, Cartegraph[11] [12], a software/GIS provider, the purpose of asset management strategies—and the technologies that support them—is to "preserve the service life of assets and proactively streamline day-to-day asset management operations." This goal is achieved by intervening at strategic points in an asset's typical lifecycle to improve its current performance and extend its expected service life.

While Cartegraph's focus is on municipal fixed assets such as bridges, facilities, guardrails, lighting, pavement markings, parks, roads, sanitary sewers, signs, storm sewers, traffic signals, trees, and water distribution systems, RSI-FC believes similar asset management philosophies and rigour should apply to fleet management. As so, there are seven key steps[13]:

1) COLLECT DATA

[11] RSI has no business relationship with, nor do we promote or endorse Cartegraph. This material is provided for information purposes only.
[12] Source: https://www.cartegraph.com/operations-management-software-for-government
[13] Source: Cartegraph Asset Management Basics to an asset management strategy.

Smart asset management is powered by data—current, accurate data that tells management exactly what assets it has, where they're located, and how much they're worth. Collecting accurate data is crucial to making good decisions and implementing a productive asset management strategy.

2) ASSESS CONDITION
One thorough inspection can tell how an asset is performing, what life it has left, and whether it's worth the money spent on it. This condition data should help to inform the organization's current and future infrastructure maintenance needs.

3) DETERMINE VALUE
Consider the asset's purpose and place in the city's infrastructure and what happens if it fails. Valuation is essential to the asset management strategy because it requires the prioritization of assets and the resources needed to sustain them.

4) GAUGE PERFORMANCE
Identify the factors that measure each asset's performance. At what point is it considered faulty or unsafe? Does the public expect it to look good? Answering these questions reveals the baseline for maintaining an asset.

5) PROACTIVELY STRATEGIZE
There is a time to repair and a time to replace. Create an asset management strategy that is proactive in its scope and realistic for the city and its workforce. Use data and cost-benefit analysis to help decide what to do and when to do it.

6) PUT INTO PRACTICE
Install, maintain, inspect, and—if need be—replace. Then do it all again for every network and asset your city has. With a well-planned strategy in play, infrastructure and the system supporting it will steadily improve.

7) FOLLOW THROUGH
Smart asset management all about patience, planning, and execution. Regular, proactive monitoring is the key to it working efficiently and effectively to make sure a city's assets are maintained satisfactorily.

RSI-FC believes that critical to fleet asset management success is the ability to confidently know, at any point in time, each unit's original acquisition cost, current value, utilization rate, age, and condition. With that information, fleet management would have processes in place to quickly and easily gauge the cost-effectiveness – and value to the organization – of each vehicle asset. With

good access to such information, fleet management can then make confident, informed assessments about the investment in each asset (vehicle/equipment) and whether each unit/asset is delivering value to the municipality. This baseline information should also be used for forecasting purposes.

To facilitate optimal asset management, fleet managers require access to current, real-time, and reliable operating data (including total cost of ownership, consumptions, usage rates, unit performance, downtime, and more.) Mechanisms to analyze this data must be in place to assess each unit's performance regarding utilization, availability (uptime) rates, and operating costs. With this information, each vehicle can be evaluated as to whether it aligns with and supports the organization's corporate objectives (i.e., fleet management's responsibility to provide safe, reliable, and suitable transportation for employees to carry out their daily work routines).

For example, if historical data shows that a particular unit has been utilized at a rate less than an acceptable threshold for minimum usage, it is costing the organization money without serving a purpose and, hence, the vehicle is a liability (unless it has some redeeming value, i.e., a special-purpose or backup vehicle for emergencies, or a unit reserved for peak periods).

Ownership of such a unit should be re-evaluated to determine if there are more cost-effective ways of accomplishing the corporate end-goal. If a specific vehicle is used infrequently, management should consider creative solutions as to whether a less costly mode of travel could be employed. For instance, an inter-departmental vehicle sharing arrangement, a third party service-provider, video-conferencing, or the use of employee-owned vehicles may be better options.

Downsizing the Fleet

Downsizing the fleet by reducing the total number of low-utilization vehicles is a common first step taken by fleet managers seeking to achieve cost reduction. While downsizing a fleet by eliminating vehicles can yield savings, it must be undertaken cautiously to minimize the possibility of loss or disruption of service during peak periods.

Exception Management

Exception management is a crucial tool to achieve peak performance. Every fleet has top-performing vehicles and poor performers – these are the fleet's exception units (or outliers). A robust fleet management system (Asset Works FleetFocus™ or Dossier™ are two examples of many) is essential for providing reports that allow fleet managers to compare individual vehicles to the average performance of units in the same categories within the fleet.

Systematically correcting the issues associated with poor performers in the fleet, whether caused by mechanical problems or operational issues, and leveraging the economic advantages of the top performers, will assure success. Business sector benchmarking also provides fleet managers with useful comparisons to peer fleets in their business sector – comparisons that highlight areas requiring attention.

Once the exception vehicles have been identified, fleet management's next task is to take appropriate action(s). For example, if an individual vehicle is under-utilized, it can potentially be re-deployed, or if a unit's costs are higher than average, fleet management should review its history to determine the root cause(s) and then take corrective action(s).

Continuous Improvement

The utilization of exception management practices will, in time, move up and improve the fleet's baseline performance. How far the baseline moves up depends on fleet management's effectiveness and its choices of corrective actions.

The reality is that every fleet will always have outliers, regardless of how finely tuned the fleet becomes. Therefore, exception management is a valuable tool for continuous improvement of fleet operations.

Fleet Modernization

Older fleets will almost certainly have lower reliability and higher levels of costly downtime, higher repair costs, decreased safety, poorer fuel economy, and an increased cost of fuel due to operating old-technology vehicles in frontline service. Ongoing capital investment in new vehicles will continually refresh the fleet and help the organization reap the benefits while heading off the negative issues associated with fleet aging.

There are additional benefits to a newer, more fuel-efficient fleet, which include increased vehicle uptime, a lower risk level, and, quite possibly, improved employee morale. Through consistent, ongoing capital investment in the fleet, the City’s fuel usage, operating expenses, and emissions will also be reduced.

Vehicle Replacement at the Rate of Depreciation

A guideline for fleet replacement is to invest capital at the rate of depreciation. For example, if new vehicles are amortized over five years, then 1/5th (20%) of the fleet's current NPV would be required each year to fund its replacement to maintain the average age of the fleet at the desirable level. The same guideline can be applied to planned vehicle lifecycles. If a vehicle is to be retained for 10 years,

then 1/10 of its expected replacement cost, plus inflation, should be applied each year to the reserve fund.

Note: This guideline is only valid if performance indicators such as uptime and fuel-efficiency are satisfactory. If not, then a one-time increased capital expenditure would help to bring the fleet's average age and performance up to an acceptable level.

Managing Fleet Growth

A significant challenge for every fleet manager is restraining unbounded growth of the fleet. Efforts to do so can be seen as an impediment to departmental managers striving to have sufficient fleet vehicles to ensure mobility for their staff who provide municipal services.

Challenges

Unless protocols or guidelines are in place to validate the addition of more vehicles to the fleet, the total number of fleet vehicles can grow unchecked. This will lead to underutilized vehicles and increased operating expenses. Therefore, RSI-FC is of the opinion that requests for additional vehicles for line departments needs should be accompanied by valid, defensible business cases and concurrence from senior-most levels of the municipality.

Such an approval process for adding vehicles to the fleet, as we have described, should be set in municipal policy. A hierarchal approval process should ensure approvals up to the senior-most levels of management or Council. It should not be left up to fleet management to make the final determination around requests for additional vehicles as this may cause an adversarial relationship with departmental managers. Please see *Figure 19 - Managing Fleet Growth - Process Flow* Chart (overleaf) which shows our step-by-step recommended business processes for adding additional vehicles to the fleet from the beginning through to budget approval.

Synopsis – Asset Management

Without a dedicated fleet management information system (FMIS), as described later in this report (See Section 7.4: Information Technology), City of Kawartha Lakes Fleet and Transit is without access to the layers of information essential to fleet asset management. With an FMIS, fleet management could make informed data-driven decisions based on around vehicle and equipment utilization rates and costs, and strive to optimize fleet assets.

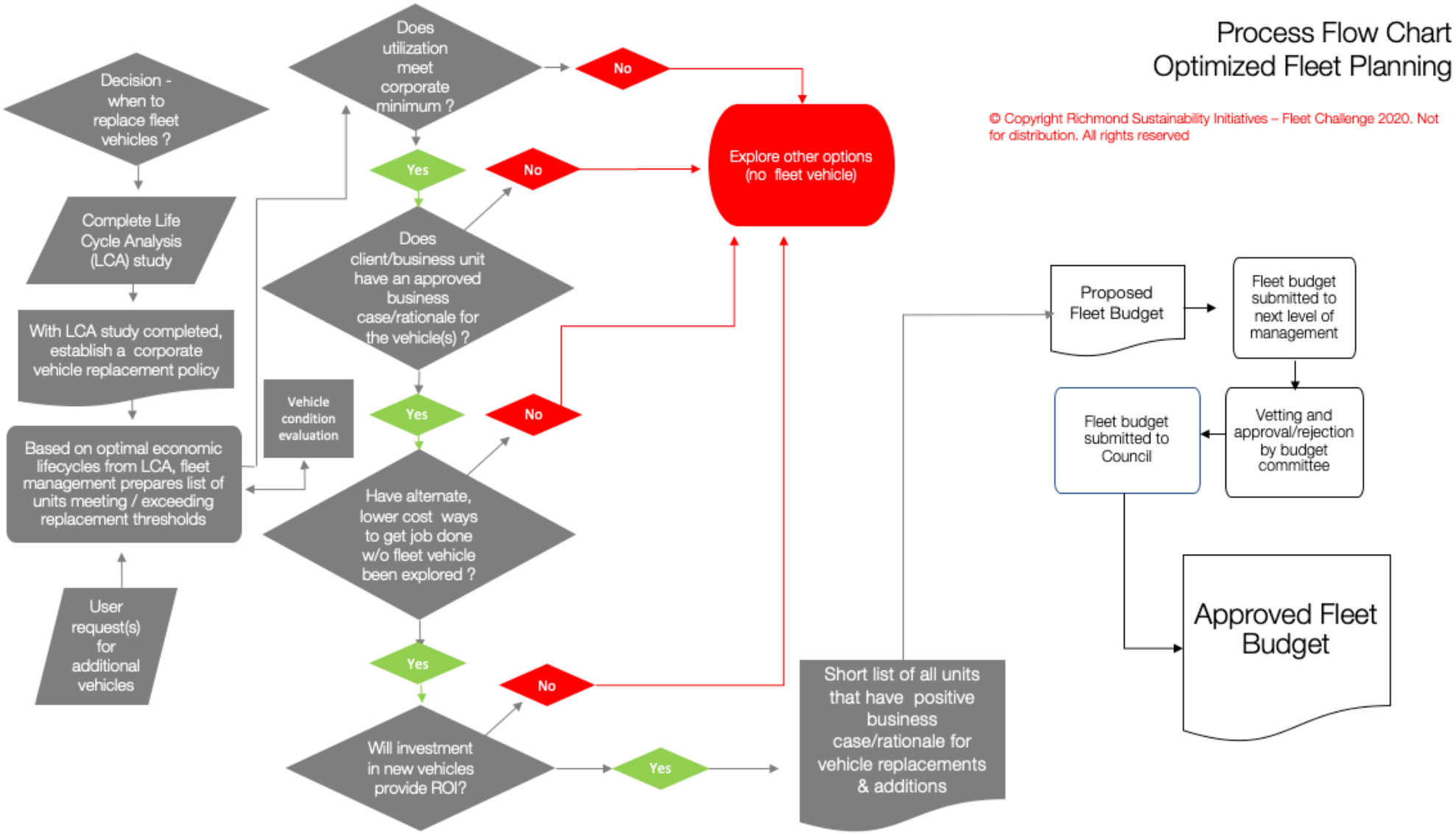
Recommendations – Asset Management

- Consider implementation of a fleet asset management information system (FMIS).

- Implement a policy requiring business cases for all requests for additional fleet vehicles.

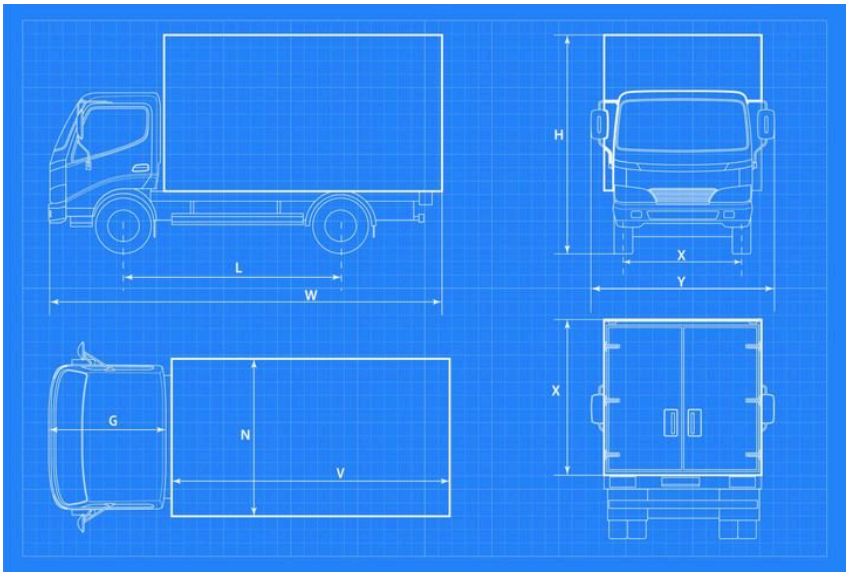
- Implement a policy requiring multi-level approvals with senior-most level concurrence (and/or up to City Council) for proposed additional vehicles to be added to the fleet.

Figure 19 - Managing Fleet Growth - Process Flow Chart



7.2 Vehicle Specifications

Fleet managers should always prepare detailed specifications for new vehicles with consideration for past performance of similar vehicles (i.e., the past predicts the future). When planning the go-forward procurement of vehicles and vehicle components (such as engines and drivetrains), fleet managers should give preference to units that have demonstrated the lowest historical total cost of ownership and highest reliability. Management should avoid the pitfall of buying vehicles that simply cost the least to acquire and meet only basic requirements.



Technical Drawing - Getty Images

Historical cost information about makes, models, and components should be frequently reviewed. This step enables informed procurement decisions based on Total Cost of Ownership (TCO) concepts, instead of purchasing vehicles based on lowest price.

Vehicle Standardization

Standardizing vehicle specifications wherever possible delivers numerous benefits. Standardization minimizes spares inventory, increases driver and mechanic familiarity, and increases the fleet's buying power with OEM vendors. Standardization may also reduce vehicle acquisition costs through volume buying.

Most, and possibly all fleets have budgetary and procurement guidelines that must be followed. Sometimes those guidelines dictate the choice of the vendor or the product that will be procured for a specific application. While purchase price is a key component, it should not be the only consideration.

Fleet managers should expect to get a realized return on investment (ROI). As so, management must have an understanding of what the total cost of ownership (TCO) will be for the vehicle(s) being selected through the competitive bidding processes (i.e., RFQ, RFP, tenders).

If an organization bases its procurement decisions purely on up-front acquisition costs, it can result in significant, often costly, challenges throughout the vehicle's lifecycle.

Vehicles that have been selected for lowest purchase price may be under spec'ed for their intended job function leading to safety risks, increased maintenance costs, unforeseen downtime, shorter lifecycles, and reduced end of lifecycle resale value. While a fleet may be able to reduce costs at the time of the acquisition, it will likely experience significantly higher costs and reduced productivity throughout the vehicle's time in service.

Government fleets deal with a wide variety of vehicles and equipment, between passenger cars and medium-duty trucks, heavy-duty trucks, and off-road equipment. Add in different makes and models for each type of asset, and keeping track of assets and their parts can seem impossible.

One way fleets are combatting this problem is through standardization[14]. By narrowing their fleet operations to a few standard vehicles or critical components, fleets can increase efficiency and save money on inventory, training, and repairs.

Before he was fleet manager for Osceola County, Fla., Hector Sierra Morales became familiar with standardization while in the U.S. Army, where all vehicles were standardized. According to Morales, "If you maintain the same equipment, your parts inventory will be smaller, and you will be able to have an idea of how many maintenance parts and specialty tools you need for your fleet. The maintenance of your equipment will be similar, and you will not need to have 20 different codes in your software for preventive maintenance." "The readiness of your equipment is important; you need to have your trucks in service, and having your technicians well-trained with the right parts in stock will reduce downtime."

Osceola County is standardizing its medium- and heavy-duty vehicles so they use the same engine, transmission, and tires. Morales began the process this year and expects to reduce his parts inventory by 25%, saving about $75,000 USD the first year.

Changing the way a fleet purchases its vehicles will require support from management, technicians, and end users. According to Sean Joyce, fleet manager for Bonneville Power Administration in Oregon, USA: "the more non-standardization is entrenched in your organization, the harder it is to break it," Joyce said. "You've got to have executive-level buy-in or senior management buy-in to drive and enforce standardization. Changing the way a fleet purchases its vehicles will require support from management, technicians, and end users."

The benefits of standardization are many and the payback can be substantial.

[14] Source: Government Fleet February 2017

Total Cost of Ownership Approach

When competitively bidding (such as RFP, RFQ, or tender) for new vehicles and equipment for the fleet, it is a best practice to require bidders to state the total lifecycle cost of ownership of their vehicles which have been offered. The Fleet Challenge team has observed that several fleet managers purchased the most fuel-efficient vehicles offered by vendors, rather than vehicles with the lowest purchase price. In other situations, units with the lowest total cost of ownership were selected despite a higher purchase price.

Lowest TCO is better than the lowest purchase price, and this would naturally deliver the lowest possible cost to the City, making TCO the better method of vehicle selection, albeit more complex and difficult to prepare for RFQs/tenders and assess vendor bids.

Recycling Mounted Equipment

Used truck service bodies and mounted equipment (such as cranes, dump bodies, salter/sanders, power tailgates) can potentially last for two (or more) truck chassis lifecycles after being rebuilt and remounted on new chassis. By "recycling" truck bodies and mounted equipment in this way, we estimate up to $20,000 or more (depending on the complexity and value of the equipment) could be saved on each new truck purchase. Although there is a potential for cost-savings, the practice of rebuilding and remounting add-on equipment should be approached cautiously – it can lead to reliability and, potentially, safety problems.

We acknowledge that some truck bodies and mounted equipment are subject to severe-duty usage (road salt exposure, for example). Despite that, we suggest that the concept of remounting ancillary equipment should not be overlooked. We recommend that unit condition assessment should be undertaken for mounted equipment on units due for replacement. If the condition assessment for the installed equipment is still "good," the option of remounting should be considered.

We suggest obtaining vendor quote(s) for rebuilding and remounting ancillary equipment. Then use this information to decide whether there is a business case for re-using truck bodies and other mounted equipment on new truck chassis – or if the more practical option is to replace the unit(s) in their entirety.

Right-Sizing Vehicles

In the past, some fleet managers subscribed to the adage "*identify the size of truck you need for the job —then buy one bigger.*" This anachronistic thinking resulted in fleets with oversized vehicles, poor fuel economy, and higher operating costs.

Today's savvy fleet managers know that the old approach is wrong. The correct approach is to right-size the fleet vehicles – that is, correctly specify the right-sized vehicles for the job at hand, which will lead to optimal fuel efficiency and lower overall operating costs.

Light-Weighting Vehicles

According to the U.S. EPA, every 10 percent reduction in truck weight[15] reduces fuel use between five and ten percent. Generally, an empty truck makes up about one-third of the total weight of the truck. Using aluminum, metal alloys, metal matrix composites, plastics, and other lightweight components can reduce empty truck weight (tare weight), improve fuel efficiency, and reduce greenhouse gas emissions.

Low-Emissions Vehicles

There is no question that the world is moving away from the internal-combustion engine (ICE) vehicles. Some jurisdictions have already legislated the end of the ICE. Many organizations and governments have committed to 100% zero-emission (battery-electric or hydrogen fuel cell) fleet vehicles within very short timelines. Acquisition of high-efficiency, low-emissions vehicles that meet operational needs (e.g., hybrids, plug-in hybrids, battery-electric vehicles, or compact cars) should be prioritized now.

Fuel-Saving Technologies

Green vehicle technologies such as idle shutdown devices, battery backup systems for DC loads, auxiliary heaters, auxiliary power units (APU) and others, will increase fuel-efficiency. Fuel cost savings most often offset their extra cost.

New vehicles should have these green technologies installed by the vendor and the cost included in the purchase price. This would mean that the cost would become a capital budget expense amortized over the entire lifecycle of the vehicle(s) instead of becoming an operating expense in a single budget year.

Diesel-Powered Vehicles

If fleet management's primary end-goal is saving fuel costs (as opposed to reducing GHG emissions), they may opt for the diesel option – not just for medium and heavy-duty trucks but also for light-duty vehicles (cars and pickups). Although the upfront cost is considerably more for diesel engines, they are inherently more fuel-efficient than gasoline-powered equivalents.

[15] Source: US EPA SmartWay https://www.epa.gov/sites/production/files/2016-06/documents/420f16028.pdf

Diesel engines are 20% or more fuel-efficient than gasoline engines and today's diesel engines produce radically lower smog-causing emissions than earlier models. On the flipside, diesels produce more (23% more) carbon emissions than gasoline engines (gasoline produces 2.2 kg/l and diesel 2.7 kg/l CO_2).

Unfortunately, in a GHG reduction scenario, the additional fuel economy for diesel engines does not (in most cases) offset their increased CO_2 emissions. That said, for those diesel vehicles now in the fleet, the use of cleaner-burning renewable biodiesel is an excellent solution for carbon reduction. Otherwise, gasoline engines may be the better option today for light-duty units, pickups and Classes 3, 4, and 5 trucks because of their lower fuel and acquisition costs and potentially less GHG emissions.

Recently, manufacturers have announced the launch of new medium-duty trucks models equipped with gasoline-powered engines; some are equipped with air compressors to provide air for brake systems and air accessories. Gasoline powered trucks in low-mileage applications will cost less to purchase and will reduce both GHG emissions and fuel costs. Today, gasoline engines may have an advantage over diesel in the municipal fleet operating environment.

Exception Units

Leading fleets routinely conduct reviews of fleet "exception" vehicles that drive up their costs. They take remedial actions on a case-by-case basis. Reports from the fleet management information system (FMIS) should identify the problem units and determine their root cause(s), thereby enabling appropriate action(s).

Waste Stream

When creating specifications for new fleet vehicles a review of the vehicle manufacturer's waste stream should be considered. The percentage of recyclable materials used in the manufacturing of vehicles should be part of the new vehicle selection process. Most manufacturers today place a degree of emphasis on this issue and should be able to provide this information for the asking.

Paints

When creating specifications for new vehicles, ensure that environmentally friendly and compliant waterborne paints will be used. The government has stringent regulations regarding Volatile Organic Compounds (VOC), and it's essential to know about the OEMs handling of this matter. The same applies to the repainting of in-service vehicles.

Synopsis – Vehicle Specifications

Selecting units with the lowest total cost of ownership (TCO) is better than the lowest purchase price and would naturally deliver the lowest possible cost to the City, making TCO the better method of

vehicle selection, albeit more complex and difficult to prepare for RFQs/tenders and assess vendor bids.

The CKL Paramedics section has opted to remount their used ambulance bodies on new chassis. We understand from our discussions with fleet management that their preference is to replace units in their entirety (chassis, body, and ancillary equipment), and we agree that this approach has its benefits. Doing so may head off potential problems with aging equipment that has had a surface-level (cosmetic) refresh. However, we feel it should not be an all-encompassing rule. There may be situations where a lower total cost of ownership may be possible by re-building and re-mounting ancillary equipment.

Right-sizing the fleet vehicles by correctly specifying the size of vehicles for the jobs at hand will lead to optimal fuel efficiency and lower overall operating costs.

Standardizing vehicle specifications wherever possible minimizes spares inventory, increasing driver and mechanic familiarity, and increasing their buying power with OEM vendors. Standardization may also reduce vehicle acquisition costs through volume buying.

Recommendations - Vehicle Specifications

- Consider employing a “total cost of ownership” approach when tendering for new vehicles (as opposed to buying the vehicle with the lowest purchase price).
- Continue to practice vehicle standardization wherever possible.
- Consider adapting zero-emission battery-electric vehicles if/when available.
- Optimal return on investment (ROI) for EVs will be for units with higher annual kms-travelled and/or fuel usage – these should be prioritized
- Begin planning for electric vehicle charging equipment. This link is for a charging station installation incentive program: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/zero-emission-vehicle-infrastructure-program/21876
- Right-size fleet vehicles for the tasks they are intended to perform.
- On a case-by-case basis, consider the cost-benefit of re-building and re-mounting truck bodies and ancillary equipment that are in good condition at the time when truck chassis are due for replacement.

7.3 Fleet Finance

Fleet Business Structure

One of the biggest concerns facing fleet managers is fiscal sustainability – ensuring that the fleet operating budget is sufficient to cover annual operational expenses (Opex), and the annual capital (Capex) budget is adequate for actual vehicle replacement costs. A primary goal for fleet manager's is reducing vehicle capital and operating expenses, without negatively affecting service levels (uptime).

Cost-Neutral Fleet Department

Several public sector fleets have successfully separated fleet management from their organization's core activities by establishing a semi-autonomous fleet department or division. In this business model, the Fleet Department is structured as an internal 'business support service' with strategic goals and objectives aligned with, and in support of, the overarching corporate vision/mission. By employing this business model, the Fleet Department can become cost-neutral to the organization it serves.

Total Cost Recovery Business Model

In Canada, there are several successful examples of fleet departments/divisions that have structured their business models in a way that mimics external fleet service providers. The key feature of this business model is an internal Fleet Services Department structure that functions like a third-party commercial fleet management provider, but without the profit motivation that a retail service provider would require. The advantages of this business model include:

- Separation of the fleet from the municipality's core functions, thereby enabling higher focus on primary corporate goals
- Fleet department can become a cost-neutral, internal service provider
- Reduced vehicle costs
- Support for the organization's vehicle needs to the fullest
- Provision of the highest possible levels of service to internal clients

There are several examples in which this business concept has been shown to earn the buy-in of line department managers, empowering them to reduce their vehicle, fuel, and accident costs for vehicles assigned to their areas of responsibility. One example of a successful implementation of this business model is the Winnipeg Fleet Management Agency, which was an early adaptor. Others are the City of Hamilton, Ontario, and the Toronto Hydro-Electric System, Fleet Management Services.

In Toronto Hydro's case, a concept described as a fully-bundled, total cost recovery vehicle lease program was implemented. The concept was put into place in 2004 and features full-service vehicle

'lease' charges to all of Fleet's internal user groups. The utility's fleet department was restructured in a way that resembled a retail full-service fleet management (leasing) company, including monthly full-maintenance vehicle lease charges issued to its user groups.

At Toronto Hydro, the change had strikingly positive results. Key features of Toronto Hydro's monthly vehicle charges to its user departments include:

- Vehicle 'lease' charges, based on the cost of capital for each unit and acquisition cost apportioned over the planned life cycle
- Preventive maintenance fees based on average annual PM costs for each type of vehicle
- Routine repair costs based on the average annual cost of reactive repairs for each type of vehicle
- Management and unionized Fleet staff salaries and wages are embedded within the monthly lease charges to user departments and as so, fully recovered

Toronto Hydro Fleet developed Service Level Agreements (SLAs) for all its user groups; these SLAs set out Fleet's commitments and charges to each user department.

Fully-bundled lease charges for all directly-assigned vehicles at Toronto Hydro were (and still are today) transferred monthly by journal entries for all vehicles assigned to each user department/division. In this business model, the fully-bundled total cost recovery vehicle charges became the full responsibility of the assigned user departments.

When this plan was implemented, most of Toronto Hydro's line managers were quick to surrender under-utilized and redundant vehicles. They also became supporters of acquiring new vehicles that were of higher efficiency that would cost their departments less to acquire and maintain. Their motivation was to reduce their departmental costs.

For Toronto Hydro, this new practice was a visible reminder to managers of vehicle user departments regarding their actual vehicle costs. As a result of this change, Toronto Hydro's fleet rapidly downsized from over 1,000 units to a lean 750. Fleet's operating costs decreased by several million dollars annually. The company, then operating in a newly deregulated business environment, continues this successful business structure today and has continued to benefit from even further reductions in fleet size and cost.

Fuel Costs

In addition to their vehicle lease charges, Toronto Hydro vehicle user departments/divisions are invoiced for the fuel consumed by their assigned vehicles. Fuel usage reports that are issued monthly to each user department/division help inform managers about the fuel efficiency of their assigned vehicle(s), and this highlights the exception units that are under their control. These reports create awareness which ensures buy-in for reducing fuel costs at the end-user levels of the organization.

For example, if a user department does not buy into fuel-use reduction practices or if it fails to guide its drivers to act responsibly around fuel conservation, only their department suffers the costs, instead of all user groups. Departments that encourage fuel conservation benefit from lower operating costs for their assigned fleet vehicles.

Toronto Hydro's department/division managers became acutely aware of the fuel-efficiency of their vehicle assignment and fuel costs and became keenly interested in and empowered to help reduce their vehicles' fuel usage. This reduced their department's costs and, as so, the entire organization became the beneficiary.

At-Fault Accidents and Negligent Damages

In the example of Toronto Hydro, the full cost of any *at-fault* accidents and *negligent* damages to vehicles are charged directly to the user department/division whose driver caused the damages. Costs for these preventable damages are not included in their vehicle lease charges.

This best management practice encourages line managers to take responsibility for their drivers who display bad driving behaviors or those who may be habitually abusive toward vehicles and equipment. The practice places responsibility for driver behaviors where it belongs – in the hands of managers who are best-positioned to deal with the issue of their drivers' poor driving habits.

Service Level Agreements

Service Level Agreements (SLAs) manage user group expectations by defining exactly what they should expect to receive from the Fleet Department. For example, an SLA might include language stating that vehicles will be replaced every "x" years, or that vehicle charges include maintenance, repairs, insurance, licensing, driver training at specific intervals, and more.

SLAs that exactly define what will be provided by the Fleet Department to the vehicle user-departments will help level the playing field between user departments. SLAs are a recommended best management practice.

Fully-Bundled Lease Charges versus Reserve Funds

As described, Toronto Hydro's fully-bundled total cost recovery vehicle lease charges, including all fixed and variable costs, are passed on to each user department/division each month for their assigned vehicles. In turn, user departments post hourly vehicle charges to their capital projects or customer service initiatives, just as they do for their employees' time on jobs, plus material and any third-party costs. In that sense, fully-bundled, total cost recovery vehicle charges, as described, resemble a traditional reserve fund in that assigned vehicle operating costs are calculated which fully offset the fleet department's costs for all vehicles and provide capital for replacements at the end of their useful life cycles. That's where the resemblance stops. Reserve funds may create a sense of entitlement in line managers. User group managers may feel entitled to receive a new replacement vehicle despite their assigned unit still having remaining useful life. They may feel this way because their user department/division has been contributing to their assigned vehicle's capital replacement fund from the beginning.

Reserve funds are typically topped up through hourly vehicle charge-out rates captured on work orders/time tickets. However, department(s) are known to hold the keys to a vehicle(s) for full days, yet post only their hourly charges for a fraction of each day. This practice prevents usage of the vehicle(s) by any other departments. Consequently, if this occurs repeatedly, there will be a shortfall in the reserve fund when the time comes for replacement of the vehicle(s).

In the fully-bundled total cost recovery vehicle charges concept we've described, the Fleet Department continues to 'own' all units but transfers bundled vehicle lease costs to user departments/divisions each month, just as a third-party vehicle full-service lease provider would. There are numerous advantages to this business structure. Key features of the fully-bundled, total cost recovery business model concept are:

- Creates awareness of fleet which usually instills a desire to surrender under-utilized vehicles
- User-department managers feel less entitled to receive new, replacement vehicles when their units have remaining usable service life
- User-department managers will share in the goal of keeping capital costs down for new, replacement units because vehicle acquisition costs will ultimately translate into higher costs for their own departments/divisions
- Encourages fuel conservation by placing responsibility for fuel costs within the user-department/division to which the vehicle's drivers report
- Encourages accident and damage reduction by placing responsibility for costs within the user-department/division to which the vehicle's drivers report
- User-department/division managers who more carefully manage their assigned fleet vehicles can decrease their department/divisions' operating budgets
- The Fleet Services Department can become cost-neutral to the organization

Vehicle Leasing

Vehicle leasing can be an attractive option as a way of reducing a fleet's average age without investing capital. The aging of a fleet results in high costs, poor reliability and, potentially, decreased safety. Leasing is a way to quickly modernize a fleet that has been allowed to age excessively.

The decision to lease vehicles must be approached cautiously. A full accounting review of the leasing/renting option should be undertaken and it should be based on discounted cash-flow analysis using standard accounting principles.

A full and detailed review and discounted cashflow analysis of buying-versus-leasing vehicles is not part of the current scope of work for RSI-FC. Still, we note this issue can have a significant impact on the overall business, bottom line, and financial performance. In general terms, based on our past research into this matter, we have determined that leasing or renting vehicles will be costlier for municipalities than buying units outright.

In a cash flow analysis study completed by RSI-FC for an Ontario municipality's Parks and Recreation Dept., renting/leasing their 68 seasonal-use pickups would cost over $200k more each year than buying them. With the right combination of elements and reasonable fleet management control, a municipality can generally fund vehicle replacement Capex and maintain the fleet more economically than a third-party fleet management service provider.

We suggest that, if the City of Kawartha Lakes should ever be considering the leasing option, it should be analyzed thoroughly. First, detailed specifications should be prepared for each specific service requested from potential lessors and then, formal bids/quotes from potential fleet leasing vendors be obtained. These steps will help ensure that vendor prices and proposals are based on "apples-to-apples" comparisons.

For example, competing vehicle lessors should be required to state their total 'cradle-to-grave' lifecycle costs including interest rates (i.e., lease interest rates based on prime interest rates and floating/fixed), plus mark-up, carrying costs, acquisition costs, registration fees, end-of-cycle disposal fees, reconditioning fees, and environmental fees. With this information, fleet management can accurately assess which lease vendor is really offering the overall best prices. This approach will avoid "surprise" costs and extra fees that may emerge after the contract is signed. Often, the savings offered by a vehicle leasing vendor with a lower interest rate can be negated by its numerous extra fees and surcharges.

Total Cost of Ownership Approach

Preference should be given to acquiring new vehicles with the lowest total cost of ownership (TCO).

When new vehicles are being selected through the competitive bidding process (e.g., tenders, requests for quotations) units with the lowest TCO should be selected from vendor offerings. Although some units offered by vendors may have a higher purchase price, they may have a lower TCO. Lower TCO will result when vehicles have one or more of the following:

1. Lower, or less costly maintenance requirements
2. Better fuel economy
3. Historically higher levels of reliability (less downtime)
4. Historically higher end of lifecycle resale value

Historical cost information from the fleet management system should be reviewed to identify vehicle makes and models with lowest TCO. This information should include the salvage value and/or auction proceeds recovered from end-of-lifecycle vehicles.

When bidding for new vehicles, prospective vendors should be required to state the manufacturer's fuel consumption ratings and, also, the estimated cost of scheduled maintenance requirements of their offered new vehicles.

Proceeds from Surplus Vehicles

It is a best management practice that proceeds realized from the disposal of end-of-lifecycle surplus units flow back into Fleet's reserve fund. In this way, the fleet management team becomes vested with the responsibility and empowered to recover the maximum amount from surplus fleet units. This is the current practice at the City of Kawartha Lakes.

Synopsis – Fleet Finance

As we have described earlier in this report, we feel strongly that a cost-neutral Fleet Department will deliver many advantages to an organization. In this business model, the Fleet Department prepares its annual operating and capital budgets as usual. Full cost recovery vehicle lease charges are applied to user departments throughout the fiscal year to fully offset the fleet's Opex through vehicle user charges, thus making Fleet Services cost-neutral.

We believe that user departments should carry the full costs of vehicle operation, and this practice ensures their buy-in. That said, we do not suggest abdicating responsibilities for fleet management to the user-departments. The Fleet Services Department, with vehicle subject matter expertise, must maintain control over critical decisions relating to fleet vehicles, including replacement cycles and maintenance. The Fleet Department should be the organization's 'go-to' resource as an internal service provider and in-house subject vehicle and equipment matter expert.

Recommendations - Fleet Finance

- Consider fully-bundled, total cost recovery monthly 'lease' charge approach as we've described which includes all direct and indirect vehicle costs and overheads.
- We recommend a business structure in which the Fleet Services Dept. becomes its own full-cost recovery business unit.
- Service Level Agreements should be developed for all vehicle user departments.
- Consider transferring the direct cost of fuel used by each assigned vehicle, plus at-fault accidents and negligent damages costs, as pass-through costs to user departments with directly assigned vehicles.
- Funds recovered from the sale of end-of-lifecycle surplus fleet units should continue to flow back into the Fleet vehicle reserve fund.
- Employ a total cost of ownership (TCO) approach when tendering for new vehicles

7.4 Information Technology

Fleet Management Information Systems

Fleet asset-management decision-making and analysis are best achieved by using dedicated and purpose-designed "best-of-breed" fleet management information systems (FMIS). For maximum management effectiveness and control, accurate and reliable fleet data is essential for managers to make well-informed, data-driven decisions for their fleet asset base.

Data is Crucial

To facilitate optimal asset management, fleet managers require access to current, real-time, and reliable operating data (including total cost of ownership, consumptions, usage rates, unit performance, downtime, and more). Mechanisms – such as an FMIS – to analyze this data must be in place to assess each unit's performance regarding utilization, availability (uptime) rates, and operating costs. With this information, each vehicle can be evaluated as to whether it aligns with and supports the community's corporate objectives (i.e., fleet management's responsibility to provide safe, reliable, and suitable transportation for employees to carry out their daily work routines).

For example, if historical data shows that a particular unit has been utilized at a rate less than an acceptable threshold for minimum usage, it is costing the community money without serving a purpose and, hence, the vehicle is a liability, unless it has some redeeming value (i.e., a special-purpose or backup vehicle for emergencies, or a unit reserved for peak periods).

Ownership of under-utilized units should be re-evaluated to determine if there are more cost-effective ways of accomplishing the corporate end-goal. If a specific vehicle is used infrequently, management should consider creative solutions as to whether a less costly mode of travel could be employed. For instance, an inter-departmental vehicle sharing arrangement, a third party service-provider, video-conferencing, or the use of employee-owned vehicles may be better options.

Data Systems

Some organizations have been successful in using their corporate 'enterprise resource planning' (ERP) software solutions with built-in fleet management functionalities. Others will, with a degree of effort, derive satisfactory results through user-designed spreadsheets. A few fleet managers still rely on paper-based records. In our team's experience, ERP systems are not a good fit for the unique requirements of fleet management. Fleet's needs for information are diverse. Purpose-designed, "best-of-breed" fleet management information systems (FMIS) are a better choice for optimal fleet management.

Regardless of the information system(s) chosen, the critical factor is having the ability to capture fleet data, conduct analysis, and prepare reports based on current, accurate information. An FMIS

enables managers to routinely and expeditiously run reports to analyze the performance of each fleet unit in the context of costs and service levels. Empowered with this level of information, managers can make confident and informed go-forward decisions around operating, maintaining, and disposing of fleet assets.

There are numerous advantages and due-diligence reasons for a purpose-designed FMIS, but at minimum, it will greatly facilitate and automate the important process of PM scheduling and manage the spare parts inventory. The system will reduce time, duplication of effort, and costs. FMIS-generated work orders for fleet technicians will capture and store vehicle repair and maintenance histories – essential details for due-diligence or in the event of a government safety audit.

Preventive Maintenance Scheduling

FMIS data systems will automate preventive maintenance (PM) scheduling, reducing the possibility of errors such as missed vehicle inspections. Today's leading fleets seamlessly and efficiently capture their fleet's kilometer or engine hour readings and track the amount of fuel used by each unit by integrating their FMIS with a fuel island transaction system. Drivers are prompted to key in their vehicle's odometer (or engine hour) readings at the time of each re-fuelling. Fuel island transaction data interfaces with the FMIS to update PM schedules. Such systems also enable easy reconciliation of fuel inventories, ensuring that all bulk fuel purchased is properly accounted for and managed.

From fuel island transaction data, the FMIS will auto-schedule PM events well in advance thereby reducing the possibility of errors and missed PM events while also helping to balance the mechanic's workflow.

FMIS fleet maintenance/management software solutions help manage operations specific to maintaining a fleet. Key features include a central database of all units – whether active, retired or planned (data that could be shared between other departments including accounting for their purposes), a dashboard, preventive/predictive maintenance scheduling, maintenance costs and performance analysis.

FMIS Data Integrity and Accountability

Managers of 'best-in-class' fleets assign responsibility and accountability for ensuring regular, accurate data input, updates, and database quality control to a single key staff member. This mitigates the possibility of experiencing the classic problem of "garbage in, garbage out", and ensures data integrity and consistency.

Each unit's original acquisition cost and date-in-service should be entered into the unit's profile. The FMIS should be capable of calculating depreciation for reporting purposes. In doing so, the system should also be able to calculate each vehicle's current book value in real-time.

Fleet management systems should include interfaces with any/all in-house fuel supply systems and any retail fuel vendors. These interfaces would be used to upload, for example, all fuel data and post fuel costs and usage quantities to each vehicle. Interface(s) should also be developed to enterprise systems/ERPs to facilitate internal financial transactions at the general ledger (GL) level (e.g., transferring vehicle, fuel, and accident costs to user department/divisions).

Fleet management software should be sufficiently robust to track costs at the vehicle level and be capable of benchmarking individual units to similar category vehicles within the fleet for exception management purposes. The system should also support the tracking of relevant Key Performance Indicators (KPIs).

FMIS Key Attributes

When considering a fleet management information system, considerations should include:

- Preventive maintenance (PM) scheduling: What are the systems options and capabilities?
- Does the software support multiple triggers for scheduling PM and other events?
- Management reports: Does the software provide exception reporting?
- Maintenance histories: What is included in each unit's maintenance history?
- Fuel tracking: Does the system report fuel usage and statistics per unit, categories of units and entire fleet?
- Does the software support fuel system reconciliation i.e., litres of fuel purchased vs. litres dispensed?
- Parts inventories: What are the capabilities of the system for managing spare parts?
- Cost reporting: Does the system provide detailed cost reporting on a unit by unit basis and does it provide exception reporting?
- How does the system track fixed overhead or indirect costs? It is important to include fixed costs such as salaries and wages, insurances, and other overhead costs to determine total cost recovery and pass-through costs for end user department/divisions.
- Does the system calculate vehicle book value in real-time? (This is an asset-management best practice, essential for vehicle cost vs. age analysis.)
- Does the system track vehicle assignments and stored location data?
- Does the system report on utilization rates per vehicle?
- Does the system track vehicle downtime?
- Is the system capable of categorizing maintenance and repair costs using industry standard terms of reference, e.g., industry-standard ATA Vehicle Maintenance Repair Standard (VMRS) codes (for benchmarking purposes)?
- Is the system user-friendly for creating reports "on the fly" such as calculating historical operating costs by vehicle type, brand, year, etc., and by unique vehicle configurations (e.g.,

the ability to calculate historical operating costs of vehicles with a certain engine/drivetrain configuration for comparative analysis)?

- Does the system provide internal and/or external benchmarking functionality?
- Is the system capable of being configured to generate reports on specific KPIs?

Data Management

A well-designed and configured FMIS should be capable of tracking current vehicle assignment information, e.g., departments /divisions/cost centers to which units are assigned.

Vehicle categorization protocols ought to be consistent with industry standards for benchmarking purposes, e.g., Ministry of Transportation, DOT, or APWA/CPWA standard categories. The system should track each unit's full acquisition cost at the time of purchase, data on each unit's current book value, and the entire fleet's current book value and mileage.

Odometer and Engine Hour Readings

The adage "you can't manage what you don't measure" is particularly relevant to fleet management. Mileage or engine and power take-off (PTO) hour readings form the foundation for cost comparisons and benchmarking, which are critical success factors for leading fleets.

It is imperative to capture vehicle odometer readings promptly and accurately. As well, engine & PTO hour readings should be maintained in real-time using uploads from the fuel system interface or shop work order entries posted into the FMIS.

Leading fleets are vigilant about recording every unit's mileage reading regularly – at minimum monthly to ensure 'short interval control' of the fleet. Readings can be recorded manually or captured via other methods, i.e., telematics, fuel dispensing systems, work orders or driver reports.

Synopsis – Information Technology

A fleet management information system (FMIS) would be of tremendous benefit to the City of Kawartha Lakes for the many reasons we have described in this report.

FMIS solutions are designed to help fleet managers and line staff capture, measure, and analyze the dynamics of their fleet maintenance and operating costs. They provide reporting capabilities with decision support tools. Such systems help manage other aspects of fleet maintenance that include cost and inventory management; they will track and manage different types of vehicles and equipment.

A well-designed and configured FMIS, when properly configured, is said to save a fleet up to 20% in operating expenses while ensuring due diligence with asset and inventory cost control.

Recommendations – Information Technology

- A purpose-designed, best of breed, full-function fleet management information system (FMIS) is recommended for CKL Fleet management.
- The FMIS should be configured so that all of the City's fleet vehicles and equipment are included in the system, including those managed by Public Works, Transit, Fire, Police and Paramedics.
- CKL sub-fleets that outsource their repairs and maintenance should input their third-party vendor invoices into the shared FMIS platform
- Preventive maintenance scheduling should be managed in the FMIS for all CKL vehicles and equipment.
- The Phoenix fuel system should be interfaced with the FMIS to capture vehicle and transactional data.

7.5 Human Resources

For this section of our report, human resources pertains not only to the Fleet & Transit Services department personnel but also to the fleet's drivers. We will address each group in this section of the Review.

The Fleet & Transit Services Management Team

For most mid- to large-size municipalities, the fleet is usually one of the top expenses on the corporate balance sheet. For this reason, mid- to large-size fleets engage the focused attention of a professional Fleet Manager with responsibilities solely focused on fleet management. Being a large and diverse fleet, with 377 vehicles and equipment units, this is the situation for the City of Kawartha Lakes Public Works and Transit sections of the City's fleet. For smaller municipal fleets, or sub-sections of a large municipal fleet, fleet management may be one aspect of a portfolio for a Supervisor, Manager, Director or Chief (Fire Services). For the CKL Paramedics, Fire Rescue Services and Police Services sections of the overall City fleet, this is the business structure that is in place.

Management Staff - Personal Development

Whether managing a small local fleet as part of his/her overall responsibilities or overseeing a large, diverse fleet, specialized skills and knowledge are required to make well-informed business decisions. Therefore, fleet management personnel should continually seek specialized training and personal development opportunities for themselves and their team, in order to continue to grow their fleet management expertise and knowledge. Options include membership and participation in industry organizations that offer relevant training and education, college and university courses, and a variety of personal skills development classes and networking events.

Attendance at fleet management networking and information/training events can result in an enthused, focused, refreshed, and motivated fleet management team and potentially result in new take-home best management practices. The NAFA Fleet Management Association www.nafa.org is one example of an industry organization that offers a Certified Automotive Fleet Manager (CAFM) program. The American/Canadian Public Works Association (www.apwa.net<http://www.apwa.net) offers a Certified Public Fleet Professional (CPFP) program that is oriented toward public sector municipal fleets.

We believe that regular attendance at fleet management conferences should be part of personal development plans for those involved in managing and maintaining the CKL fleet. Examples of annual events are NAFA sessions and the annual Fleet Technology Expo. The knowledge gained from attending these events more than justifies travel and accommodation expenses, and a side benefit may be morale and confidence-boosting. They are rich in content, offer learning and networking

opportunities, and have the potential to save money and increase fleet efficiencies that may result in a net benefit to the City of Kawartha Lakes.

For these reasons, we recommend participation in personal development and networking opportunities for those engaged in managing the CKL fleet. Additionally, the staff (technicians and support staff) who are carrying out maintenance and other fleet-related tasks would benefit from personal/career development training or peer networking events.

Fleet Maintenance Technicians

Recruiting qualified vehicle technicians in today's market is a perennial problem. Retaining technicians is also often problematic as some skilled, licenced technicians may be lured away by potentially higher earnings elsewhere. Some vehicle technicians may also be attracted to less physically demanding jobs to which they can apply their knowledge and skills. Recruiting and retaining suitable new technicians, with the requisite training, skills and endorsements may be challenging.

Fleet & Transit Services currently employs nine technicians with Automotive Service Technicians (Trade Code 310S), Truck and Coach Technicians (Trade Code 310T) accreditations. In the future, additional skills-training will be required to service emerging technologies, such as electric vehicles. Emergency Vehicle Training (EVT) is also important training for servicing CKL's Fire and Rescue Services vehicles.

An Automotive Service Technician (310S) is defined as a person who, on motor vehicles and light trucks, inspects/diagnoses and troubleshoots/repairs/verifies repairs on:

- Engine systems, electrical systems – starting and charging
- Engine management systems, electrical systems – body
- Fuel delivery systems
- Transmission systems
- Drive shafts, differentials, and drive axle assemblies
- Suspension systems and frames
- Steering systems, braking systems, tires, wheels, rims & hubs, heating, ventilation
- Air-conditioning systems, body and trim, exhaust, and intake & emission control systems

A **Truck and Coach Technician (310T)** inspects, repairs and maintains commercial trucks, emergency vehicles, buses and road transport vehicles, performing work on structural, mechanical, electrical and electronic systems.

A Truck and Coach Technician inspects, repairs and maintains:

- Electrical and electronic systems
- Engines including fuel, exhaust, intake and emission controls
- Transmissions, clutches, drive shafts and axles
- Body and trim, frames and hitching/coupling systems
- Steering, suspension and computer control systems
- Tires, wheels and hubs
- Braking systems including air supply and hydraulic
- Heating, ventilation, air-conditioning and refrigeration systems

An **Emergency Vehicle Technician (EVT)** has completed the following training:

Maintenance, Inspection & Testing (F-1):

- The maintenance, inspection and testing of Fire Apparatus as described in NFPA 1911, Standard for the Inspection, Maintenance, Testing and Retirement of In-Service Fire Apparatus

- Design & Performance Standards and Preventative Maintenance of Fire Apparatus (F-2)

- The standards for fire apparatus as described in NFPA 1901, Standard for Automotive Fire Apparatus, and in NFPA 1911, Standard for the Inspection, Maintenance, Testing and Retirement of In-Service Automotive Fire Apparatus

Staff Requirements

Calculating Labour Demand

RSI-FC completed a fleet maintenance demand study to evaluate the adequacy of current staffing levels. By calculating the frequency, the estimated labour hours required for PM inspections, and the number of each type of vehicle in the fleet we calculated total preventive maintenance demand (in terms of person/hours). From this value, knowing from experience and past data that a PM Ratio of .50 delivers a high level of uptime, we calculated reactive repair demand (also in terms of person/hours). By adding PM (and PMCVI) demand to reactive repair demand (PM Ratio of .50) we calculated total Fleet Technician labour demand for fleet maintenance.

As in all human endeavours, there is variability between each technician's productivity levels. Also, there may be variability between vehicles, even those of the same categories, which can make maintenance less – or more – demanding. For this reason, we calculated total labour demand using low and high estimates of the time required to perform PM and reactive repairs.

The low estimate of total labour demand to service the 377 units of the Public Works Fleet and Transit section of the City's fleet is 13,528 hours and the high estimate is 20,248.

Calculating Labour Capacity

We calculated the labour capacity for each full-time equivalent (FTE) Fleet Technician. To do this we began with the total annual, on-duty, direct labour hours for each Fleet Technician. From this we subtracted statutory holidays, paid vacations, lunches and breaks, safety (and other) meetings, and an allowance for other indirect time such as delivering vehicles, meeting with drivers, reviewing vehicle issues, road tests, completing work orders, etc. The net annual labour capacity per each FTE Fleet Technician is 1,274 hours.

Calculating Fleet Technician Requirements

With Fleet Technician labour demand and net capacity per FTE calculated, we then compared total fleet maintenance labour capacity to demand. Based on low and high estimates of baseline labour demand for attainment of all PM, PMCVI and reactive repairs, we determined that from 11 to 16 FTE technicians are required today to meet the current demand[16].

The City of Kawartha Lakes Fleet and Transit Services employs 10 FTE Fleet Technicians – nine FTE Truck and Coach Technicians and one Chief Truck and Coach Technician, which is one less than the current minimum (low estimate) of today's labour demand.

Recruiting Motor Vehicle Technicians

Recruiting qualified motor vehicle technicians in today's market has been a perennial problem but this was not the case at the beginning of this century. To better understand the downward trend in licensed technicians, we looked at a 2019 study conducted by the Canadian Apprentice Forum (CAF). From 2004 to 2010, the number of registered apprentices in the top 10 Red Seal trades increased from 99,500 to 145,300. In 2014, the number of registrants began to decline due to downward trends in oil and other commodity prices (decrease of 7,100 registrants between 2014-2017). Ever since, the number of registered apprentices stayed consistent but the demand for qualified candidates has increased steadily. Projections for 2019 and beyond show nearly as much

demand as there is supply of apprentices which will put the industry at an even more dramatic deficit for qualified motor vehicle technicians soon.

Recruiting and retaining technicians with multiple licenses (e.g. 310S, 310T) is even more difficult and oftentimes organizations will settle with those holding, or apprenticing, for one license type. The challenge then becomes encouraging technicians – for example, a technician with a 310S licence – to continue their trades-training by earning their 310T, or their Emergency Vehicle Training (EVT) and other accreditations.

To develop and maintain a strong pool of skilled workers, recruitment and retention incentives must be considered and these can be widely various depending on the candidates. In general, studies have shown millennials are incented by much different rewards that their baby boomer counterparts; therefore, recruitment and retention strategies should also be customized, ensuring equality and inclusiveness.

In *Table 3 - Vehicle Technician Profiles* (below) are two examples showing equal but customized approaches for employees in various generational groups.

Table 3 - Vehicle Technician Profiles

Employee/Situation	Organizational Benefit(s) and Drawback(s) of Employee Type	Examples of Effective Incentives
Employee Profile - Example 1:		
Fully licensed technician (holding 310S and 310T) who has been working for over 20 years in the industry and within approximately five years of retirement	Benefits: • Highly skilled & experienced • Consistent/predictable work quality, capacity & productivity • Potential to mentor and transfer skills to other workers • Potential to move into head technician position (if not there already) Drawbacks: • May be unwilling to expand current skill set • Sometimes resistant, or has difficulty using new technology & diagnostics • Potentially unwilling to share knowledge with new, inexperienced employees	• Technicians in this example/category are generally more incented by financial security and recognition of experience and skill set. Therefore, an effective incentive could be structured on performance-based goals and recognition of accomplishments around peers (if warranted). • Depending on the individual, they may be incented by being known as the subject matter expert (or go-to person) from other staff. • More introverted individuals will be incented by one-on-one interactions with superiors versus sharing their knowledge openly with others. • Good candidate for future CKL Chief Technician role
Employee Profile - Example 2:		

Employee/Situation	Organizational Benefit(s) and Drawback(s) of Employee Type	Examples of Effective Incentives
New, inexperienced and recently out of high school or college looking for an introduction or hours towards an apprenticeship	Benefits: • Typically, these workers are young (20s or younger) and eager to learn • They are more economical hires versus experienced, fully licensed technicians • They have little experience in the field and can be more easily trained on organizational processes • They adapt to, and even expect, to be exposed to new technologies and diagnostic tools	• Anything related to accelerating learning and training are often the most effective incentives (training, tool allowances, college bursaries or incentives that subsidize hard costs such as textbooks) • Work schedule flexibility is often highly valued by this group to accommodate school schedules/appointments that typically occur during the Monday-Friday office business hours of 9AM – 5PM.

Retaining Motor Vehicle Technicians

Pay Scale

While a competitive pay rate is a benefit for employees, it also benefits employers. Employers offering excellent wages have employees who are more productive and engaged. A major cause of employee turnover is pay rate. If employees feel that they aren't being paid enough and are able to find higher-paid work elsewhere, they'll quit and move on. Employee turnover costs companies huge amounts of money. The cost of replacing and training new employees exceeds the amount of money saved by offering lower pay.

Stability and Predictability

In very general terms, experienced, licensed technicians are often looking for consistent, regular shiftwork (either day, afternoon or weekend shifts). Rotating shifts, although useful to provide coverage for the company, are often difficult to administer, complicated to adjust for short term disruptions (sick leave, vacation, unforeseen circumstances) and can be unappealing to technicians

who require more consistency. This is especially true for young apprentices trying to balance school, work and appointments or those with young families trying to balance a busy home life.

Work Environment

Employee retention is often incumbent on a good working environment. For Fleet Technicians, work environment extends to their working relationship with fleet management and staff, user-groups, and co-workers. No one likes spending their working hours in a toxic, unhappy environment.

Work environment includes the physical workplace, in this case the fleet garage, and the shop equipment technicians are provided to do their jobs. Work environment extends to garage lighting, noise levels, safety equipment, heating and ventilation, and more.

Fleet Technicians Survey

To assess the level of satisfaction of the Fleet Technicians in CKL's Fleet and Transit Services section RSI-FC issued a Fleet Technicians survey. The survey was anonymous and we received a high response rate – seven (out of ten) responded.

Note: The full survey questions and charts for Fleet Technicians are found in Appendix "F".

Job Satisfaction

We asked the Fleet Technicians seven questions related to their jobs and working environment. We received very positive responses as we see in *Illustration 4 - Fleet Technician Survey #1* (below).

Illustration 4 - Fleet Technician Survey #1

Survey Questions for Fleet Technicians (1)	No. of Responses	Rating (out of 5)
Overall, how would you rate your level of job satisfaction?	6	3.7
What is the likelihood you would refer someone to work at the City of Kawartha Lakes Fleet and Transit Services?	6	3.5
What do you feel is the likelihood that your personal career goals and aspirations will be met in Fleet & Transit Services?	6	2.8
Do you feel your current job is your only career option in Fleet & Transit Services?	6	4.5
Does another job within Fleet and Transit Services that would get you off the shop floor someday have appeal to you?	6	3.7

We asked the group a second set of questions relating to the garage work environment. Responses were again very high – from 3.8 to 5.0 (out of 5). Clearly, they are satisfied with their work environment as demonstrated in *Illustration 5 - Fleet Technician Survey #2* (below).

Illustration 5 - Fleet Technician Survey #2

Fleet Technicians Survey Questions (2)	No. of Respondents	Rating (out of 5)
Do you feel valued at work?	6	4.5
Do you receive recognition for your work from the person you report to in Fleet & Transit Services?	6	4.5
Do you feel that Fleet & Transit Services management takes your opinions seriously?	6	4.7
Do you feel Fleet & Transit Services management is transparent in their actions?	6	4.3
Are you comfortable giving upwards feedback to your immediate supervisor?	6	4.7
Are you comfortable giving upwards feedback to fleet management?	6	5.0
Do you feel your co-workers give each other's respect in the workplace?	6	4.3
Do you have fun at work?	6	3.8

We asked the group a third set of questions relating to their tools and equipment, work bays, lighting, heating/ventilation and safety. Responses were again very high – from 3.7 to 4.0 (out of 5), showing a high degree of job satisfaction as we see in *Illustration 6 - Fleet Technician Survey #3* (below).

Illustration 6 - Fleet Technician Survey #3

Fleet Technicians Survey Questions (3)	No. of Respondents	Rating (out of 5)
The tools and shop equipment provided by Fleet & Transit Services are suitable for the work I do.	6	4.3
Tools and shop equipment are maintained properly.	6	4.3
The garage bays and workspace are suitable for me to carry out my duties.	6	3.7
The garage and facilities are clean, organized and well-maintained.	6	4.0
Garage lighting is good.	6	4.3
Heating and ventilation are adequate.	6	4.0
Workplace Hazardous Materials Information System (WHMIS) information is available to me readily for the products I am working with.	6	4.2

Fleet Technicians Survey Questions (3)	No. of Respondents	Rating (out of 5)
I have adequate understanding and training in WHMIS.	6	4.0
I am provided suitable safety and personal protective equipment to complete my job.	6	4.5
I believe management places a high emphasis on worker safety.	6	4

Being a fleet maintenance technician can be a physically challenging occupation. It can be strenuous and entail cold working conditions while, for example, repairing frozen vehicles. Even in the most ideal working conditions, the job may exacerbate or aggravate inherent health conditions such as arthritis in some people. With this reality in mind, and despite the high level of job satisfaction we observed in the first survey questions, we asked: *Does another job within Fleet and Transit Services that would get you off the shop floor someday have appeal to you?* Respondents felt equally strongly (3.7 out of 5) that a job that would get them off the shop floor someday had high appeal to them.

Compensation and Benefits

Fleet Technician survey respondents are dissatisfied with their pay rate. As we see in *Illustration 7 - Fleet Technician Survey #4* (below) they felt their benefits packages are fair (3.3/5). However, there is clearly dissatisfaction when it comes to their pay. Responses ranged from 1.3/5 to 2.7/5 for the questions about their pay rate and vacation.

Illustration 7 - Fleet Technician Survey #4

Fleet Technicians Survey Questions (4)	No. of Respondents	Rating (out of 5)
My compensation package, including pay rate and scale, benefits package and paid vacation time is fair.	6	1.7
My pay rate and scale are fair.	6	1.3
My benefits package is fair.	6	3.3
My paid vacation allowance is fair.	6	2.7

Technician Comments

In the survey respondents were asked to provide comments about their employer and their jobs. We received several excellent comments; many were positive in nature and others very constructive. That said, some of the comments raised red flags. A sampling of the comments follows:

Highlights of Fleet Technician Survey Comments

Training

"Although we do receive basic training on certain pieces of equipment, we badly need in-depth training on the more complex vehicles and pieces of equipment. E.g. diagnostic and troubleshooting training specific to plow trucks, transmissions, sidewalk machines etc."

Fleet Garage and Work Equipment

"I have no issues with working conditions, safety equipment, or PPE provided to work safely."

"This municipality needs to increase its fleet maintenance facilities and staff size. We are in no way capable of handling the vehicles and equipment we currently possess and too much crucial work ends up contracted out and that can be costly in the long run. I believe the fleet maintenance facilities are a safe work environment."

"Need more space. Need more techs and equipment"

"If this department were to improve, it must begin by engaging employees in creating a comprehensive and efficient vehicle and equipment preventative maintenance program that will promote consistency in the inspections and repairs conducted. Including employees in this process will help with employee "buy in", and they will feel that they were a part in how their workplace operates."

"An investment in a CMMS (Computerized Maintenance Management System) will greatly assist in tracking maintenance, work order creation, inventory management, and recording vehicle history. Implementing such a system will improve efficiency within the department. However, the easier place to start would be to improve pay rates for technicians, include their input in some decisions made, in depth training from OEM, and expanding the staff and facility size to better accommodate the size of the fleet serviced. Dealing with problem employees to prevent their negativity from spreading needs to happen as well."

"A larger shop in order to bring all of the fleet. I mean all of the fleet repairs in house would be great. This would mean a larger shop and increased fleet Techs as well as apprentices in order bring younger Techs into the City shops in order to grow our Techs to be great mechanics."

"We should maintain all equipment as we do a better job and are cheaper. Need more space and techs"

Personal Development

"I aspire to be a fleet supervisor, however I'm not sure if that opportunity will open up here for me."

"Training is provided on a regular basis"

Pay Scale

"We need more work in house as we do it better, cheaper and more effectively. Better compensation would improve moral and keep good people here."

"I have no problems with anything except our pay rate. We all have worked hard to get and maintain our skilled trade licenses. It's disheartening to see unskilled labour sometimes getting compensated as much or more than us. Workers at local dealerships are in the $30 plus range mostly with only a 310-S."

"I don't feel I'm compensated fairly for the responsibilities I hold."

"The pay rate is not fair if compared to other equivalent sized municipal fleets. Neighboring municipalities offer higher pay rates."

"Much underpaid compared to neighboring municipalities."

"The rate of pay for the job that is performed is not at the proper rate of pay."

"Our skilled labour pay is much lower than any neighbouring municipality or repair facilities. It would be nice to retain and attract good skilled labour."

Apprenticeship Program

Legally, technicians must be either fully licensed (in good standing) or officially sponsored as an apprentice by the employing organization to work on vehicles and equipment. It is critical employers understand the intricacies of the skilled trades programs administered by the College of Trades (soon to be transitioned to the Ontario Government's Skilled Trades) to navigate all the rules and regulations.

If development of a strong pool of technicians with multiple accreditations (i.e. 310S, 310T) to meet the needs of a diversely mixed fleet of municipal vehicles and equipment is fleet managements preferred outcome, as we believe to be the goal of Kawartha Lakes fleet management, then an apprenticeship support program would be very effective.

As mentioned in the previous section, most apprentices are young and just out of school (either high school or college). They are eager to build their skills, gain work experience and hours towards their apprenticeship and as such can be incented with those considerations in mind.

Typically, new apprentices are incented by resources or training that can build their capacity, including:

- Tool allowances to increase their mix of tools which they otherwise could not afford until more financially secure. This increases the apprentice's capacity at work and therefore is a benefit to the employer as well. Typically, there is an approval process associated with a tool allowance to ensure the investment in the apprentice is beneficial to the company as well.

- Any type of training available. Most technicians will jump on the opportunity to participate in training (even if it's not related to their day-to-day). Apprentices may volunteer for these opportunities even if it means coming into work off-shift (unpaid). This may be impossible in a unionized work environment.

- Having the opportunity to shadow more experienced technicians to learn the tricks of the trade. Theoretical learning is a core component of apprenticeship, but hands-on learning cannot be replaced by any textbook. Often, apprentices will go above and beyond if they can shadow, and learn from, respected technicians on staff.

Consistent with the employee profiles described in *Table 3,* when a young apprentice in time becomes a licensed 310S technician, he/she may have the impetus, enthusiasm and interest in continuing their training so as to augment their personal skillset to include other trade designations. These may include 310T, 310J, EVT or battery-electric vehicle training, which is expected to be

available soon. Potentially, their pursuit of additional training and trade designations takes place when they are younger and eager to learn and, in doing so, increases their earnings potential.

Challenges

As we have described in this section of our report, recruiting qualified vehicle technicians has been a perennial problem and continues to be the case in today's market. Retaining technicians is often problematic as some skilled, licenced technicians may be lured away by potentially higher earnings or perceived better conditions elsewhere. Some vehicle technicians may also be attracted to less physically demanding jobs at a point in their career.

The City's Fleet Technicians top rate of pay is $28.27 per hour. A full review of pay scales for similar positions in the Kawartha Lakes area is beyond the scope of this project. However, RSI-FC completed online research and a market scan (https://mechanicshub.com). Our research indicates that pay rates at CKL may be anywhere from $7-12 per hour less than surrounding areas.

Recruiting and retaining suitable new technicians, with the requisite training, skills and endorsements to meet the demand has already become increasingly challenging. Attracting younger technicians from the private sector is difficult as they make up to $10 per hour more and most have some form of benefit packages.

All current technicians in CKL Fleet & Transit Services have the 310S and 310T designations necessary for servicing a diverse fleet of vehicles from cars up to heavy trucks. CKL management is reviewing this requirement as it struggles to hire competent people with both licenses.

Additional skills-training will be required to service emerging technologies in the future, such as electric vehicles. Emergency vehicle training (EVT) training is also important training for servicing CKL's Fire and Emergency Services vehicles.

From our surveys we learned that CKL's technicians would be interested in advancing their skills. Further, they would be incented to increase their skills training if it meant a pay scale increase.

Opportunities

Fleet Succession Planning

Many technicians have no desire to change career paths at any time in their employment. But for those who do seek career advancement and the possibility of transitioning away from the shop floor someday, making options available to them and prioritizing their recruitment for other positions may be attractive.

RSI-FC is of the opinion that a recruiting-from-within approach for less physically demanding roles in Fleet and Transit Services would retain the knowledge and skills of the most experienced fleet technicians. Here are some examples:

- Chief or Lead Technician (a hands-on shop floor role but less physically demanding)
- Fleet Supervisor
- Stock Room Attendant
- Fleet Analyst (management position)
- Driver Trainer (management position)
- Fleet Manager (management position)
- Fleet management information system administrator (including FMIS, ELD and fuel data systems functionalities)

Synopsis – Fleet Technicians

Recruiting for CKL Fleet Technicians has been an issue for more than five years. The City has been seeking to fill two technician positions for more than a year, only recently filling one; recruiting continues for the second.

From our labour demand calculations, we have determined that the current number of Fleet Technicians is at less than the minimum level required. Should one of the current Fleet Technicians decide to vacate their position for a higher-paying job elsewhere, or for any other reason, it will exacerbate the City's longstanding issue of attracting skilled talent. This would expose the City to a risk in that the Fleet Technician labour shortage would mean seeking alternatives to in-house fleet maintenance – including costly outsourcing.

RSI-FC believes that the issues of recruiting and retaining technicians are intertwining and may be addressed by a four-pronged approach:

(1) **Pay Rate Review:** A wage review of surrounding municipalities and the private sector

(2) **Attracting New Technicians:** The introduction of an apprenticeship program in Fleet and Transit Services to attract young, ambitious talent into the vehicle technician trade

(3) **Technician Skills Development:** Incremental pay-scale classification increases for technicians who acquire additional trade designations. This would incent technicians to progressively increase their skills and accreditations, and in doing so, their pay scale

(4) **Retaining Technicians:** A Fleet Services succession plan in which senior-most Fleet Technicians are given priority status for less physically demanding roles within the Fleet Services department

Recommendations – Fleet Technicians

- A Fleet Technician wage review should be undertaken of surrounding municipalities and the private sector, with the possibility of an increase to market-based pay rates for the area of CKL.

- Consider implementation of the 4-step approach to Fleet Technician recruitment as we have described.

- A Fleet Technician apprenticeship program is recommended to help address the issue of technician recruitment. It would also groom technicians who will gain knowledge and experience with the unique and diverse specialities and requirements of municipal fleet maintenance.

- Within the collective agreement and City of Kawartha Lakes Human Resources job classifications, implement a pay scale aligned with increased levels of technician licences and accreditations.

- Consider offering staff the ability to learn/acquire the skills to perform positions in Fleet which may be less physically demanding, should such positions become vacant.

Fleet Driver Training

In most public sector fleets, the drivers of fleet vehicles are managed by, and the responsibility of, the vehicle user departments. The Fleet Department typically plays a role in providing driver training, and the drivers of fleet vehicles can directly impact the fleet's safety rating.

For reasons of due-diligence, worker and public safety, and skills-enhancement, engaging the services of a fleet driver and equipment trainer is an essential best management practice for municipal fleets. Driver training programs vary between municipal fleets but typically include pre-hire and orientation sessions, on-road training, abstract reviews, remedial one-to-one training for drivers who have had repeat incidents, and refresher training courses.

There are no published standards or guidelines around how frequently driver refresher training should take place. Credible published recommendations or best practices on these matters are not readily available from any known source. In the author's own experience as a former fleet manager responsible for providing driver-training for 1,500 commercial drivers, yearly driver refresher training was determined to be the optimal interval for providing a Professional Driver Improvement Course (PDIC) to all drivers.

Over time, many things can change regarding rules and regulations that affect commercial drivers. As well, physical and mental changes that may impact the performance of individual drivers can occur; onset of disabilities may be gradual and not immediately detected by the affected individuals or their employer.

There is no single answer to the question of how frequently driver training should take place; it is something that should be determined by trend-analysis. Our recommended approach is to begin by ramping up training in increments, starting with the highest-frequency groups as identified by studying past trends (such as light-duty vehicle drivers versus medium/heavy-duty truck drivers). Continue to monitor the impacts of the additional training and then make course-corrections as required until collisions begin trending downwards.

Driver Guidebook

A driver's guidebook (or handbook) is an invaluable aid for new-hires and existing employees alike. Leading fleet managers ensure that such a document is available and up-to-date. This ensures consistency in fleet operations.

At minimum, a driver's guidebook should describe standard operating procedures, practices, and policies around vehicle operations. It should include contact information and inform drivers about fueling, emergency and accident procedures, and provide tips about safe and eco-friendly vehicle operations.

Synopsis - Fleet Driver Training

RSI-FC is of the belief that CKL should ramp up its driver training and safety programs.

Recommendations – Driver Training

- Consider engaging a driver trainer, whether in-house or from an external service provider.
- Consider driver training in increments and study the impacts of the increase. Continue to increase training frequency until a satisfactory level of accident reduction is attained.
- Consider a third-party CVOR “mock audit” to identify gaps in fleet safety program.
- Continue to monitor vehicle and equipment collisions and claims as is the current practice.
- Segment collision data into vehicle categories (light-duty vehicles, medium and heavy trucks)
- Study the collision trends to determine the drivers requiring more focused training.
- Consider posting costs for at-fault vehicle collisions to user departments whose drivers were responsible, thereby potentially incenting departmental managers to take part in and support remedial actions for their drivers.

7.6 Fleet Operations

Utilization

It is a fleet management best practice to act on reducing the number of low utilization units in the fleets on an ongoing basis. If vehicles are redundant, they may be stranded assets and an unnecessary financial drain.

Reducing fleet size by disposing of under-utilized units will free up capital that could be re-applied to newer vehicles, thereby reducing the fleet's average age and operating costs, while increasing fuel efficiency and lowering emissions.

Measuring Utilization

Making informed assessments of the precise metrics to define the levels of utilization for a municipal fleet is a daunting task. There are few known and/or published statistics, clear definitions or guiding protocols regarding utilization levels for municipal fleet vehicles. Most often it is left up to the best judgment of municipal departmental managers to make their own assessments as to whether their assigned fleet vehicles are being utilized fully, based on their personal definitions of acceptable usage.

It is RSI-FCs contention that ideally, municipal vehicle utilization should be assessed based on the number of hours-of-use for each vehicle as posted to work orders within a municipality's enterprise resource planning (ERP), or other such system. ERP systems are becoming more commonly used by municipalities to track progress on, and costs of, capital projects and municipal services provided to constituents.

When fleet vehicle hours-of-use are posted to municipal work projects as we have described, the value of each vehicle asset to the community can be assessed, relative to the services for which the unit is required to perform.

As data of this type accrues, in time, management can then accurately determine the cost of owning municipal vehicles by each category, and the actual cost of using these vehicles to complete the municipality's work. Further, this method enables evaluation of, for example, whether it is more economical for the municipality to own and operate its own vehicles versus the engagement of contractors' units or obtaining some alternate form of service-provision.

In the absence of the business processes and software tools we described in the previous paragraphs, or any other suitable metrics, total annual kilometers-travelled (kms-travelled) is most often used to assess municipal fleet vehicle utilization.

Obviously, kms-travelled would be a meaningful statistic for a fleet of commercial over-the-road transport trucks which derives its revenue by charging their customers on a ton/kilometer or some other distance-based rate formula.

Kms-travelled each year is far less meaningful, or possibly even non-applicable, to municipal fleet vehicles. For example, vehicles may be used to move a crew of workers, their gear and job materials to a worksite just a few kilometers from their base of operations, where the unit may remain parked for the remainder of the day. Vehicles used in this way may only travel a few kms per day and applications like this are abundant in all municipal fleets. Despite low kms-travelled, these units are every bit as valuable as vehicles that are used in high kms-travelled applications such as the commercial transport fleet vehicle example we've described.

With this conundrum in mind, we cautiously present the following data with the caveat that making assessments of municipal utilization, measured by kms-travelled, must be kept in context. We believe that reports and statistical information highlighting vehicles with chronically low kms-travelled should serve as alerts to management of low-usage fleet vehicles. Such information should initiate further management review around the value of low usage units to fulfillment of the corporate mission.

Availability

Availability (also referred to as uptime) is a prime success indicator of fleet management. Availability is the opposite of downtime. It is a key responsibility of fleet managers to ensure that vehicles have maximum availability during business hours.

There are only two ways to increase fleet availability:

1) Reduce the fleet's age by investing in newer, more reliable vehicles, or
2) Increase the frequency and/or intensity of preventive maintenance

Regardless of which of the two methods are employed, availability is a critical success measure that should be tracked and monitored and managed. Leading fleets monitor their availability performance measure and their managers implement appropriate actions when uptime is low. Downtime is defined as the period when a vehicle is not available for use during prime business hours. Downtime includes unavailability due to reactive repairs (breakdowns) as well as accidents or negligent damages caused by the unit's operator. Downtime and availability should be tracked and managed in the fleet management information system.

The "Just in Case" Fleet

In our experience as career fleet-managers-turned-fleet-consultants, we recognize that a condition often exists in many fleets we refer to as *"the just in case fleet"*. As this moniker suggests, some line managers and supervisors may cling tenaciously to additional vehicles so their departments will be ready if extra vehicles are required during peak times, emergencies or in case of vehicle breakdowns for their primary units.

Oftentimes, the root cause for this phenomenon is that their assigned fleet vehicles have become old and unreliable. User department managers wish to be prepared in case of yet another vehicle breakdown and, thus, the number of low-utilization spare units increases. The result is that the fleet continues to grow and become populated with under-utilized units, all with associated fixed costs. Right-sizing the fleet is critical and the fiscally responsible answer.

We stress the importance and criticality of completing lifecycle analysis to fully understand and confidently know vehicles total cost of ownership and optimal lifecycles, having a younger and more reliable fleet, reducing downtime while saving operating costs, and holding the line on fleet size.

Monitoring Utilization Rates

Leading fleet managers will act on reducing the number of low utilization units in their fleets on an ongoing basis. If vehicles are redundant they may be stranded assets and an unnecessary financial drain on the organization.

Reducing fleet size by disposing of under-utilized units will free up capital that could be re-applied to newer and more fuel-efficient vehicles, thereby reducing the fleet's average age, increasing fuel efficiency, and reducing emissions and operating costs.

We suggest a cautious approach in any plans for downsizing. Plans must be orchestrated carefully and in consultation and agreement with user-group managers to avoid potential service disruptions due to insufficient number of vehicles.

Monitoring Availability Rates

Also referred to as "uptime", availability is a prime success indicator of fleet management. Availability is the antithesis of downtime. It is a fleet manager's key responsibility to ensure that vehicles have maximum availability during business hours.

Synopsis – Fleet Operations

Reducing fleet size by disposing of under-utilized units will free up capital that could be re-applied to newer and more fuel-efficient vehicles, thereby reducing the fleet's average age and operating costs, while increasing fuel efficiency and lowering emissions.

Recommendations - Fleet Operations

- Fleet & Transit Services should routinely track, monitor, and report the utilization of all units to user department managers as a means of managing the overall productivity of the fleet.
- A corporate standard and policy for minimum vehicle utilization should be established.
- A corporate policy or directive from the highest levels of the municipality should require managers of all departments to regularly review their assigned vehicles and surrender any units that are under-utilized, unless a business case exists to retain the units.

7.7 Preventive Maintenance

Fleet Preventive Maintenance Programs - Overview

A prime indicator of fleet management success is a high level of vehicle uptime. As described in the previous section, there are only two ways fleet managers can achieve increased uptime: (1) acquire newer, 'younger' vehicles or, (2) ensure a highly-effective preventive maintenance (PM) program is in place. If sufficient funds are not available for purchasing newer vehicles, then fleet management must ramp up PM activities; otherwise, availability and reliability will suffer while operating costs increase. Safety may also be negatively affected as the fleet's vehicles continue to age.

Through preventive maintenance vehicles are inspected, repaired and maintained to prevent defects and failures which could lead to accidents and violations. If preventive maintenance is not performed regularly, vehicle life spans will be reduced. Some vehicles may be prone to excessive breakdowns requiring expensive repairs causing a vehicle to be out of service when least expected and possibly when needed most. Vehicles may become unsafe due to a lack of PM.

Proper maintenance will help avoid litigation from negligence[17]. Preventive maintenance is as necessary as a driver safety program. If a vehicle becomes unsafe due to lack of maintenance or repair, the fleet manager can be liable for negligent entrustment. As defined, liability is premised upon providing an employee with a dangerous tool or instrument, such as a vehicle, while knowing or having reason to know that use of the vehicle creates unreasonable risk or harm to others. Simply stated, the vehicle must be safe to operate. Should, for example, the brakes fail, causing a severe crash or fatality, authorities may impound the vehicle for investigation.

Should the investigation determine defective brakes or other vehicle malfunctions contributed to the accident, authorities can seek a court order to obtain vehicle maintenance records. If the fleet manager fails to produce evidence that they practiced preventive maintenance, under these circumstances, he/she could be prosecuted for negligence.

For these reasons and without exception, all leading fleets employ a system of minor and major PM inspections. PM events are often designated as A, B, C, D, etc. As one moves down the alphabet from A to B and so on, the PM (and completion time required) increases in complexity. The actual maintenance portion of PM is composed of scheduled, standardized inspections and maintenance. An "A" level PM ("A" is usually a minor PM) generally consists of a safety check and lubrication as well as checks of critical components such as brakes, lights, steering, tire condition and inflation,

[17] Source: www.fleetowner.com

fuel filter replacements and fluid level checks. It also includes checking and adjusting high-wear components.

A "B" inspection is more complex and includes all aspects of an "A," but is a deeper level of checks that may include a wheels-off brake inspection, battery, and alternator testing, transmission and differential servicing, filter changes and breather servicing and fuel filter changes among other procedures determined by the vehicle's manufacturer. A "B" level PM may also include a download of the ECM and action on any trouble codes or problems reported by the ECM (if applicable).

Reactive Repairs vs. Preventive Maintenance

When a vehicle is brought into a garage needing something unexpected or unplanned, it is described as a reactive repair. Reactive repairs are based on failures, which result in downtime and costs associated with idle equipment.

A PM program, on the other hand, brings vehicles in for inspection and maintenance on a schedule and repairs any items that meet or are approaching a fixed cut-off point. Being proactive about PMs means making repairs on a pre-determined schedule, preventing violations and accidents, and keeping the vehicles rolling.

In leading fleets, management uses its fleet management software system to determine which, and when, vehicles are due for preventive maintenance. Frequency is determined through legal requirements, manufacturer's recommendations, and observation of past vehicle reliability histories relative to preventive maintenance inspection scheduling (i.e., when inspections are not completed frequently enough, or with insufficient thoroughness, failures and breakdowns can occur).

Another PM scheduling consideration is the matter of truck air brake adjustments. Today, some MD and HD trucks are equipped with air disc brakes or drum brakes with automatic slack adjusters. Both types of brakes still need to be inspected, and for the latter type (drums with auto slack adjusters), the brakes need to be manually adjusted, inspected and serviced from time to time. This is a basic operation in most fleet's "A" and "B" PM routines.

Leading commercial fleets place the highest level of importance on preventive maintenance (PM). Effective PM programs are designed to avoid reactive repairs and resultant downtime. Reactive repairs include vehicle breakdowns and other unexpected failures, which are costly. This is not only because of the costs of unplanned repairs but also due to the cost of spare vehicles or rentals, plus the costs associated with the loss of productivity (such as the driver – or an entire crew – unable to complete his/her/their work that day).

Identifying whether the costs for work performed by mechanics are either PM (planned) or reactive (unplanned) is another easily-adaptable, world-class best management practice that we strongly recommend. By separating reactive repair and PM costs, analysis and decision-making can be informed around the effectiveness of PM programs:

- Are the frequency and intensity of PM inspections adequate to reduce downtime?
- Are reactive repairs increasing as vehicle(s) age, and causing increased downtime costs?

PM Scheduling

Most fleets synchronize their "A" and "B" PMs with routine oil changes to avoid multiple trips to the shop and extra downtime. Typically, a minor "A" inspection should be carried out several times per year. For light-duty vehicles, the usual interval for "A" level PM is between 2,500 to 5,000 kilometers, coupled to a time interval not to exceed a pre-determined threshold (such as 30-120 days depending on utilization levels), and between 8,000 and 16,000 kilometers for medium- and heavy-duty vehicles, also coupled with a time-interval (days/weeks/months) threshold.

In some settings, such as utilities, municipalities, and other low mileage applications, km-based PM intervals may take a very long time to accrue. Therefore, if kms-traveled are the primary (or only) maintenance trigger, insufficient PM events may be scheduled, and failures (reactive repairs) may result. Time-based (days/weeks/months) parameters for PM would be the better choice of trigger points for low-mileage fleets like municipalities.

Conversely, a potential problem is when time-based intervals are the sole maintenance trigger, some high-usage vehicles may be under-maintained, while for low usage units the interval could be extended. A second, or even third, parameter should be employed. For this reason, some low-mileage fleets opt to base their PM scheduling on engine hours operated and on a second time-based parameter (days/weeks/month) since the last PM to prevent units "falling through the cracks."

Maintenance scheduling is an elaborate and exacting science: under-maintaining or over-maintaining vehicles can both be very costly. That is why leading fleets employ fleet management software systems with robust and complex PM scheduling capabilities. For example, if a large fleet of 500 trucks conducts just one premature PM per year per truck at the cost of say $1,000 each, including downtime, the annual cost would be 1/2 million dollars.

Under-maintaining has its own costs, which could include failed engines, breakdowns, or worse. Either of these scenarios is costly – if a vehicle is under-maintained, it can lead to expensive failures and potential safety issues. If a unit is over-maintained, it means that premature and unnecessary costly inspections may be occurring while wasting resources.

Scheduling PMs based on engine hours can make sense for fleets with widely variable usage patterns, but again should be based on dual parameters (such as a time-interval) to ensure no PM inspections are missed.

We suggest that a solution is to use a minimum of two parameters for PM scheduling. When either of the two parameters are reached, a PM event will be triggered. If the first parameter is missed and the threshold exceeded, the second parameter will become a failsafe. An example is to schedule a vehicle's next PM event when it reaches the first of two parameters. For example, regardless of whether a vehicles travels "x" thousand kilometers or "y" number of months first, a PM event will be triggered in either case. In this way, vehicles will not be over-maintained or under-maintained.

Maintenance Ratio

Maintenance ratio is a performance indicator that informs fleet managers about the ratio between the cost of preventive maintenance (PM) and reactive repairs (i.e., breakdowns). This KPI is used to determine whether PM activities are sufficient to avoid costly and unplanned reactive repairs and breakdowns.

While there is no perfect ratio, RSI-FC has studied this statistic over the past years and concluded that a ratio of .5 (50 cents spent on PM work of every $1 spent on reactive repairs) results in the highest levels of vehicle uptime.

If reactive repair costs and vehicle downtime are seen to be increasing, this may be an indicator that PMs need to be completed more frequently or more thoroughly (or both) to reduce the reactive repair rate and increase uptime.

Engine Oil Sampling & Lab Analysis

By tracking downtime and maintenance ratio as described in the previous section, fleet managers can assess the frequency with which specific units need PM inspections and oil changes. But we recommend another consideration to help reduce waste and cost – engine oil sample analysis for vehicles and equipment. Laboratory oil sampling is inexpensive and pinpoints precisely when oil and filter replacements should be completed in order to reduce engine wear and extend life.

Laboratory oil analysis could mean extending the intervals between oil changes, which would save considerable resources and money. Once sampling has been completed, maintenance personnel can compare the laboratory's oil change frequency recommendation to the fleet's planned intervals for PM inspections and make well-informed decisions regarding optimal maintenance intervals.

PM Worksheets

Leading fleets, including CKL Fleet & Transit Services, and the Paramedic and Fire sub-fleets employ standardized PM worksheets designed to guide technicians in completing PM inspections to ensure nothing is missed and provide an audit trail.

A well-designed PM worksheet should be a "living document," which evolves over time and, at minimum, includes vehicle manufacturer recommended inspection tasks. Tasks that are set out on the PM worksheets should include inspection of, and making corrections to, items that have been troublesome in the past.

By carefully reviewing repair histories, trends emerge that may require the need to add additional tasks to PM worksheets. This is the essence and science of preventive maintenance – heading off problems before they happen.

Predictive Maintenance

Once adequate historical data exists in a fleet's management system (FMIS), fleet management can perform database searches and run reports to identify repetitive equipment failures and pinpoint when they are likely to occur. In this way, failures can be predicted with some degree of certainty and repairs executed in advance to head off imminent breakdowns (hence the name "predictive" maintenance).

An example of predictive maintenance might be having the ability to forecast an alternator failure before a costly and disruptive breakdown. Another is replacing a heavy truck's brake linings before the very costly brake drums become scored and require replacement.

Downtime

Downtime and its cost impacts should not be ignored. Leading fleets monitor vehicle downtime and their associated cost impacts on a per-unit basis, including direct (e.g., towing, service calls, rental/loaner vehicles), and indirect costs which include the cost of work disruption and loss of productivity for the user department/division, the wages of the driver of the vehicle, and more.

This practice is especially important to measure the effects of PM efforts relative to fleet aging and provides essential information for fleet managers since it directly reflects the effectiveness of fleet management decisions and vehicle age and preventive maintenance activities.

Once a history of downtime and maintenance ratios is available for all vehicles in the fleet over a period, management can then make well-informed decisions about the level of downtime that is acceptable to maintain good service for vehicle user-departments.

By comparing the downtime and maintenance ratio for each vehicle, trends will in time emerge. Historical data will show which types of vehicles are less reliable and costlier. Fleet management is then able to complete causal analysis. In some cases, preventive maintenance may need to be ramped up with more intensive PM inspections or intervals of a higher frequency.

Synopsis - Preventive Maintenance

Through preventive maintenance vehicles are inspected, repaired and maintained to prevent defects and failures which could lead to accidents and violations. If preventive maintenance is not performed regularly, vehicle life spans will be reduced.

Some vehicles may be prone to excessive breakdowns requiring expensive repairs causing a vehicle to be out of service when least expected and possibly when needed most.

Recommendations - Preventive Maintenance

- We recommend monitoring downtime and associated costs for all vehicles.
- A fleet management information system (FMIS) is recommended for precise PM scheduling
- Consider tracking the ratio of PM: reactive repairs as a way of determining the optimum frequency/intensity of PM activities. If reactive repair costs and downtime are seen to be trending upwards, increase the focus on PM.
- We recommend that as "living documents," PM worksheets should continue to be reviewed and updated regularly (as they are now) and suggest revisions should be visibly identified by displaying the date on each PM worksheet each time they are amended.

7.8 Minimizing Fuel Consumption

Corporate Average Fuel Efficiency

The cost of fuel is usually one of the largest controllable costs for most fleets. Proactive fleet managers will make it one of their top priorities to ensure their fleet is as fuel-efficient as possible. Reducing fuel use is critical, both fiscally and environmentally.

A best management practice aimed at reducing fuel usage is to monitor the fleet's corporate average fuel efficiency (CAFE). We feel that CAFE is one of the most important KPIs for cost-conscious fleet managers to monitor and take actions for improvement.

CAFE is directly reflective of a fleet's footprint. In essence, CAFE is a measure that encompasses many facets of fleet operations ranging from driver behaviours (such as unnecessary idling, harsh driving, unnecessary trips) to right-sizing of vehicles for their assigned tasks (getting the job done with more fuel-efficient vehicles) to the use of alternate and renewable low-carbon fuels. CAFE is also impacted by the fleet's average age since older vehicles are less fuel-efficient than modern units, they burn more fuel and, consequently, cost more to operate and produce more emissions.

Similarly, auto/truck manufacturers are required to measure and report their CAFE to the government as this is reflective of the mix of the vehicles in their lineup and their corporate environmental footprint.

CAFE indicates the fleet's overall performance, and therefore we feel it is a key performance indicator (KPI) to watch closely. Improvements to this KPI are evidence that the fleet is on a healthy trend, and strategies undertaken to improve the fleet's performance are working.

Baseline CAFE for the CKL fleet is included in the Fleet Analytics Review™ (FAR) reports which RSI-FC will provide separately to the City.

Exception Units – High Fuel Consumption

Frequent reviews of fleet exception units that are driving up fuel costs (and emissions) followed by remedial actions on a case-by-case basis are best management practices that result in reduced fuel usage, cost and emissions.

The recommended course of action is to: (1) pinpoint the problem units, (2) find the root cause(s), and (3) take corrective actions.

The following are some considerations when managing high fuel exception consumption units:

- Are there mechanical problems in the vehicle(s) (i.e., scan test or run a five-gas analysis)?

- Are the vehicles matched to their job requirements (i.e., are the vehicles too big or too small)?
- Are the vehicles technologically outdated (i.e., modern electronic engine coupled with a programmable electronic transmission vs. outdated engine technologies and a driver-controlled manual transmission)?
- Can lower cost/emission fuels be employed (i.e., diesel/biodiesel, compressed natural gas, gas/electric hybrids)?
- Can operational practices be improved upon (i.e., route planning, trip optimization)?
- Are units idling unnecessarily or driven harshly (i.e., managing driver behaviors)?
- Are there idling reduction technologies that can be employed (i.e., idling stop/start devices, auxiliary cab heaters or battery systems)?
- Are better transportation options available (i.e., mode shift – carpooling, car sharing, or employee-provided vehicles)?
- What are the weather impacts (i.e., was the past winter more severe)?
- Is the fuel posted to units going into the fleet's vehicles? Perhaps it's being used for gas-powered tools, other fleet vehicles – or possibly even being pilfered?

Driver Behaviors – Excess Idling

Engine idling is an unavoidable reality in municipal fleets, however *unnecessary* idling should be managed. Therefore, we recommend vigilance regarding *excessive or unnecessary* idling.

Most drivers wish to "do the right thing" and merely suggesting to them that excessive idling is not acceptable is often enough. For others, old habits are hard to break. All drivers would benefit from driver eco-training around the negative effects (i.e., fuel costs, emissions, health impacts) of idling. Fuel-efficient driving can come in many forms, from hiring an eco-training contractor to setting up an in-house eco-driving trainer or offering online training.

Idling vehicles are bad optics for any organization. The public is keenly aware of this issue, and bad opinions can develop from seeing a fleet's vehicles idling unnecessarily, wasting fuel and money as well as polluting the air. While there are times that idling is unavoidable, socially responsible companies take this matter seriously and do not allow their company drivers to idle unnecessarily.

Synopsis – Minimizing Fuel Consumption

The cost of fuel is one of the largest controllable costs for most fleets. It should be a top priority of CKL's fleet management to ensure the fleet is as fuel-efficient as possible. Reducing fuel use is critical, both fiscally and environmentally.

Recommendations - Minimizing Fuel Consumption

- Consider tracking corporate average fuel efficiency (CAFE) as a KPI and setting an annual target for improvement.
- Routinely (monthly/quarterly) monitor the fuel consumption of all fleet vehicles.
- Identify the outliers – those with higher than average fuel consumption and take corrective actions.
- Consider eco-driver training or idling reduction driver training.
- Consider using telematics to identify high engine idling – particularly in situations where it is unnecessary, such as when PTO is not engaged, or when heating/air conditioning is not required.
- Consider the use of idling reduction technologies – idle shutdown devices or auxiliary cab heaters.
- The CKL idling policy should be a top-down driven initiative supported at the top levels of CKL, enforced by line managers

7.9 Fleet Safety

Motor vehicle collisions are a leading cause of death and injury. Collisions – both on and off the job have far-reaching financial and psychological effects on employees, their co-workers and families, and their employers.

Vehicle Safety Overview - the Canadian Fleet Perspective

Commercial Vehicle Operators Registration

The Commercial Vehicle Operators Registration[18] (CVOR) is the registration system for operators of commercial motor vehicles. It is the part of the Highway Traffic Act under which operators of these vehicles are identified.

The CVOR also allows the Ministry of Transportation (MTO) to suspend or cancel an operator's certificate. Operators have the following responsibilities for all drivers and vehicles in their operation:

- The conduct of the driver
- Employing qualified and licensed drivers
- Monitoring the safety performance of drivers, including hours of service
- Resolving driver safety issues when they are identified
- The mechanical safety condition of the vehicle
- Keeping vehicles in good, safe condition at all times
- Ensuring that daily and annual/semi-annual inspections are completed
- The shipping of goods or passengers in the vehicle
- Ensuring load security
- Keeping records on file (e.g., vehicle repairs, kilometres travelled per year, annual inspection reports, etc.)
- Notifying the Ministry of Transportation of changes to names, addresses, telephone numbers, fleet data, kilometric travel, changes in corporate officers, etc.
- Renewing the CVOR certificate before expiration

In Canada, regulations governing commercial vehicles, drivers, and motor carriers are based on the Canadian National Safety Code (NSC) standards. The NSC is a code of minimum performance standards, applying to all persons responsible for the safe operation of commercial vehicles[19].

[18] Source: http://www.mto.gov.on.ca/english/trucks/commercial-vehicle-operators-registration
[19] Source: http://www.cvse.ca/index.htm

Based[20] on National Safety Code standards, data is collected to determine a carrier's rating, considering history such as violation tickets, out-of-service records, and at-fault crashes. Inspectors are trained in spotting defects on commercial vehicles; the carrier's rating, combined with what the officers see on the road, allow them to separate the good from the not-so-good (or unknown).

A commercial motor vehicle is:

- A truck or highway tractor with a gross weight or registered gross weight of more than 4,500 kilograms (kg)
- A bus with a seating capacity for ten or more passengers

Compliance with commercial vehicle regulations is enforced on-road by Ministry of Transportation enforcement officers and police officers, as well as through facility audits.

Ministry officers and police conduct inspections on commercial vehicles to make sure they are being operated safely by qualified drivers. Where a commercial motor vehicle or trailer is found to be in such an unsafe condition that it endangers other people on the highway, the vehicle may be prohibited from operating until required repairs are made. Commercial vehicle drivers and companies that fail to comply with many of these requirements may be fined up to $20,000.

Under Ontario's commercial motor vehicle impoundment program, critically defective commercial vehicles are impounded for a minimum of 15 days. If one or more critical defects are found on a bus, truck or trailer, an officer will remove the plates and inspection stickers from the vehicle and impound it.

Wheel Separation

Wheel separation involving commercial motor vehicles is closely monitored and action is taken when operators are involved in these serious offences. The following measures have been introduced to reduce wheel separation or wheel-offs for commercial vehicles:

Daily Inspection Requirements for Drivers and Operators

- An absolute liability law for wheel separations
- Specialized training for technicians involved with wheel installations
- On-road inspections from ministry enforcement officers & specially trained police officers
- Fines for wheel separations ranging from $2,000-$50,000

[20] http://www.mto.gov.on.ca/english/trucks/commercial-vehicle-safety-requirements.shtml

Truck Speed Limiters

By law, most large trucks driven in Ontario and Quebec are required to use electronic speed limiters that cap their speed at 105 km/h. This applies to commercial motor vehicles that:

- Were built after December 31, 1994
- Are equipped with an electronic control module
- Have a manufacturer's gross vehicle weight rating of 11,794 kg or more

Exemptions apply only to a limited number of vehicle types, such as ambulances or fire trucks.

Safety Inspections

Periodic inspections are required for commercial motor vehicles, trailers and converter dollies. These inspections help reduce collisions caused by mechanical defects and improve highway safety throughout Canada. There are three safety inspections:

1. Annual
2. Semi-annual
3. Safety standard certificates

Annual and semi-annual inspection requirements are the minimum requirement under the law. It may be found that additional inspections and maintenance are required to properly maintain a vehicle's on-road standards.

Inspection Criteria

Ontario, along with most Canadian provinces and territories, has adopted the National Safety Code 11, Part B, Periodic Commercial Motor Vehicle Inspections (NSC 11B) as the inspection criteria for annual, semi-annual and safety standards certificate inspections for commercial vehicles, school-purposes vehicles and accessible vehicles. The Highway Traffic Act Regulation 611 contains the requirements for these inspections, along with modifications to the NSC 11B (schedules 3).

Annual, semi-annual and safety standards certificate inspections must be completed by a licensed motor vehicle inspection mechanic at an MTO-licensed inspection station.

Safety Standards Certificates Inspection

Safety standards certificates are required for:

- Registering a rebuilt motor vehicle
- Transferring a used motor vehicle to a new owner as fit
- Registering a motor vehicle in Ontario that was registered in another province or country

- Changing the status of a vehicle from unfit to fit

If a vehicle meets all of the requirements of a safety standards certificate inspection, the certificate is issued and the vehicle is deemed fit.

Annual and Semi-Annual Inspections

Effective July 1, 2019, pickup trucks and trailers for personal use were exempted from the requirement for an annual inspection (both the inspection and displaying the yellow decal/sticker).

Annual Inspections: Personal-Use Pickup Trucks and Trailers

An annual inspection is valid for 12 months. Trucks, trailers and converter dollies, alone or in combination, with a total gross weight, registered gross weight or manufacturer's gross vehicle weight rating of more than 4,500 kg, require an annual inspection.

Total gross weight: the weight transmitted to the highway by the truck and/or trailer – includes the driver, passenger, fuel, equipment, tools, cargo, etc., carried by the truck and/or trailer

Registered gross weight (RGW): the maximum weight based on the fees paid for the truck licence plates, indicated in kilograms on the right (plate) portion of a truck's ownership next to "REG. GROSS WT." (trailers and converter dollies do not have a RGW)

Manufacturer's gross vehicle weight rating (GVWR): the maximum weight a truck is safely capable of weighing as declared by the manufacturer, indicated on the vehicle's vehicle identification number (VIN) plate

Buses, school-purposes vehicles used for transporting six or more persons, and accessible vehicles require inspections semi-annually (i.e. every six months).

A vehicle with a seating capacity for 10 or more passengers (not including the driver) is considered a bus. This can include large passenger vans, limousines, as well as vehicles commonly known as a bus.

A bus with a manufacturer's gross vehicle weight rating of 4500 kg or less and used for personal use is exempt from the semi-annual inspection requirement.

If a bus, school-purposes vehicle or accessible vehicle meets all the semi-annual inspection requirements, an orange sticker is applied to the vehicle and a certificate and report are issued by the inspecting station.

What an Inspection Covers

The following components are thoroughly inspected to check that they comply with the National Safety Standard and applicable legislation:

- Power train
- Suspension hydraulic brake system
- Brakes
- Steering
- Instruments and auxiliary equipment
- Lamps
- Electrical system
- Body
- Tires and wheels
- Couplers and hitches

Failed Inspections

If a vehicle doesn't pass an inspection, the owner will be required to repair it and have it re-inspected.

Daily (Pre-Trip) Inspections

The purpose of the daily vehicle inspection is to ensure that problems and defects have been identified before the vehicle is operated on the highway. Inspections prevent the operation of a vehicle with problems that are likely to cause or contribute to the severity of an accident.

HTA Regulation 199/07 contain the requirements for daily (pre-trip or "circle check") inspections that must be completed within 24 hours before driving.

Vehicles That Require Daily Inspections

- Trucks, trailers and converter dollies, on their own or in combination, with a total gross weight or registered gross weight of more than 4,500 kg
- Buses designed to transport 10 or more passengers, and any trailer towed by one of these vehicles
- Accessible buses modified to be used to transport persons with disabilities, if not being used for personal purposes only, and every trailer towed by one of these vehicles
- School-purposes vehicles and buses operating under contract with a school board or other authority in charge of a school being used for the transportation of 6 or more children or adults with a developmental disability

How Daily Inspections Work

- The vehicle is inspected before it is driven

- The inspection is conducted with the use of a schedule listing the vehicle components and systems that require inspection
- An inspection report is completed
- The inspection and report are valid for 24 hours
- The driver carries the inspection schedule and report in the vehicle
- The driver records on the report any defects found while enroute and at the end of the trip or day
- The driver reports defects to the operator at the time they are discovered – the operator must repair the defect immediately or before the next dispatch, and keep records of repair.

How to Complete a Daily Inspection

An inspection procedure (circle procedure or walk-around) that best suits the vehicle and its location can be chosen. No matter which order of items one chooses, each item on the applicable inspection schedule must be inspected.

Defects must be recorded on the inspection report, and the operator notified about them. Drivers must carry and produce an inspection schedule based on their vehicle, as well as a corresponding valid inspection report. If no defects are found on the vehicle, as defined in the inspection schedule, then "no defect" is recorded, and the inspection is valid for 24 hours.

If a "minor" defect is found on the vehicle, as defined in the inspection schedule, the defect must be recorded and reported to the operator as soon as possible. The operator is required to repair any defects that do not meet the performance standards. The inspection is valid for 24 hours.

If a major defect is found on the vehicle, as defined in the inspection schedule, the vehicle cannot be operated. Drivers must record the defect, report it to the operator immediately, and the vehicle must be repaired prior to being driven.

If a defect as defined in the inspection schedule is identified after the inspection is completed, the defect must also be recorded and reported to the operator. Should the identified defect be a major defect, drivers must stop operating the vehicle until it is repaired.

The National Safety Code program office monitors all carriers and each is given a safety rating. This rating is determined by their:

- On-road performance, and
- Record-keeping and safety-monitoring performance (if the business has been audited by a Carrier Safety Inspector).

The fleet's safety rating is shown on the front page of its Carrier Profile. A safety rating may be:

- Excellent
- Satisfactory
- Satisfactory – Unaudited
- Conditional
- Conditional – Unaudited
- Unsatisfactory – Unaudited

If a carrier's NSC Safety Certificate has been cancelled, the safety rating will be Unsatisfactory. The NSC program office monitors carriers through their Carrier Profile. A fleet operator will be contacted if its profile shows safety problems. The fleet may also be contacted for a random compliance review or audit.

Contact from the NSC program comes in several ways, including:

- Warning letter
- Safety plan self-assessment
- Compliance review
- Quantifiable audit
- Recommendation that an NSC Safety Certificate be suspended or cancelled

Electronic Logging Devices

Canadian fleets must start transitioning to electronic logging devices (ELDs) as the Canadian transport ministry has announced new regulations. The Transport Canada ELD mandate for commercial drivers is aimed at improving road safety and comes into effect in June 2021.

Currently, drivers of commercial buses and trucks in Canada are required to self-report their on-duty, off-duty and daily driving time, according to the Commercial Vehicle Drivers Hours of Service Regulations. Drivers must keep a daily log of driving records. Use of paper logs or electronic recording devices to record hours of service (HOS) is permitted at this time.

Official Canadian ELD regulations have been in the works for several years. In 2017, Transport Canada announced that it would be making electronic logging mandatory. Like in the U.S., Canada has provided a two-year phase-in period for ELD use. Canada is asking motor carriers to be in full compliance by June 2021.

Canadian ELDs must meet the Technical Standard for Electronic Logging Devices published by the Canadian Council of Motor Transport Administrators (CCMTA) which outlines the minimum requirements.

Canadian ELD regulations mimic U.S. regulations in that the ELD will be required to:

- Synchronize with the engine
- Provide GPS tracking
- Capture drive time automatically
- Use an on-screen display to show inspectors at roadside
- Allow special driving statuses – Yard Move (YM) and Personal Conveyance (PC)
- Have a mechanism to verify logs and agree to edits

Log Book Exemption

Under the Ontario regulation[21], a driver is not required to keep a daily log for the day if:

- On the operator's instructions, a commercial motor vehicle is driven solely within a radius of 160 kilometres of the driver's starting location
- The driver returns at the end of the day to the location from which he or she started

Log book exemption can create confusion when dealing with municipalities within 160 kilometres of the drivers starting location. Many believe this exempts municipalities from tracking hours of service. However, if a driver is not required to keep a daily log, RSI-FC believes the operator (the City of Kawartha Lakes) is obligated to maintain records for the day showing:

- The date, the driver's name and the location at which the driver starts and ends the day
- The cycle that the driver is following
- The hour at which each duty status starts and ends, and the total number of hours spent in each duty status
- The number of hours of on-duty time and off-duty time, within the meaning of this regulation, that the driver accumulated each day during the 14 days immediately before the start of the day, for which the driver was exempt from this regulation and not required to keep a daily log

For the purpose of the hour at which each duty status started and ended, if the driver is on duty within a municipality such that a number of periods of driving time are interrupted by a number of periods of other on-duty time of less than one hour each, the periods of driving time may be combined and the periods of other on-duty time may be combined.

The exemption from having to keep a logbook does not exempt a driver from being in compliance with the remainder of the Hours of Service (HOS) regulations; it applies only to the requirement of maintaining a logbook. If any of the above conditions that exempt the driver from keeping a logbook end, then the driver must maintain a daily log for each day he/she does not qualify for the exemption.

AVL Systems and ELD Systems – Decision-Making

AVL and GPS systems have been a growth industry since they began to emerge about two decades ago. The commercial fleet industry has seen many AVL/GPS telematics providers come and go through corporate mergers and acquisitions.

[21] Source: http://www.mto.gov.on.ca/english/trucks/commercial-vehicle-operators-registration.shtml

ELD systems, being an adjunct to AVL/GPS and relatively new, have already seen their share of providers. For both systems, throughout this period, just a few providers have excelled and emerged as the industry leaders; one such company is Geotab. Of the industry leaders, deciding which solution is the best fit can be challenging.

The key to success in selecting a system is identifying specific business needs and goals, then making objective comparisons between the industry leaders. Below is a list of criteria for consideration when selecting a system.

Service Contract, Warranty & Cost

- Monthly cost per vehicle
- Length of the service contract
- Length of warranty on hardware devices
- Additional fees for upgrades or feature improvements

Customer Service

- Is customer service outsourced or kept in-house?
- What will the overall customer service experience be like?
- What is the operational uptime of the solution? If the solution goes down, what are the procedures to communicate outages and time back online?
- Metrics and commitments such as average time to respond to emails, calls or online chat sessions

Training

- Is there an additional cost for training?
- Is training in various formats (i.e., web-based, in-person, video tutorials, etc.)?
- Is there easy access to help center or digital resources for ongoing educational purposes?

Ease of Use

- How easy is the solution to use?
- Is data easy to interpret and understand?
- How convenient is the solution setup for an administrator?
- Does the system offer a mobile app?
- Are there customizable views by users based on their roles and permissions?
- Can administrators easily update information stored in the solution?
- Are there easily customized benchmarks and alert thresholds?

Installation

- How long does installation take?
- How long will vehicles be off the road?

- Can installation take place at a time and convenient location?
- Flexibility around multiple installs if some vehicles are unavailable
- Use of certified installers who are trained in GPS fleet tracking installation processes

Reports and Dashboards

- Easily customizable so users see only the view they require
- Ability to schedule and export reports and dashboards to solution users and non-users
- Summarized data shown in a way that provides actionable results

References

- How many customers?
- Feedback from other users is provided

Challenges

Maintaining historical digital records of daily trip inspections and hours-of-work data are as critical as the current-day practice of retaining paper-based, hard copies of inspections. Paper-based, hard copy records are virtually permanent and require filing, archiving and storing the forms in a safe area in readiness in the event they are ever required for audit, or other purpose. Digital records are vulnerable, in that data can be deleted unintentionally and backup servers can fail. Therefore, historical data storage is a significant concern that must be addressed.

Commercial Vehicle Driver Training

In the fleet management world, it is widely known that there are numerous advantages that come from providing drivers with commercial fleet driver training. Commercial driver training can save lives and reduce the risk of life-altering injuries within the workforce. Driver training will protect an organization's human and financial resources and guard against potential company and personal liabilities associated with crashes involving employees driving on company business. Such a program can keep the driver, and those with whom he/she shares the road, safe.

There are no published standards or guidelines around the correct or appropriate ratio of municipal FTE drivers relative to driver trainers, much less how frequently driver refresher training should take place. Credible published recommendations or best practices on these matters is not readily available from any known source.

Anecdotal information and feedback from discussions with other professionals in the fleet industry tells us that, in general, five years between driver refresher training sessions was insufficient. In the author's own experience as a former fleet manager responsible for providing driver-training for 1,500 commercial drivers, yearly driver refresher training was determined to be the optimal interval for providing a Professional Driver Improvement Course (PDIC) to all drivers.

Many things can change over the years regarding rules and regulations that affect commercial drivers. As well, physical and mental changes that may impact the performance of individual drivers can occur; onset of disabilities may be gradual and not immediately detected by the affected individuals or their employer. For these reasons, RSI-FC suggests that training for commercial drivers should take place frequently – annual refresher training is a good option.

There is no single answer to the question of how frequently driver training should take place; it is something that should be determined by trend-analysis. Our recommended approach is to begin by ramping up training in increments, starting with the highest-frequency groups as identified by studying past trends (such as light-duty vehicle drivers versus medium- and heavy-duty truck drivers). Monitor the impacts of the training and then make course-corrections as required until collisions begin trending downwards.

Our recommended approach is to consider a third-party contractor, and/or a seconded City of Kawartha Lakes employee as interim solutions until accident trends and improvements from the increased training can be established.

Synopsis – Fleet Safety

Motor vehicle collisions are a leading cause of death and injury. Collisions – both on and off the job have far-reaching financial and psychological effects on employees, their co-workers and families, and their employers.

Driver training programs can change driver attitudes, improve behavior, and increase skills to build a "be safe" culture. Workplace driver safety programs not only make good business sense but also are a good employee relations tool, demonstrating that employers care about their employees.

Recommendations – Fleet Safety (Drivers)

- Prepare for Canada's electronic logging device (ELD) mandate – June 2021.
- Review and ensure compliance with Hours of Service (HOS) and Daily Trip Inspections legislation.
- Opinions differ around the applicability of ELDs and HOS in the municipal context when commercial motor vehicles are driven solely within a radius of 160 kilometres of the driver's starting location -- RSI-FC recommends CKL should seek expert legal advice on the matter

Driver training programs can change driver attitudes, improve behavior, and increase skills to build a "be safe" culture. Workplace driver safety programs not only make good business sense but also are a good employee relations tool, demonstrating that employers care about their employees. In the U.S., according to OSHA, the average crash costs an employer $16,500 (USD). When a worker has an on-the-job crash that results in an injury, the cost to their employer is $74,000. Costs can exceed $500,000 when a fatality is involved.

The real tragedy is that crashes are largely preventable. A growing number of fleet operators have established traffic safety programs as an opportunity to save lives. No organization should ignore a major problem that has such a serious impact on both its personnel and the company budget.

OSHA 10-Step Program

In the U.S., per OSHA, their 10-Step Program provides an excellent set of guidelines for what an employer can do to improve traffic safety performance and minimize the risk of motor vehicle crashes. The following are 10 key items OSHA recommends to ensure capable drivers:

1. Senior Management Commitment & Employee Involvement
2. Written Policies and Procedures
3. Driver Agreements

4. Motor Vehicle Record (driver abstract) checks
5. Crash Reporting and Investigation
6. Vehicle Selection, Maintenance and Inspection
7. Disciplinary Action System
8. Reward/Incentive Program
9. Driver Training/Communication
10. Regulatory Compliance

Acts of Terrorism

In several recent examples around the world, nefarious individuals bent on harming masses of innocent citizens have turned commercial vehicles into "rolling weapons of mass destruction" by driving into crowds of innocent people. In some cases, the vehicles used by these terrorists have been rental trucks, but we ask: what is stopping someone from simply stealing or hijacking a commercial or municipal vehicle to commit an evil act?

Often, due to the nature of their work, municipal and utility vehicles are left running and unattended at job sites in order to run onboard equipment or PTOs – is it feasible to ask drivers to lock the doors?

For another example, at the City's fleet parking areas, we suggest a review of where vehicle keys are kept – are they stored in a secure place? Access to vehicle keys presents a risk that should be managed, and we suggest a review of vehicle key management/control.

While an act of terrorism may be improbable, the possibility does exist. For this reason, we include this matter as a risk that should be managed.

The Coronavirus

The coronavirus (or COVID-19) and its potential impacts should not be ignored. Fleet managers have a major degree of responsibility for the at-work safety of their staff and to provide safe vehicles for fleet drivers. Managers should consider how the virus may affect fleet operations and take proactive measures.

Here are a few suggestions for proactive fleet managers to consider. The following are some basic, common-sense options for fleet managers to start taking action:

- Discuss a COVID-19 strategy with environmental, health, and safety (EHS) or workplace safety representatives and senior management.
- Most vehicles are equipped with cabin air filters - ensure they've been replaced recently and that routine replacement is part of your standard preventive maintenance procedures.

- Consider purchasing a stock of personal-sized hand sanitizers for placement in each vehicle and also make them freely available in the workplace.
- Encourage frequent hand-washing by placing signage in conspicuous places, including vehicles and the fleet workspace.
- Place personal-sized tissue packets in all vehicles and make them available in the workplace.
- Place waste bags in all vehicles and ensure that drivers dispose of them promptly.
- Consider providing a supply of antiseptic wipes in each vehicle to wipe all areas of contact such as door handles (inside and outside), steering wheels, gearshifts, dash controls, etc.)
- Encourage staff to stay home if sick and pursue treatment.

Synopsis – Fleet Safety

Canadian fleets must start transitioning to electronic logging devices (ELDs) as the Canadian transport ministry has announced new regulations. The Transport Canada ELD mandate for commercial drivers is aimed at improving road safety and comes into effect in June 2021.

The Commercial Vehicle Operators Registration[22] (CVOR) is the registration system for operators of commercial motor vehicles. It is the part of the Highway Traffic Act under which operators of these vehicles are identified. The CVOR also allows the Ministry of Transportation (MTO) to suspend or cancel an operator's certificate.

Recommendations – Fleet Safety (Legislative & Security)

- Fleet and Transit Services should consider having a third party conduct a CVOR mock audit to identify any gaps.

- Investigate and begin the transition to ELD systems including drivers daily pre/post trip inspection defects, mapping and route planning/optimization, and snow plow operation data.

- Ensure backup ELD records of driver pre-trip inspections and hours-of-service information are archived in a secure way that, consistent with statute of limitations legal requirements, ensures access in the event of a government safety or other audit.

- Consider a review with workers around vehicle security practices on job sites.

- Consider a review of where vehicle keys are being stored and the degree of security provided.

[22] Source: http://www.mto.gov.on.ca/english/trucks/commercial-vehicle-operators-registration

7.10 Environment

About Green Fleet Plans – An Overview

In Canada and around the world, leading companies and all levels of government have developed Green Fleet Plans to set out their short and long term carbon reduction targets; some may also include strategies for air/land/water pollution reduction.

A Green Fleet Plan may also include the fleet's green initiatives for its maintenance or parking garages. For fleets that outsource maintenance, plans may also define eco-standards for contractors, such as third-party suppliers. In this section, we describe some options for fleet operations.

Situation

We are living in a period of transportation history as the world quickly and steadily transitions away from fossil-fuelled vehicles powered by internal combustion engines (ICEs) and toward electric vehicles (EVs). It has been referred to as the "end of the ICE age".

Globally, the end of ICEs has already been legislated. Germany and California have both passed legislation, the latter now requiring all trucks to be zero-emission vehicles (ZEVs) by 2045.

Unlike ICE fleet vehicles, EVs: do not require costly fuels like gasoline and diesel; have far fewer moving parts; do not require tune-ups, oil changes or filter replacements; and require far less brake friction lining replacements[23], if ever.

All sizes and types of on-road vehicles in the municipal context can benefit from electrification. With that stated, the question for municipalities with a fleet of low kms-travelled vehicles becomes whether payback periods for low utilization units will be protracted and if there will be return on investment (ROI).

EVs currently cost more than ICE vehicles. With higher levels of usage, the potential ROI improves as the increased cost of capital for an EV is offset by the reduced cost of fuel, repairs and maintenance. Vehicles with very low kms-travelled are, therefore, not ideal candidates for replacement with EVs.

Municipally operated Class 8 ICE trucks burn fuel at a staggering rate – anywhere from 50 to 100 litres per 100 km or even more. As a general rule of thumb, the larger a vehicle is, and the higher its utilization rate, the better the business case for replacement with an EV.

[23] Elon Musk of Tesla has stated that his company's electric Class 8 Tesla Semi will never need brake lining replacements.

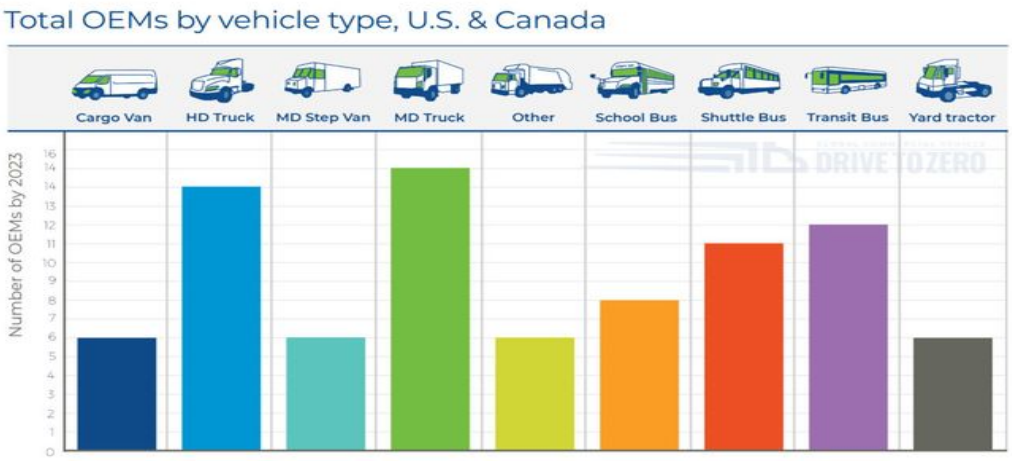
In preparing this report, we have completed a Fleet Analytics Review (FAR) analysis of the CKL fleet. A key functionality of FAR is its capability for data-modeling green fleet scenarios including the switch to electric vehicles. Should CKL's fleet management ever be considering the switch to electric vehicles, it is easy to quickly assess EVs for any vehicle types in FAR.

Current and Emerging Electric Vehicle Categories

Most vehicle original equipment manufacturers (OEMs) are working rapidly to develop EVs of all categories. Seemingly almost daily, new makes and models of EVs are announced. Battery-electric vehicles (BEVs or EVs) are available now in the light-duty vehicle categories, such as cars and SUVs.

For municipalities everywhere, a mainstay of their fleets is pickup trucks; on average, 46% of all Canadian municipal fleet vehicles are pickups. Seven EV pickup models are slated for availability within the next two model years for purchase.

Figure 20 - Total EV Truck & Bus OEMs by 2023 (Source: Calstart)



In addition to EV pickups that are soon to emerge, in *Figure 20 - Total EV Truck & Bus OEMS by 2023* we see that the OEMs are quickly ramping up with other types of commercial EV trucks (medium- and heavy-duty truck categories) that are suited for municipal work environments.

Moving Towards a Hydrogen Future

The progression towards ZEVs began with EVs that are recharged from the electrical grid. Industry experts are in general agreement that in the next phase ZEV batteries will be recharged with onboard hydrogen fuel cells.

Currently, much work is taking place around the world toward 'green' hydrogen (H2) from renewable sources, since H2 is produced largely by the burning of fossil fuels at this time.

Illustration 8 – H2 Fuel Cell Trucks Bound for Switzerland

The hydrogen fuel cell trucks shown in *Illustration 8 (left)* will be refueled with green hydrogen made from hydropower in Switzerland, as opposed to 'grey' hydrogen made from methane with very high CO_2 emissions, which is the case in most countries.

As of June 2020, more than 14 countries and over 20 cities around the world have proposed banning the sale of passenger vehicles powered by fossil fuels such as gasoline, liquefied petroleum gas and diesel at some time in the future[24]. China, the largest auto market globally, is researching a timetable. In Japan, the number three global auto market, there has been comprehensive plans to become a hydrogen economy by 2040.

Other countries with proposed bans on fossil-fuel vehicles and/or implementing 100% sales of ZEVs include: the UK, South Korea, Iceland, Denmark, Sweden, Norway, Slovenia, Germany, France, the Netherlands, Spain, Portugal, Canada, 10 U.S. states that adhered to California's Zero-Emission Vehicle (ZEV) Program, Sri Lanka, Cabo Verde, and Costa Rica.

The 'Messy Middle'

Green, low-carbon fleet planning began many years ago. Leading fleet managers have been taking action to reduce their fleet's carbon footprint for more than 15 years. But the reality of a day when all vehicles are zero-emissions is well into the future.

The period of time we are now in has been referred to as the "messy middle", a time in which fleet managers seeking to reduce emissions must turn to a gallimaufry of interim solutions, some of which are challenging and potentially costly to implement. Today's interim solutions include, but are not limited to, transportation demand management, alternate and renewable fuels, and technological enhancements.

Alternate and Renewable Fuels

GHG emissions can be reduced by using low-carbon options, such as alternate and renewable fuels. Given the likelihood and emergence of new EV options for fleets and the timing of their availability, low-carbon fuels may be suitable interim solutions for reducing CKL's CO_2 emissions now.

[24] Source: https://en.wikipedia.org/wiki/Phase-out_of_fossil_fuel_vehicles

The following are some of the most common options for low-carbon fuels:

Compressed Natural Gas

Compressed natural gas (CNG) can be used in place of gasoline or diesel fuel. CNG combustion produces fewer undesirable gases than traditional fossil fuels. It is also thought to be safer than traditional fuels since, in the event of a spill, natural gas is lighter than air, and natural gas disperses quickly when released.

Natural gas is found above oil deposits or collected from the decomposition of organic matter, where it is known as biogas (explained next). CNG is used in traditional gasoline internal combustion engine vehicles that have been modified, or in vehicles which were manufactured for CNG use, either alone (dedicated), with a segregated gasoline system to extend range (dual-fuel), or in conjunction with another fuel such as diesel (bi-fuel). CNG is most commonly used in fleet vehicles like buses and heavy-duty trucks because it requires a larger fuel tank than gasoline and diesel fuel[25].

The cost and placement of fuel storage tanks is the major barrier to wider and quicker adoption of CNG as a fuel. CNG offers many advantages for fleets, and although there are major upfront capital costs ($1m or far more), savings may ensue.

Construction of fast-fill CNG fueling stations can be a very expensive consideration, should CKL choose this option. Slow-fill refuelers may be an option, but caution must be exercised to ensure protracted filling time does not create operational challenges.

Investment in a CNG fast-fueling station would be significant; anywhere from one to three million dollars is realistic. While RSI-FC supports CNG as a carbon reduction option for fleets today, such a large investment in infrastructure must be seen as a long-term investment with a payback period that might be decades-long, perhaps as much as 40 years or longer.

Natural gas is plentiful today, but it is important to remember it is still a non-renewable, fossil fuel. With the emergence of EVs of the types and sizes required by the City of Kawartha Lakes being just ‘around the corner’, natural gas, at this time, may be only a short-term solution. The massive investment in a CNG fueling station may, therefore, be seen as a long-term investment for a short-term solution.

Renewable Natural Gas/Biogas

[25] Source: https://consumerenergyalliance.org/2019/04/energy-explorer-cng-vs-lng/#:~:text=The%20reason%20you%20see%20CNG,requires%20a%20larger%20fuel%20tank.&text=Like%20CNG%2C%20LNG%20is%20compressed,state%20into%20a%20liquid%20state.

Renewable natural gas (RNG) consists of biogas (methane) from landfill recovery, wastewater treatment plants, anaerobic digesters at dairies, food processing plants, or waste processing facilities that are cleaned to meet natural gas pipeline standards. Like conventional natural gas, RNG can be used as a transportation fuel in the form of CNG.

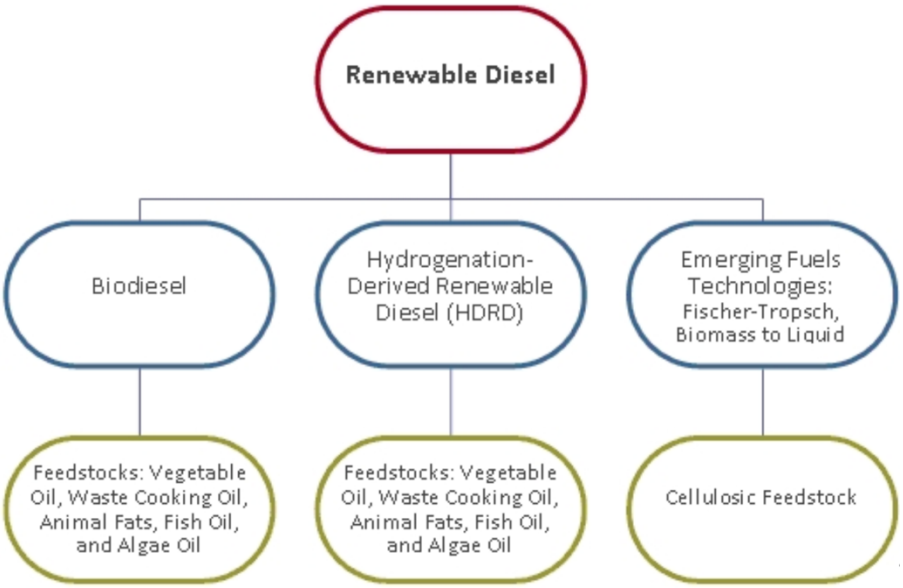
Renewable Diesel

Renewable diesel is defined as, "a diesel fuel substitute made from renewable materials such as vegetable oil, waste cooking oil, animal fat and fish oil and potentially from cellulosic feedstock consisting of agriculture and forest biomass"[26].

There are two main renewable diesels – biodiesel and hydrogenation-derived renewable diesel (HDRD), explained below – and other technologies to convert biomass renewable diesel are being developed *(Figure 21,* below*)*. All diesel fuel sold in Canada contains a percentage of renewable diesel owing to a renewable fuels standard.

[26] Source: https://www.nrcan.gc.ca/energy/alternative-fuels/resources/nrddi/3669

Figure 21 – Renewable Diesel Types and Feedstocks



Biodiesel: Biodiesel is produced from a diverse mix of feedstocks including recycled cooking oil, agricultural oils, and animal fats. In technical terms, biodiesel is a vegetable oil- or animal fat-based diesel fuel consisting of long-chain alkyl (methyl, ethyl, or propyl) esters made by chemically reacting lipids (e.g., vegetable oil, soybean oil, animal fat) with alcohol-producing fatty acid esters. Biodiesel is often referred to as fatty acid methyl ester or FAME[27].

Blends of biodiesel and conventional hydrocarbon-based diesel fuel are products most commonly distributed for use in the retail diesel fuel marketplace. Much of the world uses a system known as the "B" factor to state the amount of biodiesel in any fuel mix:

- 100% biodiesel is referred to as B100
- 20% biodiesel, 80% fossil diesel is labeled B20
- 5% biodiesel, 95% fossil diesel is labeled B5

Blends of 20% biodiesel and lower can be used in diesel equipment with no, or only minor modifications, although certain manufacturers do not extend warranty coverage if equipment is damaged by poor quality fuel in these blends.

[27] Source: https://www.neste.com/what-difference-between-renewable-diesel-and-traditional-biodiesel-if-any

Biodiesel can also be used in its pure form (B100), but may require certain engine modifications to avoid maintenance and performance problems. A new system recently emerged involving the use of a heated fuel storage tank in which the engine starts on standard diesel, and then after warm-up of the fuel tank, switches over to B100. The system is said to allow the use of B100 year-round in cold, winter conditions.

Hydrogenation-derived renewable diesel (HDRD): HDRD is made from animal fats or vegetable oils – alone or blended with petroleum – refined by a process called hydro treating. Unlike biodiesel, HDRD is made primarily from waste and residues and impurities are removed during the hydrotreating process[28]. HDRD is cleaner and has a lower carbon footprint than petroleum-based diesel, and it can also operate at colder temperatures than standard diesel and biodiesel. Therefore, HDRD can be used in higher concentrations than biodiesel and even as a standalone product in diesel engines.

Ethanol Fuel

Ethanol is a renewable fuel made from various plant materials, primarily corn. In most North American jurisdictions, renewable fuel standards require all gasoline sold to be a 10 percent ethanol blend (E10).

A higher blend of ethanol, known as E85 (85% ethanol, 15% gas), is available in some areas. This fuel must be used in dedicated "flex-fuel" vehicles, which can run on any combination of gasoline and ethanol blends (up to 85%). The City of Kawartha Lakes owns many flex-fuel vehicles that are designed, built and ready for ethanol blends up to E85 without modification. However, it may be challenging to find a local supplier of E85.

Several steps are involved in making ethanol available as a vehicle fuel. First, feedstocks are grown, collected, and transported to an ethanol production facility. Then, ethanol is made from these feedstocks at the production facility along with by-products such as animal feed and corn oil. Next, the fuel is transported to a blender/fuel supplier. Finally, ethanol is mixed with gasoline by the blender/fuel supplier and distributed to fueling stations.

We expect non-edible plant material, rather than corn, will become the dominant source of ethanol in the future. This "cellulosic" material cannot be used as food, so it wouldn't reduce edible resources.

[28] Source: https://www.neste.com/what-difference-between-renewable-diesel-and-traditional-biodiesel-if-any

Propane

Propane, otherwise known as liquefied petroleum gas (LPG), is produced as part of natural gas processing and crude oil refining. In natural gas processing, the heavier hydrocarbons that naturally accompany natural gas, such as LPG, butane, ethane, and pentane, are removed prior to the natural gas entering the pipeline distribution system. In crude oil refining, LPG is the first product that results at the start of the refining process.

Propane is a gas that can be turned into a liquid at a moderate pressure (160 pounds per square inch). It is stored in pressure tanks at about 200 psi at 100 degrees Fahrenheit. When propane is drawn from a tank, it changes to a gas before it is burned in an engine.

Propane has been used as a transportation fuel since 1912 and is the third most commonly used fuel in the United States, behind gasoline and diesel. More than four million vehicles fueled by propane are in use around the world in light-, medium- and heavy-duty applications. Propane holds approximately 86 percent of the energy of gasoline and so requires more storage volume to drive a range equivalent to gasoline, but it is usually price-competitive on a cents-per-km-driven basis.

Infrastructure Requirements and Costs

Natural gas fast-fuelling stations may cost anywhere from one to three million dollars. CNG vehicle conversions range from up to ~$10k for light-duty vehicles and ~$45k for medium- and heavy-duty trucks. Propane vehicle conversions and fueling systems generally cost much less than natural gas systems.

As for EV charging equipment, Level 2, 240-volt chargers typically range in cost from around $1.5-5k, depending on electrical system requirements. Each Level 2 charger can serve two vehicles at any time of day; usually, charging is done overnight during the off-peak period.

The costs for installing a Level 3 DC fast charger vary greatly. Costs for a fast-charging station are dependent on the electrical supply available at the chosen charging site, site preparation costs including trenching, cable runs and many other installation considerations. There is little published information as to typical DC fast charging installation costs, but for estimation purposes, the total investment may be from $80,000 and up.

Regarding renewable diesel, there are no vehicle conversion or fuelling infrastructure costs. Almost all modern diesels are suitable for biodiesel blends up to B20 (20% biodiesel) without modification.

For ethanol fuels, domestic “flex-fuel” cars, pickups and vans are designed to run on E85 (85% ethanol) without modification. As for the fueling infrastructure, for CKL, a secondary tank and pump

would be required to store and distribute E85 since many of the City's gasoline powered vehicles, small engines and equipment are not capable of running on higher blends of ethanol.

Electric Vehicle Training Requirements

Should CKL Fleet and Transit Services decide to move ahead toward vehicle electrification, fleet technician training is recommended. In Ontario, RSI-FC's research has found just two community colleges that currently offer EV technician training; neither is geographically located near the City of Kawartha Lakes.

While there is a paucity of EV technician training in Ontario, due to the rapid onset of electric mobility we suspect that reality will soon change. Before EVs are deployed in CKL's fleet to any great extent, we recommend high voltage training for technicians.

Published high-voltage guidelines specific to vehicle technicians servicing EVs are not readily available through traditional sources. However, we suggest that anyone working with high voltage in any format, including EVs, should be provided guidance on applying Occupational Health & Safety Management System fundamentals. This includes[29] a 'plan, do, check, and act' philosophy while working with energized electrical equipment. Such training is available for non-electrical workers from Lineman's Testing Laboratories (LTL) of Weston, Ontario. LTL offers an awareness level course for non-electrical workers which is claimed by the company to provide a basic level understanding of workplace electrical safety.

Aside from awareness training, fleet technicians should also have access to, and be trained on the use of electrical-specific personal protective equipment (PPE). Such PPE would include tested and certified non-conductive gloves as well as non-conductive tools and equipment as a last line of defence, ensuring all such gear is appropriately used and maintained. Protective gloves and other PPE, as well as non-conductive tools, must be re-tested periodically to ensure safety.

Synopsis - Electric Vehicles, Green Technologies, Alternate & Renewable Fuels

Electric vehicles (EVs) are coming in the types the City requires. Planning should begin now for the transition to EVs in the CKL fleet.

While awaiting the expected availability of EVs of the types required by the City, planning, budgeting, and installing EV charging equipment should begin in the near-term. Funding for the EV charging infrastructure may be available from NRCan and other sources including the FCM Green Municipal Fund

[29] Source: https://training-ltl.ca/

Recommendations - Vehicles, Green Technologies, Fuels

- Prioritize the purchase of battery-electric EVs and plug-in hybrids that are available now in the light-duty categories (cars, SUVs).
- Seek funding for an EV charging infrastructure from NRCan and other sources including the FCM Green Municipal Fund.
- For an interim solution for reducing fleet's GHG emissions, consider the use of renewable fuels, including biodiesel (B20 in summer and B5 in winter) and higher blends of ethanol (E85) in all factory-designed "flex-fuel" capable vehicles.
- Invest in idling-reduction technologies such as auxiliary cab heaters and power units, extra auxiliary batteries for DC loads, or solar charging options.
- In the medium to long-term future, consider hydrogen fuel cells as this technology evolves and becomes commonly available, and once "green" H2 source(s) are in place.

Eco-Friendly Fleet Maintenance Operations

Whether maintaining vehicles in-house or outsourcing this activity, the following are some eco-friendly procedures to consider:

Aqueous Parts Cleaners: Aqueous parts washers are a new generation of water-based small parts cleaning equipment that are safe and biodegradable yet have the cleaning power of traditional cleaning solvents.

Filter Recycling: Used oil, fuel, coolant and air filters should be recycled. Local service providers may be available for this task.

Waste Oil Recycling: Waste oils are used in the creation of new products from the recycled oils, including the recycling of motor oil and hydraulic oil. Oil recycling benefits the environment and lessens the likelihood of used oil being dumped on lands and in waterways. Service providers will pick up and recycle waste oils.

Vehicle Washing: Vehicle washing processes can contain contaminants that are released into the groundwater, rivers, lakes and streams. Preferences should be for re-using wash water and utilizing eco-friendly products.

Tire Recapping: Quality tire casings can be re-capped, extending their life cycle and saving money. Ensure that all end-of-cycle scrap tires are disposed of in an environmentally friendly way.

Synthetic Oils: Most engines today are compatible with synthetic oils. Synthetic oil is used as a substitute for lubricants refined from petroleum when operating in extremes of temperatures because, in general, it provides superior mechanical and chemical properties versus traditional mineral oils. Synthetics typically cost more but may extend oil drain intervals, thereby potentially reducing expense and wasting fewer natural resources.

Recommendations – Environment (Maintenance)

- Continue to explore and use eco-friendly shop practices and new ways of being green in the fleet workplace.
- Review all products and cleaners used in the fleet garage to eliminate all potentially toxic products and ensure safe disposal of any such items now in use.

7.11 Policies and Procedures

Policies and Procedures Manual

A well-organized, information-rich policies and procedures manual (PPM) is a vital foundation document that defines the business practices of contemporary leading businesses.

According to the Bureau of Business Practice, a policy is a consistent guide to be followed under a given set of circumstances. A good policy provides guidance for handling a wide range of organizational and operational issues and establishes a framework for both management and staff decision-making. Per the BBP good policies are broad, current, comprehensive, inviolate, written to specify responsibility for action, and used frequently.

A procedure is a sequence of steps for completing a given activity. While policies change slowly if at all, procedures change often, dictated by changes in staff, equipment, and other factors.

Top-performing fleets have well-documented, readily accessible fleet practices/procedures manuals or guidebooks in place. Such documentation sets out the fleet's standard operating procedures and practices, and therefore comprises a procedural guide for employees and drivers. The PPM requires support from the most senior level of the organization for maximum effectiveness.

A fleet management procedures guidebook should be a living document that can grow with the organization. Content should include all matters relating to the fleet and especially vehicle practices, fueling, driver training, accident procedures, contact information and preventive maintenance practices.

Synopsis - Policies and Procedures

A well-documented, readily accessible fleet practices/procedures manuals or guidebooks is essential. Such documentation sets out the fleet's standard operating procedures and practices, and therefore comprises a procedural guide for employees and drivers.

Key Recommendations - Policies and Procedures

- We recommend development of a Driver's Handbook.
- Updates to the Driver’s Handbook should be dated and identified with version numbers.

7.12 Fuel Procurement and Distribution

Fuel is usually one of the largest operating expenses for fleet operators, and there are several strategies employed by fleet managers to reduce fuel costs. These include commodity or financial hedging, purchasing in bulk for distribution at their in-house fuelling stations, and negotiating discounts with suppliers for retail procurement in situations where it is not practical/possible to have a corporate fuelling station. Choosing the most effective strategy is often dictated by circumstances resulting from geographical operational conditions and several other situations.

CKL participates in a fuel co-op with Peterborough which mitigates fuel costs.

Fuel Distribution

Most fleet managers find it necessary to employ multiple methods for fuel supply that include onsite bulk tanks, commercial card lock sites, retail purchases, and direct-to-truck fuelling. The key to choosing the best strategy(ies) for maximum discounts is first to determine the volume of fuel that is required in each period.

Volume Discounts

Determining a fleet's fuel volume creates an advantage for the fleet manager to negotiate with fuel suppliers, regardless of bulk or wholesale fuel based on the local rack or retail prices. There are several examples of fleet managers in neighboring partner companies, joining their collective fuel purchase volumes to negotiate a better price with suppliers.

Direct to Vehicle Fuelling

In certain situations, the driver's time spent fuelling his/her vehicle is a factor for consideration. Some fleets may make a positive case for direct-to-truck refueling. This method has drivers arrive each morning to find their trucks supplied with ample fuel for the day instead of spending unproductive time at a fuelling station. Typically, there is a premium price for this service, but in some situations, there may be a business case, and therefore we feel it should not be overlooked when creative solutions are sought.

Fuelling Sites

A fuel spill or leakage into the ground could be catastrophic and mechanisms must be in place – and regularly monitored – to detect fuel leakage. It is essential for bulk fuel tank owners to monitor and reconcile fuel in all storage tanks.

Monitoring and reconciliation of fuel ensures spill detection and typically requires manual daily dips (level reading) of the fuel tanks and daily recording of the dip readings, and/or optionally the use of some form of electronic leak detection that provides an audit trail. Manual dips also enable the

opportunity for staff to complete a visual inspection of the fueling site for potential problems, which gives the manual method an advantage in our opinion, although electronic methods provide continuous monitoring.

Fuel usage reconciliation is a link in a chain of best management practices that ensures all fuel purchased is accurately accounted for and is used appropriately (i.e., the fuel is being used in the fleet's vehicles and the potential for pilferage is mitigated). This requires accurate record-keeping of all deliveries and all fuel transferred to vehicles.

Spill Control & Secondary Containment

Specific legislation applies to fuel storage and distribution, and this matter should not be taken lightly. A full review is out of scope for this report. However, it is critical to ensure that spill control has been taken into consideration and is properly managed.

Synopsis - Fuel Procurement & Distribution

Fuel is usually one of the largest operating expenses for fleet operators, and there are several strategies employed by fleet managers to reduce fuel costs. Choosing the most effective strategy is often dictated by circumstances resulting from geographical operational conditions and several other situations.

Recommendations - Fuel Procurement & Distribution

- Review fuelling system(s) for compliance with Technical Safety Standards Authority (TSSA) compliance.

- Consider electronic calendar reminders/alerts for follow-up reviews of the fuelling site to ensure continued fuel system TSSA compliance.

7.13 Performance Management

Most public and private sector organizations today have some form of a performance management program in place. Leading fleet managers align their own department's performance objectives to support the organization's overarching mission and values.

At its most basic level, performance management typically includes the use of key performance indicators (KPIs) which are designed strategically to monitor progress towards pre-determined performance objectives.

Key Performance Indicators

Fleet managers can support their organization's overarching vision by implementing KPIs to measure their performance toward corporate objectives. KPIs should be achievable, effective, meaningful, and supportive of corporate goals, with a degree of "stretch" (they should be ambitious).

Performance Targets

Performance objectives should receive senior-level corporate support and include both short- and long-term targets for each team member and the Fleet department/division as a whole. Regular (monthly/quarterly) progress reports are recommended; these reviews would include both individual and team targets for performance.

KPI attainment targets designed to achieve pre-set goals should be built into the fleet's strategic plan. Some examples of KPIs for service level include average vehicle utilization, availability, PM attainment, fuel efficiency, Opex, and Capex and its emissions-reduction objectives (i.e., carbon reduction targets).

Employee Performance Contracts

Many/most organizations today implement staff performance contracts that incentivize successful attainment of personal, department/divisional and corporate goals.

Performance incentives are typically tied to individual and team achievement of targets. While employee rewards are usually monetary (i.e., annual pay increases based on the achievement of performance targets), they can also be recognition-based.

Rewarding Good Performance

Almost everyone appreciates positive feedback, recognition, or rewards for personal achievement. Many leading fleets incent all employees – from shop floor staff and up to management; they are recognized in some meaningful way (either financially or otherwise) for successfully completing personal performance objectives linked to and supportive of the overarching corporate mission and

objectives. Rewarding employees can be challenging in a unionized setting and may require some creativity, however it is possible and nonetheless important.

Synopsis - Performance Management

Fleet management can support their organization's overarching vision by implementing KPIs to measure their performance toward corporate objectives. KPIs should be achievable, effective, meaningful, and supportive of corporate goals, with a degree of "stretch" (they should be ambitious).

Recommendations - Performance Management

- Consider performance measures for the Fleet & Transit Services team that would be beneficial in terms of personal motivation and likely to instill a sense of accomplishment.

- To support a fleet performance related goal (as above), consider targets that provide a degree of stretch yet are realistically achievable. Examples of fleet performance targets might be: "x" % vehicle availability, "x" PM attainment, "x" days of downtime, "x" % GHG reduction, or "x" accident-free miles-driven, etc.

7.14 Communications

Open communications and interaction are critical in every organization. Most employees like to feel engaged, empowered, and of value to their organization. In the private sector, a company's customers and shareholders, or in the case of municipalities, its residents appreciate hearing success stories.

Good news stories about the fleet, whether these communications are around new cost-saving measures, safety, good deeds by its drivers, or eco-successes, are welcomed by most people.

We believe that the fleet should and can easily be a source of pride for an organization and its employees. The following are some steps that can help meet this objective.

Fleet Advisory Committee

Many top fleet managers choose to establish 'fleet advisory committees' (FACs) that are made up of their user group representatives. Employees are often passionate about the company vehicles they drive. Participation in an FAC would provide them a chance to have input about fleet operation processes and also take part in the development of new vehicle specifications – the vehicles they, and their co-workers, will drive on the job. The FAC should include representatives from each of the fleet user departments and the union.

FACs should meet regularly (we suggest monthly or quarterly) with a mandate, i.e., to air and resolve lingering vehicle issues, review proposed specifications for new vehicles, discuss safety and workflow issues, business process improvements, and more.

We've seen examples where regular FAC meetings have gone a long way toward resolving vehicle-related issues, and they will foster driver buy-in as changes are contemplated or implemented.

Awards and Other Forms of Recognition

Leading fleets communicate their success stories widely. Recognition of accomplishments boost employee morale and public opinion. Achievements such as business excellence, cost savings initiatives, and more, can be communicated internally and externally to build confidence and pride in the fleet.

Internal and External Communications

Fleet greening efforts, safety records and other achievements should be made public through media releases, media interviews, public events, and appearances. Fleet achievements could be a component of speeches delivered by senior management at events and conferences. Corporate

communications or public relations staff could assume a focus on fleet successes and broadcasts. Signage and graphics on vehicles are also an effective way that convey positive messages publicly.

Synopsis – Communications

Fleet greening efforts, safety records and other achievements should be made public through media releases, media interviews, public events, and appearances.

Internal publications such as company newsletters and website postings could highlight positive developments within the fleet department/division. Such broadcasts build fleet staff morale and inform other departments/divisions about the valuable contributions of fleet activities.

Recommendations - Communications

- Consider communications that highlight stories about employee awards and other types of recognition (e.g., safe driving certificates and lapel pins denoting milestones for vehicle safety).

- Communicate success stories internally through employee newsletters as well as publicly via printed media releases and social media.

Section Eight

Review of Fleet & Transit Services
Maintenance Consolidation Options

Section 8. Maintenance Consolidation

Situation

The City of Kawartha Lakes Fleet and Transit section maintains the Public Works and Transit portions of the fleet, while Fire Rescue Services, Paramedics, and Police Services sections are responsible for managing their own sub-fleets.

Paramedics and Police Services outsource maintenance to local vendors. For Fire Rescue Services, the majority of fleet maintenance takes place in-house with an on-staff technician who is a certified Emergency Vehicle Technician (EVT). The technician is an employee of Fire Services. Fire mainly outsources annual certifications, rustproofing and the occasional flat tire emergency; while the Technician/EVT completed approximately 1,000 hours (2019).

In *Table 4 - Labour Cost Comparison* (below) we have prepared a brief cost comparison between the labour rates for fleet maintenance of the four sections that make up the City's fleet. For this analysis, we have treated the CKL Fleet & Transit Services burdened labour rate of $35.31 as the baseline by which we compare the external service providers that maintain the other CKL fleet sections.

Please note we have used the upper estimates[30] of PM and reactive repair labour demand for this assessment.

Table 4 - Labour Cost Comparison

Fleet Section	Maintenance Provider	Labour Cost per Hour	Increase Over Baseline Labour Cost	Annual Labour Upper Estimate (Hours)	Cost Over Baseline for Outsourced Maintenance
Paramedics	John's Quality Auto Service	$83.50	+ $48.19	1,352	$65,153
Fire Rescue	Brasier Truck Service Less in-house labour Total outsourced:	$93.00	+ $57.69	2,300[30] -1,000 1,300	$74,497
Police	Local Ford Dealer	$95.00[31]	+ $59.69	640	$38,202
Estimated Cost for Outsourced Suppliers over Baseline:					**$177,852.00**

[30] For Fire, the upper estimate was provided by CKL

[31] Anecdotal, subject to confirmation

Based on the calculations in *Table 4,* labour costs for outsourcing fleet maintenance is estimated to cost up to $178k more than if the same work was completed by CKL Transit and Fleet Services. This estimate is based on the upper estimate of the labour required for optimal preventive maintenance practices. We cannot ascertain whether this high level of maintenance is actually being performed within the scope of this report. A review of the actual levels of spending with these outsourced vendors would assist in confirming the business assumptions we have used for our calculations.

In addition to the third party vendor's labour costs, which are estimated to be as much as $178k, parts and materials from the external vendors would include a markup, which may add substantially to the total extra cost for outsourcing.

Outsourcing versus Insourcing

RSI-FC understands the rationale behind CKL's choice to engage third-party outsourced suppliers for the Fire Rescue Services, Paramedics, and Police Services fleets. In our discussions with management personnel from each of the sections, satisfaction was evident in their vendors performance and service.

Our user group surveys confirm user groups have a high level of satisfaction with the external vendors, although the overall rating of service provided in-house by CKL Transit and Fleet Services was somewhat higher than for the external vendors.

Outsourcing some (or all) of a fleet's maintenance and repair demand to a local retail service garage seems to present a tantalizing opportunity for a fleet to have repairs and maintenance completed in a timely manner, thus increasing its uptime and potentially eliminating the need for capital investment in additional fleet maintenance facilities (garages) and the additional costs of more fleet maintenance personnel (mechanics/technicians). However, outsourcing introduces a whole new set of issues that must be managed for due diligence and fiscal restraint reasons.

There is a fundamental difference between fleet mechanics and retail service mechanics. For fleet mechanics, their objective is to complete PM inspections that are sufficiently thorough to prevent breakdowns until the next scheduled PM event. On the opposite side of the spectrum, retail mechanics/technicians, for whom many work on a flat rate basis in which they are compensated and thus are financially rewarded for "selling" additional services, may often focus on selling their customers as many repairs as possible during the repair visit.

This difference can be costly for a fleet – one solution for fleets choosing to outsource is to employ skilled personnel who will be tasked with validating the repairs stated as necessary by the outsourced repair vendor. To do this, it can sometimes take as many staff personnel to "police" the outsourced

repair vendor's repair assessments as it might take to just complete the work in-house. While outsourcing may have benefits, the big picture view must be considered before making a commitment to outsourcing fleet maintenance to external vendors.

Fleet Garage Service Bay Capacity and Demand

RSI-FC assessed the capacity of the CKL fleet garage to determine if it is appropriately sized to maintain the Public Works & Transit fleet, plus the additional demand of the Fire Rescue Services, Paramedics, and Police Services fleets.

We conducted a study of the fleet garage bays *demand* versus *capacity*. We based the study on current-day information regarding:

- Types/categories of vehicles in the fleet
- Fleet size (numbers of each category of vehicle)
- Fleet maintenance demand
- Reactive repair demand
- The number of available service bays in the current fleet garages (Lindsay and Coboconk)

Other Considerations

In calculating garage bay demand, it is essential to include a margin to allow time for bays tied up for any reason, including delays waiting for parts and materials, etc. Parts tie-ups and other delays are the reality in fleet maintenance and an unavoidable part of typical garage workflow.

Other considerations which increase the need for additional garage bay demand include vehicle staging (in preparation for repairs/PM, or for thawing frozen vehicles in winter), bays used for small engine or equipment repairs, and bays tied up when management desires the repairs started by one technician to be completed by the same person[32]. All of these add to garage bay demand and must be taken into consideration.

Architect Larry Jacobsen[33] of Schemmer Associates has considerable expertise in designing fleet maintenance garages. According to Jacobsen[34], on a single shift operation, it is common practice to provide two maintenance bays per mechanic. This provides the opportunity to stage one vehicle while the other is being serviced, or if delivery of parts delays one vehicle, the technician can work

[32] At times fleet management may determine that a vehicle repair started during one shift (day or afternoon) would be best completed by the same individual due to that individual's specialized skill set, expertise, experience or other such circumstances.

[33] William (Larry) Jacobsen AIA, FCSI provides architecture and engineering planning expertise for The Schemmer Associates Inc., where he is a principal. https://www.schemmer.com/portfolio-category/transportation/

[34] Source: https://www.petrolplaza.com/knowledge/1698

on the other one. The arrangement also maximizes the mechanic's efficiency and keeps more vehicles awaiting maintenance out of the weather.

Additional Garage Service Bay Demand Study

RSI-FC calculated the City of Kawartha Lakes preventive maintenance (PM) and reactive repair workload demand based on the above-stated business assumptions. Given that each hour of labour necessitates garage bay time commensurately, we calculated the precise number of bays required for full attainment of fleet maintenance activities, without consideration for additional spare bays as recommended by the industry expert.

We based the calculations on the current one-shift per day, five-day work week. We considered the industry's best practice guideline of allowing extra bays for the reasons stated earlier in this section of our report. While a 1:1 ratio (one extra bay per technician) was recommended for a one-shift operation, we more conservatively used an extra bay ratio of .75.

On a five-day per week, one-shift per day schedule, for a full year minus statutory holidays, total available bay time is 2,008 hours. By dividing total fleet maintenance demand by total bay/hours available, the number of bays required could be as few as **12 (lower estimate of labour demand)**, or as many as **18 bays (upper estimate of labour demand**).

Note: This estimate (12 to 18 bays) is the number required to maintain the current workload of the 377 units in the CKL Fleet and Transit Services fleet. This number of bays does NOT include the additional load of the Fire Rescue Services, Paramedics, and Police Services fleets.

Fleet Maintenance Technician Survey

The Lindsay CKL Fleet garage has seven working bays and the Coboconk garage has four bays for a total of 11 bays. Based on our estimates the current garage bay capacity is already less than demand by at least one bay. Our study shows that the current number of bays may be less than needed. To 'acid-test' these calculations, we felt it was prudent to ask the fleet technicians their opinion in a survey.

Fleet Technicians were asked their opinions about the current fleet garage and some options for future growth. The questions and the technicians' responses are shown in *Illustration 9 - Fleet Technician Survey* (below).

Illustration 9 - Fleet Technician Survey

Survey Questions	No. of Respondents	Rating (out of 5)
Do you sometimes find it difficult to find available bays for completing repairs/maintenance?	6	3.8
Do you feel the current fleet maintenance facilities would be adequate to serve an increased fleet size?	6	1.5
Do you feel that the current fleet maintenance facilities are a safe work environment? (please explain which garage/facility)	6	4.0

Additional Fleet Technician Labour Demand Study

As we have explained, we established current-day baseline relative to today's capacity. From the baseline, we then completed analysis to calculate the number of technicians and bays that would be required to insource the additional maintenance demand of the Fire Rescue Services, Paramedics, and Police Services fleets.

We completed further analysis to determine:

(1) The number of technicians that would be required to maintain an increase in fleet size for the Fire Rescue Services, Paramedics, and Police Services fleets; and

(2) The number of fleet maintenance bays that would be required to meet the increased demand.

We estimated that **14 (based on low demand estimate) to as many as 21 (high demand estimate) Fleet Technicians** would be required to meet the increased demand.

We calculated the number of additional bays that would be required to maintain the Fire Rescue Services, Paramedics, and Police Services fleets, in addition to the Fleet and Transit vehicles now being serviced in-house. At the low estimate of maintenance demand for the additional vehicles, on a one-shift per 5-day operation **17 bays would be required and for the upper estimate, as many as 25 bays.**

The above analysis is a best estimate based on present-day realities combined with cautious business assumptions and extrapolations. To calculate the actual requirements must be based on actual labour and fleet size data – there is no substitute for factual information.

Making go-forward decisions around future staffing and service bay requirements without verification of business assumptions is a risk to be avoided. A fleet management information system (FMIS) would be ideal for tracking this type of data (as we have recommended in this report).

Options

Adding a Second Shift

With the estimated bay capacity now at maximum, adding a second shift is a possible solution, one that would maximize the usage of the available floor space as far as service bays. A two-shift operation would make better use of garage bay space. The caveat is that it is likely to cause dissatisfaction in the ranks of the Fleet Technicians, which could exacerbate issues around retention of fleet maintenance personnel.

Additionally, at this time, the City has been unable to attract new technicians. For this reason, the need for even more technicians to address the additional maintenance demand of the Fire Rescue Services, Paramedics, and Police Services fleets would exacerbate an existing problem.

Satellite Garage

A satellite garage is an option; however, it is an option that in our assessment is less than ideal. A satellite garage would require additional, unproductive labour to move vehicles to and from the remote operation. It may also mean additional supervisory personnel would be required to oversee an additional site, since workers should not be expected to work alone or in an unsupervised site.

In this scenario each service visit would require that Fleet personnel pick up each vehicle to be serviced at the satellite garage and return the vehicle after maintenance. This process would entail a considerable amount of unproductive time. Travel to and from a satellite garage would increase risk exposure from traffic collisions. Risk would increase further when slow-moving mobile equipment such as off-road loaders, backhoes and the like would need to travel to a satellite garage in the same traffic lanes intended for on-road motor vehicles.

Challenges

The reduced number of bays required for a two-shift per day operation may seem appealing in terms of optimal utilization of workspace, but whether in practice it is viable is questionable. If the two-shift option is ever being considered, it should be approached cautiously. If, for any number of reasons one (or more) bays became unavailable for an extended period (i.e., major or lengthy repairs, parts delays, etc.), it could impede the fleet maintenance operation, potentially causing setbacks in completing timely preventive maintenance and legally mandated government inspections, as well as disrupting workflow and productivity. In addition, adding a second shift may cause dissatisfaction in the fleet technician workforce, making employee retention and new technician recruitment even more challenging.

Maintenance Consolidation - Cost versus Benefit

As shown in *Table 4*, total annual labour demand for the Fire Rescue Services, Paramedics, and Police Services fleets is 5,728 hours (upper estimate). The potential savings by insourcing all fleet maintenance is estimated to potentially save up to $178k (gross) annually based on current-ay technician pay scale and assuming qualifies additional technicians could be recruited.

While a gross annual savings of $178k is appealing we recommend CKL management to consider additional supervisory personnel to oversee the second shift or a satellite location. Additional supervisory staff (i.e., one FTE) would significantly diminish the potential savings from insourcing. Further, we suggest it would be prudent to add another parts/inventory person for the second shift or satellite shop. With additional staffing net savings could be reduced to just $22k (see *Table 5*)

If a satellite garage was the choice (as opposed to a second shift) operating and capital costs may further reduce the potential savings, or negate the savings altogether when combined with the cost of an additional supervisor and a parts/inventory person. The same applies if additional bays were to be constructed onto existing fleet maintenance facilities.

Calculations around the full cost of building an additional fleet maintenance facility or adding bays to an existing facility are beyond the scope of this fleet review. However, we suggest that to do so should begin with site evaluation and expert review of existing properties held by CKL to determine if current land would be suitable for additional fleet maintenance bays, or whether a new property must be purchased. With that matter decided, and if the notion still seems feasible in the context of cost-benefit, to proceed to the next step a design–build contractor or architect-led design–build (ALDB) firm should be consulted to determine the capital cost for changes under consideration.

As we have described, the cost-reduction business case for taking on the additional maintenance demand of the Fire Rescue Services, Paramedics, and Police Services fleets in-house diminishes greatly when all elements are considered. The case for in-sourcing all fleet maintenance appears to be thin when all elements are considered. RSI-FC recommends a careful analysis of all costs. This can begin once total labour demand for all sub-fleets managed by CKL can be confidently tallied via a fleet management information system (FMIS) or some other means of labor-time capture.

Table 5- Insourcing vs. Outsourcing of Labour for Fire, EMS, Police

Insourcing of all Fleet Maintenance – Cost Comparison	
Est. extra labour cost for Fire, EMS, Police outsourced maintenance (per Table 4)	$177,852
Second shift – additional fleet maintenance Supervisor FTE w/ benefits	- $96,000
Second shift – additional Parts & Inventory (stockkeeper) FTE w/ benefits	- $60,000
Potential estimated savings from in-sourcing:	$21,852.00

Section Nine

Review of Fleet & Transit Services

Parts and Inventory Review

Section 9. Parts and Inventory Review

Proper parts management is critical for fleet operations. When vehicle or equipment parts need to be replaced, spares must be readily available — but keeping too many spare parts increases inventory and costs.

An efficient fleet parts management program requires data, trend-analysis, and knowledge around the correct number of parts to keep in inventory. Determining this can be done through classification of inventory, forecasting, preventative maintenance and installing fleet management software. Spare parts and inventory management requires planning.

Illustration 10 – A Modern Fleet Stock Room

Maintaining the correct level of inventory while keeping investment to a minimum is a skill. Most off-the-shelf fleet management information systems (FMIS) and enterprise resource management systems have built-in functionality to aid in parts and supplies management. The downside is that some systems are very complex and can require a high degree of effort to manage, while others are not as complicated.

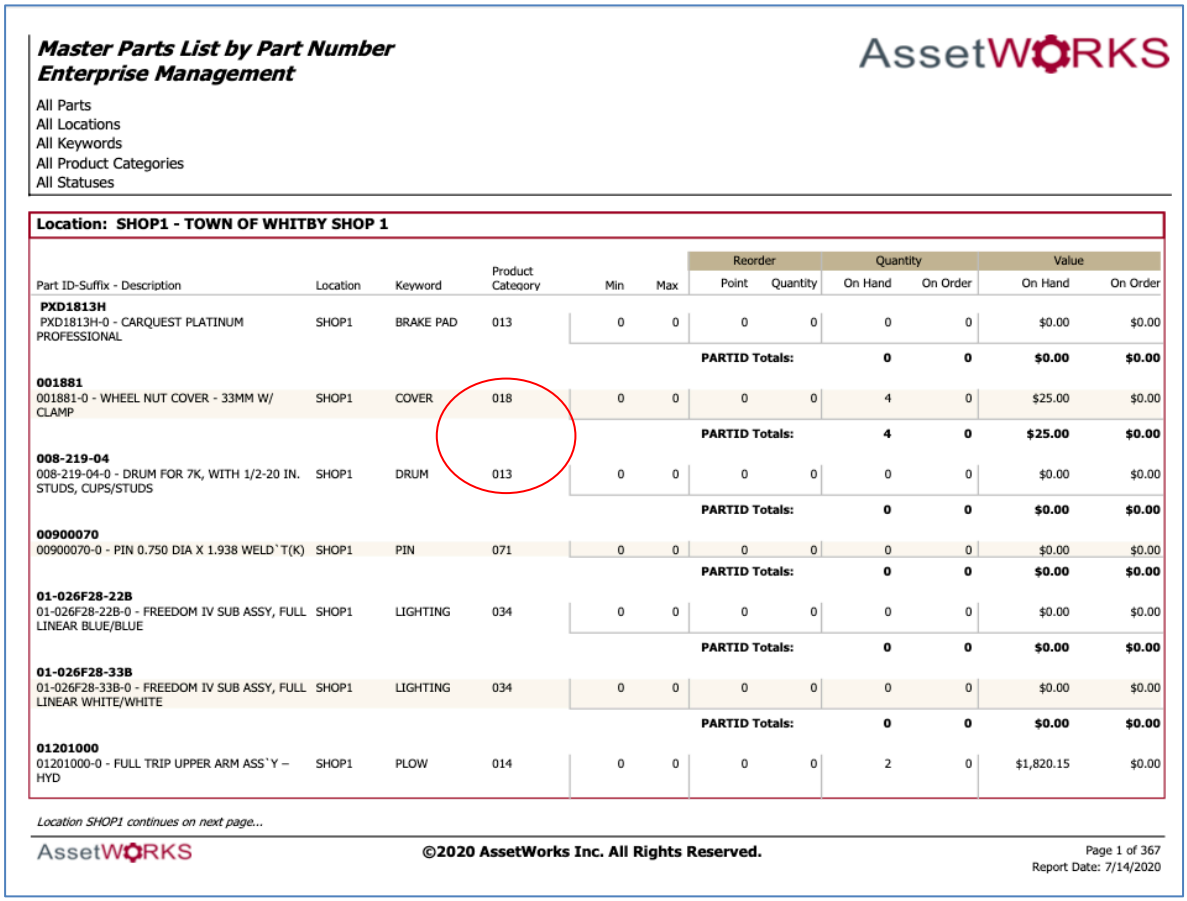
Regardless of whether a basic, traditional method of stock keeping is used or a high-performance, complex, enterprise-integrated, bar-coded system with SKU's and multiple reports – one that is focused on inventory turns – is implemented, most often, an experienced stock-keeper's intuitive knowledge is one of the most essential pieces in the parts inventory management process flow.

Stock Room Management Systems

For several decades, the American Transportation Association (ATA) has provided a standard repair and maintenance categorization protocol. Many leading fleets have subscribed to and apply these codes for tracking maintenance costs and service parts.

Asset Works™ is one example (of many) fleet management information systems (FMIS') that are in use in many municipalities. Within Asset Works™, the ATA Standard Vehicle Maintenance and Repair Standard (VMRS) codes (circled in *Illustration 11,* below) are embedded. RSI-FC strongly supports the use of the ATA VMRS codes as a leading best practice for benchmarking reasons.

Illustration 11 – Example of AssetWorks Parts Report



Master Parts List by Part Number
Enterprise Management

AssetWORKS

All Parts
All Locations
All Keywords
All Product Categories
All Statuses

Location: SHOP1 - TOWN OF WHITBY SHOP 1

Part ID-Suffix - Description	Location	Keyword	Product Category	Min	Max	Reorder Point	Reorder Quantity	Quantity On Hand	Quantity On Order	Value On Hand	Value On Order
PXD1813H											
PXD1813H-0 - CARQUEST PLATINUM PROFESSIONAL	SHOP1	BRAKE PAD	013	0	0	0	0	0	0	$0.00	$0.00
						PARTID Totals:		**0**	**0**	**$0.00**	**$0.00**
001881											
001881-0 - WHEEL NUT COVER - 33MM W/ CLAMP	SHOP1	COVER	018	0	0	0	0	4	0	$25.00	$0.00
						PARTID Totals:		**4**	**0**	**$25.00**	**$0.00**
008-219-04											
008-219-04-0 - DRUM FOR 7K, WITH 1/2-20 IN. STUDS, CUPS/STUDS	SHOP1	DRUM	013	0	0	0	0	0	0	$0.00	$0.00
						PARTID Totals:		**0**	**0**	**$0.00**	**$0.00**
00900070											
00900070-0 - PIN 0.750 DIA X 1.938 WELD`T(K)	SHOP1	PIN	071	0	0	0	0	0	0	$0.00	$0.00
						PARTID Totals:		**0**	**0**	**$0.00**	**$0.00**
01-026F28-22B											
01-026F28-22B-0 - FREEDOM IV SUB ASSY, FULL LINEAR BLUE/BLUE	SHOP1	LIGHTING	034	0	0	0	0	0	0	$0.00	$0.00
						PARTID Totals:		**0**	**0**	**$0.00**	**$0.00**
01-026F28-33B											
01-026F28-33B-0 - FREEDOM IV SUB ASSY, FULL LINEAR WHITE/WHITE	SHOP1	LIGHTING	034	0	0	0	0	0	0	$0.00	$0.00
						PARTID Totals:		**0**	**0**	**$0.00**	**$0.00**
01201000											
01201000-0 - FULL TRIP UPPER ARM ASS`Y – HYD	SHOP1	PLOW	014	0	0	0	0	2	0	$1,820.15	$0.00

Location SHOP1 continues on next page...

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Inventory-Taking

The process of inventory count-taking can be facilitated when monthly counts are taken on a section

by section basis, as opposed to the practice of annual counts of the full inventory. In this way, counts can be made for just one or two rows of shelving or one type of part (e.g., a count of all filters or all fluids).

More frequent inventory counts translate to better inventory short-interval control.

Alternative Stock Room Options

Honour System

A so-called "honour system" for parts, whereby fleet technician and staff have full access to spare parts and small hardware/fasteners, while very efficient, invites pilferage in even the best and most trusted employees, and this shrinkage can be costly. The honour system approach is not recommended.

Third-Party Vendor Option

In recent years several mid- to large-sized fleets have experimented with the practice of engaging a local auto parts supplier to provide and manage their inventory of spare parts. In this approach, a local parts supplier provides the inventory at their expense plus the human resources, usually a dedicated contract stock keeper employed by the vendor, is domiciled on the fleet's premises.

Some fleets have reported successful implementation of this business model, but anecdotal information we have received from those having experienced this practice have been less than satisfactory. The City of Toronto Fleet Services department (FSD) opted for an arrangement of this type with NAPA Auto Parts several years ago. A recent Auditor General report (October 2019) provided the following information[35] about the NAPA arrangement at the City of Toronto:

"Vehicle downtime is made worse by NAPA's ineffective parts management. FSD mechanics have been frustrated by slow response times when they request parts from NAPA. So far in 2016, NAPA has only maintained an 83% fill rate (the number of times a part is available on demand). It was even worse last year, at only 81%. This is below their (NAPA's) contractually obligated rate."

The City of Ottawa's experience with contracting out is similar to Toronto's. Both cities engaged NAPA for five-year contracts beginning in 2012. The Auditor General in each city pointed to major problems with the contract and both cities engaged third party experts to take an independent look.

On March 23, 2016, Ottawa's City Council agreed to bring parts management back in-house. As the report from Public Works General Manager Kevin Wylie notes: *"The main challenge with the existing model is that no single vendor has the expertise necessary to manage an automotive parts inventory for a fleet as large and diverse as the City of Ottawa's."*

[35] Source: http://www.cupelocal79.org/wp-content/uploads/Council-Briefing-Note-GM-14.11-Contracting-out-Fleet-Services-has-been-costly.pdf

Hardware and Sundry Items

When it comes to small hardware (nuts, bolts, washers, etc.), expensing such items is an administrative time-saving best practice employed by many fleets and retail garages. Recovery of this expense is usually by charging a percentage of labour on all work orders to offset sundry hardware costs.

Cost recovery in this manner is not a recommended practice for more expensive fluids such as lubricating oils, diesel exhaust fluid (DEF) and more – costs which should be posted as stock items to the vehicles on which the materials are being used.

Synopsis – Parts and Inventory

Maintaining the correct level of inventory while keeping investment to a minimum is a skill. Most off-the-shelf fleet management information systems and enterprise resource management systems have built-in functionality to aid in parts and supplies management. The downside is that some systems are very complex and can require a high degree of effort to manage, while others are not as complicated.

Recommendations – Parts and Inventory

- Computerize the parts and inventory with a modern fleet management information system (FMIS).
- Implement regular cycle counts of all inventory and parts.
- Consider monthly section-by-section stock counts.
- Include all parts into inventory, including costlier items (such as fluids).

Section Ten

Review of Fleet & Transit Services
Summary of Key Recommendations

Section 10. Summary of Key Recommendations

No.	Section	Focal Point	Recommendation
1	4	Internal 'customer' satisfaction	• Consider regular follow up surveys to gauge user group customer satisfaction. • Take prompt corrective action(s) to address issues if/when dissatisfaction is evident.
2	5	Life Cycle Analysis	• Adopt the lifecycle recommendations determined through lifecycle analysis in this report. • Regularly (annually would be ideal) review the lifecycles of units as more data becomes available.
3	6	Long-Term Capital Budget Planning	• Adopt the lifecycle recommendations determined through lifecycle analysis in this report. • Assess the condition of each vehicle approaching its end-of-lifecycle (as determined through LCA) by undertaking a thorough ground-up and top-down physical assessment. • Prepare annual and long-term capital budgets based on: (1) the optimal economic lifecycles determined by lifecycle analysis for each vehicle category; and (2) condition assessment of each unit approaching its end-of-lifecycle. • Balance long-term capital budgets by replacing only units that demonstrate the potential for providing return on investment (via FAR™ software or fleet information system). If there is no/low ROI, defer to a later budget year with a goal of evenly balancing multiple budget years.
4	7.1	Asset Management	• Consider implementation of a fleet asset management information system (FMIS). (Please see: Section 7.4, Information Technology) • Implement a policy requiring business cases for all requests for additional fleet vehicles.

			• Implement a policy requiring multi-level approvals with senior-most level concurrence (and/or up to City Council) for proposed additional vehicles to be added to the fleet. • Take action(s) on vehicles with performance that are beyond pre-defined thresholds of acceptability as far as their operating costs, utilization levels, or availability.
5	7.2	Vehicle Specifications	• Consider employing a "total cost of ownership" approach when tendering for new vehicles (as opposed to buying the vehicle with the lowest purchase price). • Continue to practice vehicle standardization wherever possible. • Consider adapting zero-emission battery-electric vehicles if/when available. • Begin planning for electric vehicle charging equipment. • Right-size fleet vehicles for the tasks they are intended to perform. • On a case-by-case basis, consider the cost-benefit of re-building and re-mounting truck bodies and ancillary equipment that are in good condition at the time when truck chassis are due for replacement.
6	7.3	Fleet Finance	• Consider fully-bundled, total cost recovery monthly "lease" charge approach as we've described which includes all direct and indirect vehicle costs and overheads. • We recommend a business structure in which the Fleet Services Dept. becomes its own full-cost recovery business unit. • Service Level Agreements should be developed for all vehicle user departments. • Consider transferring the direct cost of fuel used by each assigned vehicle, plus at-fault accidents and negligent damages costs, as pass-through costs to user departments with directly assigned vehicles.

			• Funds recovered from the sale of end-of-lifecycle surplus fleet units should continue to flow back into the Fleet vehicle reserve fund.
7	7.4	Information Technology	• A purpose-designed, best of breed, full-function fleet management information system (FMIS) is recommended for CKL Fleet management • The FMIS should be configured so that all of the City's fleet vehicles and equipment are included in the system, including those managed by Public Works, Transit, Fire, Police and Paramedics • Preventive maintenance scheduling should be managed in the FMIS for all CKL vehicles and equipment • The Phoenix fuel system should be interfaced with the FMIS to capture vehicle and transactional data.
8	7.5	Human Resources – Fleet Technicians	• A Fleet Technician wage review should be undertaken of surrounding municipalities and the private sector, with the possibility of an increase to market-based pay rates for the area of CKL. • Consider implementation of the 4-step approach to Fleet Technician recruitment as we have described. • A Fleet Technician apprenticeship program is recommended to help address the issue of technician recruitment. It would also groom technicians who will gain knowledge and experience with the unique and diverse specialities and requirements of municipal fleet maintenance. • Within the collective agreement and City of Kawartha Lakes Human Resources job classifications, implement a pay scale aligned with increased levels of technician licences and accreditations. • Consider offering staff the ability to learn/acquire the skills to perform positions in Fleet which may be less physically demanding, should such positions become vacant.
9	7.5	Human Resources – Driver Training	• Consider engaging a driver trainer, whether in-house or external service providers

			• Consider driver training in increments and study the impacts of the increase. Continue to increase training frequency until a satisfactory level of accident reduction is attained. • Consider a third-party CVOR "mock audit" to identify gaps in fleet safety program. • Continue to monitor vehicle and equipment collisions and claims as is the current practice. • Segment collision data into vehicle categories (light-duty vehicles, medium and heavy trucks) • Study the collision trends to determine the drivers requiring more focused training. • Consider posting costs for at-fault vehicle collisions to user departments whose drivers were responsible, thereby potentially incenting departmental managers to take part in and support remedial actions for their drivers.
10	7.6	Fleet Operations	• Fleet & Transit Services should routinely track, monitor, and report the utilization of all units to user department managers as a means of managing the overall productivity of the fleet. • A corporate standard and policy for minimum vehicle utilization should be established. • A corporate policy or directive from the highest levels of the municipality should require that managers of all departments regularly review their assigned vehicles and surrender any units that are under-utilized, unless a business case exists to retain the units.
11	7.7	Preventive Maintenance	• We recommend monitoring downtime and associated costs for all vehicles. • A fleet management information system (FMIS) is recommended for precise PM scheduling. • Consider tracking the ratio of PM: reactive repairs as a way of determining the optimum frequency/intensity of PM activities. If reactive repair costs and downtime are seen to be trending upwards, increase the focus on PM.

			• We recommend that as "living documents," PM worksheets should continue to be reviewed and updated regularly (as they are now) and suggest revisions should be visibly identified by displaying the date on each PM worksheet each time they are amended.
12	7.8	Minimizing Fuel Consumption	• Consider tracking corporate average fuel efficiency (CAFE) as a KPI and setting an annual target for improvement. • Routinely (monthly/quarterly) monitor the fuel consumption of all fleet vehicles. • Identify the outliers – those with higher than average fuel consumption and take corrective actions. • Consider eco-driver training or idling reduction driver training. • Consider using telematics to identify high engine idling – particularly in situations where it is unnecessary, such as when PTO is not engaged, or when heating/air conditioning is not required. • Consider the use of idling reduction technologies – idle shutdown devices or auxiliary cab heaters. • Consider a top-down driven idling reduction policy supported at the top levels of CKL.
13	7.9	Fleet Safety (Drivers)	• Prepare for Canada's electronic logging device (ELD) mandate – June 2021. • Review and ensure compliance with Hours of Service and Daily Trip Inspections legislation.
14	7.9	Fleet Safety (Legislative & Security)	• Fleet and Transit Services should consider having a third party conduct a CVOR mock audit to identify any gaps. • Investigate and begin the transition to ELD systems including drivers daily pre/post trip inspection defects, mapping and route planning/optimization, and snow plow operation data.

			• Ensure backup ELD records of driver pre-trip inspections and hours-of-service information are archived in a secure way that, consistent with statute of limitations legal requirements, ensures access in the event of a government safety or other audit. • Consider a review with workers around vehicle security practices on job sites. • Consider a review of where vehicle keys are being stored and the degree of security provided.
15	7.10	Environment (Vehicles & Fuels)	• Prioritize the purchase of battery-electric EVs and plug-in hybrids that are available now in the light-duty categories (cars, SUVs). • For an interim solution for reducing fleet's GHG emissions, consider the use of renewable fuels, including biodiesel (B20 in summer and B5 in winter) and higher blends of ethanol (E85) in all factory-designed "flex-fuel" capable vehicles. • Invest in idling-reduction technologies such as auxiliary cab heaters and power units, extra auxiliary batteries for DC loads, or solar charging options. • In the medium to long-term future, consider hydrogen fuel cells as this technology evolves and becomes commonly available, and once "green" H2 source(s) are in place.
16	7.10	Environment (Operations)	• Continue to explore and use eco-friendly shop practices and new ways of being green in the fleet workplace. • Review all products and cleaners used in the fleet garage to eliminate all potentially toxic products and ensure safe disposal of any such items now in use.
17	7.11	Policies and Procedures	• We recommend development of a Driver's Handbook. • Updates to the Driver's Handbook should be dated and identified with version numbers.

18	7.12	Fuel Procurement & Distribution	• Review fuelling system(s) for compliance with Technical Safety Standards Authority (TSSA) compliance. • Consider electronic calendar reminders/alerts for follow-up reviews of the fuelling site to ensure continued fuel system TSSA compliance.
19	7.13	Performance Management	• Consider performance measures for the Fleet & Transit Services team that would be beneficial in terms of personal motivation and likely to instill a sense of accomplishment. • To support a fleet performance related goal (as above), consider targets that provide a degree of stretch yet are realistically achievable. Examples of fleet performance targets might be: "x" % vehicle availability, “x” PM attainment, "x" days of downtime, "x" % GHG reduction, or "x" accident-free miles-driven etc.
20	7.14	Communications	• Consider communications that highlight stories about employee awards and other types of recognition. (Examples: safe driving certificates and lapel pins denoting milestones for vehicle safety). • Communicate success stories internally through employee newsletters as well as publicly via printed media releases and social media.
21	9	Parts and Inventory	• Computerize the parts and inventory with a modern fleet management information system (FMIS). • Implement regular cycle counts of all inventory and parts. • Consider monthly section-by-section stock counts. • Include all parts into inventory, including costlier items (such as fluids).

Appendix “A” - Average Performance Metrics by Sub-Types/Categories

Buses

Category	Review Period - Average Annual KMs or Hrs. Travelled	Review Period - Quantity of Fuel Used (liters of fuel consumed in review period)	Review Period - Downtime Days	Review Period - Preventive Maintenance (PM) costs for review period (PM includes oil changes and lubes, inspections)	Review Period - Repair Costs (reactive, unplanned repair costs for period)	Review Period - Annual GHGs produced (tonnes, combustion)	Review Period GHG Intensity	Review Period - L/100 km	Review Period - Downtime Cost per Day	Review Period - Downtime Cost for Period	Review Period - PM as % of All Parts/Labour	Review Period - Annual Fuel Costs	Review Period - Cost of Capital	Review Period - Total Cost for Period (R&M, Fuel, Capital & Downtime)	Review Period - Cost per KM	Review Period - Availability (%)	Review Period - Unit Age (Months)	Review Period - Unit Age (Years)
Bus	**31,515**	**13,754**	**42.2**	**$ -**	**$ 17,365**	**32.7**	**1.1**	**44.3**	**$ 400**	**$ 16,885**	**0%**	**$ 13,630**	**$ 3,823**	**$ 51,703**	**$ 1.64**	**83.8**	**49.0**	**4.1**
Class 4	35,187	14,510	42.7	$ -	$ 17,567	34.5	1.0	40.8	$ 400	$ 17,082	0%	$ 14,380	$ 4,150	$ 53,178	$ 1.51	83.6	43.0	3.6
Class 4 Limo style	22,948	11,990	41.1	$ -	$ 16,893	28.5	1.2	52.4	$ 400	$ 16,426	0%	$ 11,882	$ 3,059	$ 48,260	$ 2.10	84.2	63.0	5.2

Cars

Category	Review Period - Average Annual KMs or Hrs. Travelled	Review Period - Quantity of Fuel Used (liters of fuel consumed in review period)	Review Period - Downtime Days	Review Period - Preventive Maintenance (PM) costs for review period (PM includes oil changes and lubes, inspections)	Review Period - Repair Costs (reactive, unplanned repair costs for period)	Review Period - Annual GHGs produced (tonnes, combustion)	Review Period GHG Intensity	Review Period - L/100 km	Review Period - Downtime Cost per Day	Review Period - Downtime Cost for Period	Review Period - PM as % of All Parts/Labour	Review Period - Annual Fuel Costs	Review Period - Cost of Capital	Review Period - Total Cost for Period (R&M, Fuel, Capital & Downtime)	Review Period - Cost per KM	Review Period - Availability (%)	Review Period - Unit Age (Months)	Review Period - Unit Age (Years)
Car	**11,557**	**1,163**	**4.2**	**$ -**	**$ 1,834**	**2.6**	**0.3**	**10.5**	**$ 100**	**$ 420**	**0%**	**$ 1,085**	**$ 366**	**$ 3,597**	**$ 0.31**	**98.4**	**75.4**	**6.3**
Mid-size	6,782	891	4.1	$ -	$ 1,700	2.1	0.3	13.2	$ 100	$ 413	0%	$ 883	$ 269	$ 3,265	$ 0.48	98.4	100.0	8.3
Small	13,027	1,254	4.2	$ -	$ 1,879	2.8	0.2	9.6	$ 100	$ 422	0%	$ 1,147	$ 396	$ 3,700	$ 0.28	98.4	67.9	5.7

SUVs

Category	Review Period - Average Annual KMs or Hrs. Travelled	Review Period - Quantity of Fuel Used (liters of fuel consumed in review period)	Review Period - Downtime Days	Review Period - Preventive Maintenance (PM) costs for review period (PM includes oil changes and lubes, inspections)	Review Period - Repair Costs (reactive, unplanned repair costs for period)	Review Period - Annual GHGs produced (tonnes, combustion)	Review Period GHG Intensity	Review Period - L/100 km	Review Period - Downtime Cost per Day	Review Period - Downtime Cost for Period	Review Period - PM as % of All Parts/Labour	Review Period - Annual Fuel Costs	Review Period - Cost of Capital	Review Period - Total Cost for Period (R&M, Fuel, Capital & Downtime)	Review Period - Cost per KM	Review Period - Availability (%)	Review Period - Unit Age (Months)	Review Period - Unit Age (Years)
SUV	**20,771**	**2,679**	**7.4**	**$ -**	**$ 3,061**	**4.9**	**0.3**	**10.6**	**$ 100**	**$ 744**	**0%**	**$ 2,023**	**$ 864**	**$ 6,693**	**$ 0.32**	**97.1**	**54.6**	**4.5**
Compact	5,154	657	2.5	$ -	$ 1,023	1.3	0.3	12.0	$ 100	$ 249	0%	$ 558	$ 623	$ 2,452	$ 0.48	99.0	63.3	5.3
Full size	30,479	4,265	9.1	$ -	$ 3,758	7.0	0.2	9.6	$ 100	$ 914	0%	$ 2,926	$ 1,016	$ 8,615	$ 0.28	96.5	47.9	4.0

Pickups

Category	Review Period - Average Annual KMs or Hrs. Travelled	Review Period - Quantity of Fuel Used (liters of fuel consumed in review period)	Review Period - Downtime Days	Review Period - Preventive Maintenance (PM) costs for review period (PM includes oil changes and lubes, inspections)	Review Period - Repair Costs (reactive, unplanned repair costs for period)	Review Period - Annual GHGs produced (tonnes, combustion)	Review Period GHG Intensity	Review Period - L/100 km	Review Period - Downtime Cost per Day	Review Period - Downtime Cost for Period	Review Period - PM as % of All Parts/Labour	Review Period - Annual Fuel Costs	Review Period - Cost of Capital	Review Period - Total Cost for Period (R&M, Fuel, Capital & Downtime)	Review Period - Cost per KM	Review Period - Availability (%)	Review Period - Unit Age (Months)	Review Period - Unit Age (Years)
Pickup	**18,522**	**3,642**	**9.2**	**$ -**	**$ 3,804**	**8.6**	**0.5**	**19.6**	**$ 100**	**$ 925**	**0%**	**$ 3,562**	**$ 578**	**$ 8,869**	**$ 0.48**	**96.4**	**78.7**	**6.6**
Class 2E	19,366	3,453	7.1	$ -	$ 2,936	8.2	0.4	18.4	$ 100	$ 714	0%	$ 3,422	$ 327	$ 7,399	$ 0.38	97.3	94.4	7.9
Class 2E 4x4	9,192	1,803	5.1	$ -	$ 2,084	4.3	0.5	19.5	$ 100	$ 506	0%	$ 1,787	$ 98	$ 4,474	$ 0.49	98.1	121.0	10.1
Class 2F	11,867	2,290	9.5	$ -	$ 3,913	5.4	0.4	18.8	$ 100	$ 951	0%	$ 2,269	$ 1,421	$ 8,555	$ 0.72	96.3	20.9	1.7
Class 2G	10,987	2,802	7.8	$ -	$ 3,228	6.7	0.6	25.5	$ 100	$ 785	0%	$ 2,777	$ 449	$ 7,239	$ 0.66	97.0	91.0	7.6
Class 2H	15,228	2,454	5.7	$ -	$ 2,354	4.9	0.4	15.5	$ 100	$ 572	0%	$ 2,027	$ 1,264	$ 6,217	$ 0.41	97.8	43.5	3.6
Class 2H 4x4	19,998	6,109	23.3	$ -	$ 9,599	14.5	0.7	30.2	$ 100	$ 2,333	0%	$ 6,054	$ 1,536	$ 19,521	$ 0.98	91.0	28.0	2.3
Class 3	38,414	7,216	25.4	$ -	$ 10,437	17.2	0.4	18.8	$ 100	$ 2,537	0%	$ 7,151	$ 559	$ 20,684	$ 0.54	90.2	67.0	5.6
Class 3 4x4	22,146	5,889	17.8	$ -	$ 7,332	14.0	0.6	25.9	$ 100	$ 1,782	0%	$ 5,836	$ 512	$ 15,462	$ 0.70	93.1	73.8	6.2

Vans

Category	Review Period - Average Annual KMs or Hrs. Travelled	Review Period - Quantity of Fuel Used (liters of fuel consumed in review period)	Review Period - Downtime Days	Review Period - Preventive Maintenance (PM) costs for review period (PM includes oil changes and lubes, inspections)	Review Period - Repair Costs (reactive, unplanned repair costs for period)	Review Period - Annual GHGs produced (tonnes, combustion)	Review Period GHG Intensity	Review Period - L/100 km	Review Period - Downtime Cost per Day	Review Period - Downtime Cost for Period	Review Period - PM as % of All Parts/Labour	Review Period - Annual Fuel Costs	Review Period - Cost of Capital	Review Period - Total Cost for Period (R&M, Fuel, Capital & Downtime)	Review Period - Cost per KM	Review Period - Availability (%)	Review Period - Unit Age (Months)	Review Period - Unit Age (Years)
Van	**19,652**	**1,617**	**15.3**	**$ -**	**$ 6,447**	**2.4**	**0.7**	**30.4**	**$ 400**	**$ 6,130**	**0%**	**$ 997**	**$ 1,652**	**$ 15,082**	**$ 0.77**	**94.1**	**64.2**	**5.3**
Class 2E Full Size Cargo	20,392	2,664	4.8	$ -	$ 1,956	6.3	0.3	13.0	$ 400	$ 1,902	0%	$ 2,640	$ 373	$ 6,871	$ 0.34	98.2	81.4	6.8
Class 2E Mini	3,897	591	7.2	$ -	$ 3,232	1.3	1.9	79.7	$ 400	$ 2,881	0%	$ 537	$ 763	$ 7,145	$ 1.83	97.2	40.0	3.3
Class 2F Full Size	3,617	623	4.5	$ -	$ 1,857	1.5	0.4	17.2	$ 400	$ 1,806	0%	$ 617	$ 135	$ 4,416	$ 1.22	98.3	127.0	10.6
Class 2F Full Size Cargo	27,657	4,760	13.6	$ -	$ 5,598	11.3	0.4	17.2	$ 400	$ 5,443	0%	$ 4,717	$ 450	$ 16,208	$ 0.59	94.8	79.0	6.6
Class 2G Full Size	1,872	234	0.6	$ -	$ 249	0.6	0.3	12.5	$ 400	$ 242	0%	$ 232	$ 1,036	$ 1,759	$ 0.94	99.8	31.0	2.6
Class 2G Full Size Cargo	13,843	2,350	8.8	$ -	$ 3,627	4.8	0.5	21.8	$ 400	$ 3,527	0%	$ 1,996	$ 631	$ 9,781	$ 0.71	96.6	118.4	9.9
Class 3 Cutaway	38,836		31.3	$ -	$ 12,870	-	-	-	$ 400	$ 12,514	0%	$ -	$ 3,763	$ 29,147	$ 0.75	88.0	33.0	2.8
Class 3 Full Size Cargo	7,480	1,404	8.3	$ -	$ 3,422	3.7	0.5	18.8	$ 400	$ 3,327	0%	$ 1,394	$ 273	$ 8,416	$ 1.13	96.8	139.0	11.6
Class 4 Cube	8,056	2,921	13.0	$ -	$ 5,346	7.7	1.0	36.3	$ 400	$ 5,198	0%	$ 2,901	$ 296	$ 13,741	$ 1.71	95.0	163.0	13.6

Trucks

Category	Review Period - Average Annual KMs or Hrs. Travelled	Review Period - Quantity of Fuel Used (liters of fuel consumed in review period)	Review Period - Downtime Days	Review Period - Preventive Maintenance (PM) costs for review period (PM includes oil changes and lubes, inspections)	Review Period - Repair Costs (reactive, unplanned repair costs for period)	Review Period - Annual GHGs produced (tonnes, combustion)	Review Period GHG Intensity	Review Period - L/100 km	Review Period - Downtime Cost per Day	Review Period - Downtime Cost for Period	Review Period - PM as % of All Parts/Labour	Review Period - Annual Fuel Costs	Review Period - Cost of Capital	Review Period - Total Cost for Period (R&M, Fuel, Capital & Downtime)	Review Period - Cost per KM	Review Period - Availability (%)	Review Period - Unit Age (Months)	Review Period - Unit Age (Years)
Truck	**3,647**	**5,860**	**31.7**	**$ -**	**$ 13,335**	**14.9**	**26.4**	**1,003.8**	**$ 200**	**$ 6,339**	**0%**	**$ 5,646**	**$ 5,070**	**$ 30,094**	**$ 8.25**	**87.8**	**102.9**	**8.6**
Class 3 Dump 1 Ton	9,099	2,583	8.0	$ -	$ 3,305	6.4	1.8	73.2	$ 200	$ 1,607	0%	$ 2,561	$ 1,487	$ 8,959	$ 0.98	96.9	63.0	5.2
Class 3 Rescue Fire	876	59	2.6	$ -	$ 1,050	0.1	0.2	6.7	$ 200	$ 510	0%	$ 58	$ 166	$ 1,785	$ 2.04	99.0	235.0	19.6
Class 4 Dump 1 Ton	13,426	4,707	15.4	$ -	$ 6,345	12.2	1.0	37.2	$ 200	$ 3,085	0%	$ 4,673	$ 1,022	$ 15,125	$ 1.13	94.1	92.7	7.7
Class 4 Mechanical Fire	18,699	7,254	15.2	$ -	$ 6,234	19.1	1.0	38.8	$ 200	$ 3,031	0%	$ 7,203	$ 235	$ 16,703	$ 0.89	94.2	247.0	20.6
Class 4 Rescue Fire	1,023	868	6.3	$ -	$ 2,582	2.1	2.0	84.9	$ 200	$ 1,255	0%	$ 860	$ 235	$ 4,933	$ 4.82	97.6	235.0	19.6
Class 5 Aerial	22,923	6,689	31.6	$ -	$ 12,992	17.6	0.8	29.2	$ 200	$ 6,317	0%	$ 6,642	$ 4,050	$ 30,000	$ 1.31	87.9	55.0	4.6
Class 5 Dump 1 Ton	20,089	5,455	18.1	$ -	$ 7,426	14.0	1.7	68.6	$ 200	$ 3,611	0%	$ 5,414	$ 969	$ 17,420	$ 0.87	93.1	92.3	7.7
Class 5 Rescue Fire	1,425	296	4.4	$ -	$ 1,803	0.8	0.5	20.8	$ 200	$ 877	0%	$ 294	$ 235	$ 3,209	$ 2.25	98.3	199.0	16.6
Class 7 Aerial	5,930	1,342	8.8	$ -	$ 3,637	3.5	0.6	22.6	$ 200	$ 1,768	0%	$ 1,333	$ 10,011	$ 16,749	$ 2.82	96.6	7.0	0.6
Class 7 Air/Light Fire	3,044	1,590	9.5	$ -	$ 3,899	4.2	1.4	52.2	$ 200	$ 1,896	0%	$ 1,579	$ 3,530	$ 10,904	$ 3.58	96.4	136.2	11.3
Class 7 Rescue Fire	940	423	3.2	$ -	$ 1,314.00	1.1	1.2	45.0	$ 200.00	$ 639	0%	$ 419.90	$ 2,370.00	$ 4,742.76	$ 5.05	98.8	211.0	17.6
Class 8 Aerial Fire	1,191	706	14.4	$ -	$ 5,909.16	1.9	1.6	59.3	$ 200.00	$ 2,873	0%	$ 701.11	$ 5,708.57	$ 15,191.83	$ 12.76	94.5	127.0	10.6
Class 8 Pumper Fire	3,281	1,423	20.4	$ -	$ 8,401.06	3.6	1.1	42.7	$ 200.00	$ 4,085	0%	$ 1,342.41	$ 4,699.06	$ 18,527.06	$ 5.65	92.1	140.3	11.7
Class 8 Roll Off	185	2,636	18.4	$ -	$ 7,567.00	6.9	37.5	1,424.9	$ 200.00	$ 3,679	0%	$ 2,617.55	$ 10,472.56	$ 24,336.13	$ 131.55	92.9	5.0	0.4
Class 8 Single Axle Plow	299	5,971	29.4	$ -	$ 12,094.64	14.3	51.0	1,940.8	$ 200.00	$ 5,880	0%	$ 5,390.55	$ 5,513.43	$ 28,878.93	$ 96.56	88.7	61.3	5.1
Class 8 Tanker Fire	1,755	934	15.4	$ -	$ 6,339.34	2.2	1.3	49.1	$ 200.00	$ 3,082	0%	$ 843.48	$ 9,887.12	$ 20,152.07	$ 11.48	94.1	133.2	11.1
Class 8 Tandem Axle Plow	508	10,514	53.4	$ -	$ 23,297.63	27.7	55.4	2,108.0	$ 200.00	$ 10,674	0%	$ 10,440.12	$ 4,442.57	$ 47,509.86	$ 93.53	79.5	83.7	7.0
Class 8 Vac	96	3,826	24.3	$ -	$ 10,002.00	10.1	104.8	3,985.4	$ 200.00	$ 4,863	0%	$ 3,799.22	$ 23,927.00	$ 42,591.11	$ 443.66	90.6	7.0	0.6

Mobile Equipment

Category	Review Period - Average Annual KMs or Hrs. Travelled	Review Period - Quantity of Fuel Used (liters of fuel consumed in review period)	Review Period - Downtime Days	Review Period - Preventive Maintenance (PM) costs for review period (PM includes oil changes and lubes, inspections)	Review Period - Repair Costs (reactive, unplanned repair costs for period)	Review Period - Annual GHGs produced (tonnes, combustion)	Review Period GHG Intensity	Review Period - L/100 km	Review Period - Downtime Cost per Day	Review Period - Downtime Cost for Period	Review Period - PM as % of All Parts/Labour	Review Period - Annual Fuel Costs	Review Period - Cost of Capital	Review Period - Total Cost for Period (R&M, Fuel, Capital & Downtime)	Review Period - Cost per KM	Review Period - Availability (%)	Review Period - Unit Age (Months)	Review Period - Unit Age (Years)
Mobile equipment	**307**	**2,860**	**26.1**	**$ -**	**$ 11,890**	**5.2**	**21.3**	**808.7**	**$ 100**	**$ 2,609**	**0%**	**$ 1,961**	**$ 1,914**	**$ 17,216**	**$ 56.03**	**90.0**	**115.3**	**9.6**
ATV	100	506	0.7	$ -	$ 1,478	0.2	2.4	101.1	$ 100	$ 72	0%	$ 100	$ 91	$ 559	$ 5.59	99.7	155.8	13.0
Backhoe	393	2,312	27.9	$ -	$ 11,495	6.1	18.6	706.5	$ 100	$ 2,794	0%	$ 2,296	$ 1,666	$ 18,251	$ 46.39	89.3	130.7	10.9
Chipper	37	704	3.4	$ -	$ 1,410	0.6	37.9	1,442.1	$ 100	$ 343	0%	$ 233	$ 830	$ 2,816	$ 77.14	98.7	109.0	9.1
Compactor, landfill	1,250		152.8	$ -	$ 62,844	-	-	-	$ 100	$ 15,277	0%	$ -	$ 3,307	$ 81,428	$ 65.14	41.2	115.0	9.6
Double Roller	58	214	4.2	$ -	$ 1,736	0.6	8.1	308.6	$ 100	$ 422	0%	$ 212	$ 1,018	$ 3,388	$ 58.41	98.4	49.0	4.1
Grader	481	7,484	54.2	$ -	$ 22,289	19.7	54.6	2,076.6	$ 100	$ 5,418	0%	$ 7,431	$ 6,416	$ 41,555	$ 86.33	79.2	147.0	12.2
Ice Resurfacer	400		10.2	$ -	$ 4,185	-	-	-	$ 100	$ 1,017	0%	$ -	$ 1,836	$ 7,039	$ 17.60	96.1	85.5	7.1
Loader	543	4,853	61.7	$ -	$ 25,369	10.0	24.1	915.5	$ 100	$ 6,167	0%	$ 3,786	$ 2,834	$ 38,156	$ 70.32	76.3	124.4	10.4
Mower	30	371	2.1	$ -	$ 855	0.7	22.3	847.0	$ 100	$ 208	0%	$ 246	$ 537	$ 1,846	$ 60.85	99.2	151.0	12.6
Sweeper	322	2,803	8.3	$ -	$ 3,396	7.4	22.9	870.5	$ 100	$ 826	0%	$ 2,783	$ 2,552	$ 9,557	$ 29.68	96.8	127.0	10.6
Tractor	293	2,416	38.2	$ -	$ 15,727.70	6.4	22.4	851.4	$ 100.00	$ 3,823	0%	$ 2,398.79	$ 1,991.04	$ 23,940.87	$ 81.60	85.3	113.8	9.5
Tractor, large	189	3,892	22.2	$ -	$ 9,138.00	5.1	27.2	1,032.4	$ 100.00	$ 2,221	0%	$ 1,932.38	$ 1,723.62	$ 15,015.41	$ 79.66	91.5	139.0	11.6
Tractor, medium	164	490	4.5	$ -	$ 2,360.14	1.0	16.8	637.9	$ 100.00	$ 446	0%	$ 378.52	$ 496.99	$ 3,157.42	$ 19.21	98.3	83.3	6.9
Tractor, small	-		1.0	$ -	$ 593.50	-			$ 100.00	$ 96	0%	$ -	$ 38.79	$ 530.64		99.6	183.0	15.2

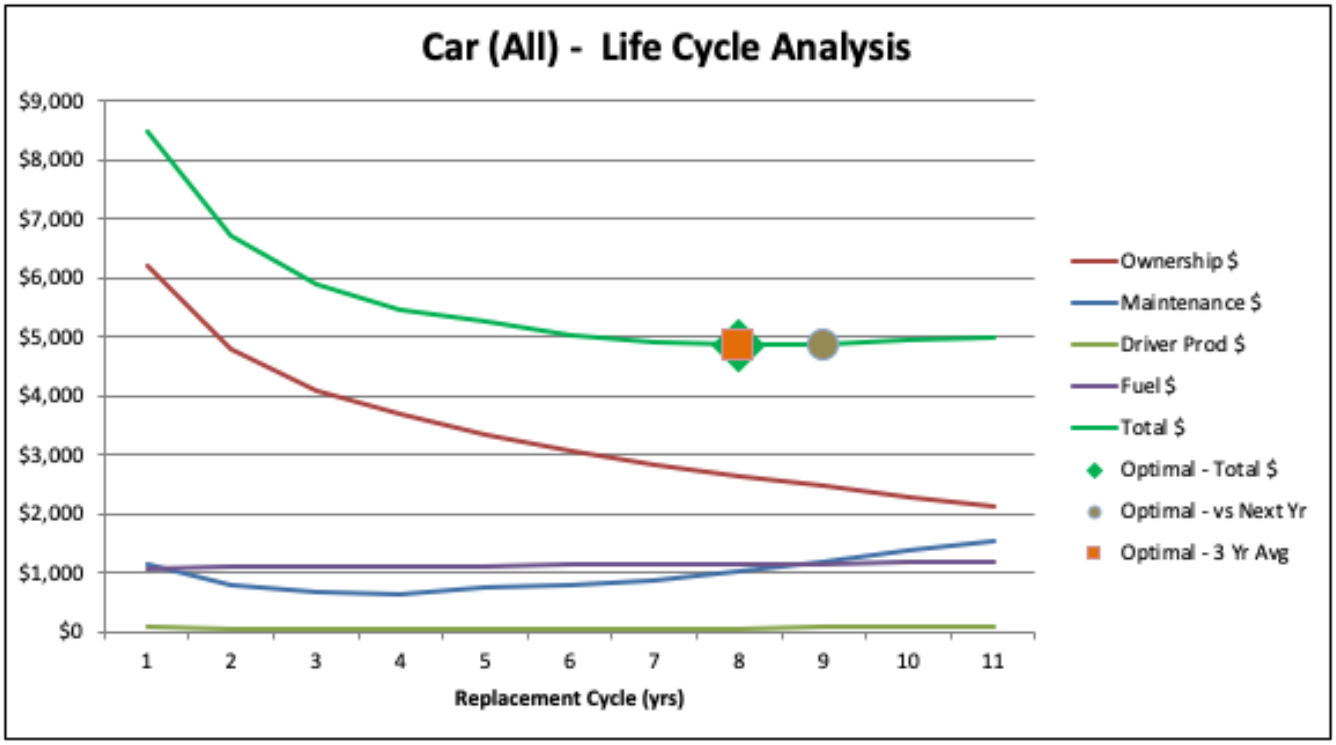
Equipment

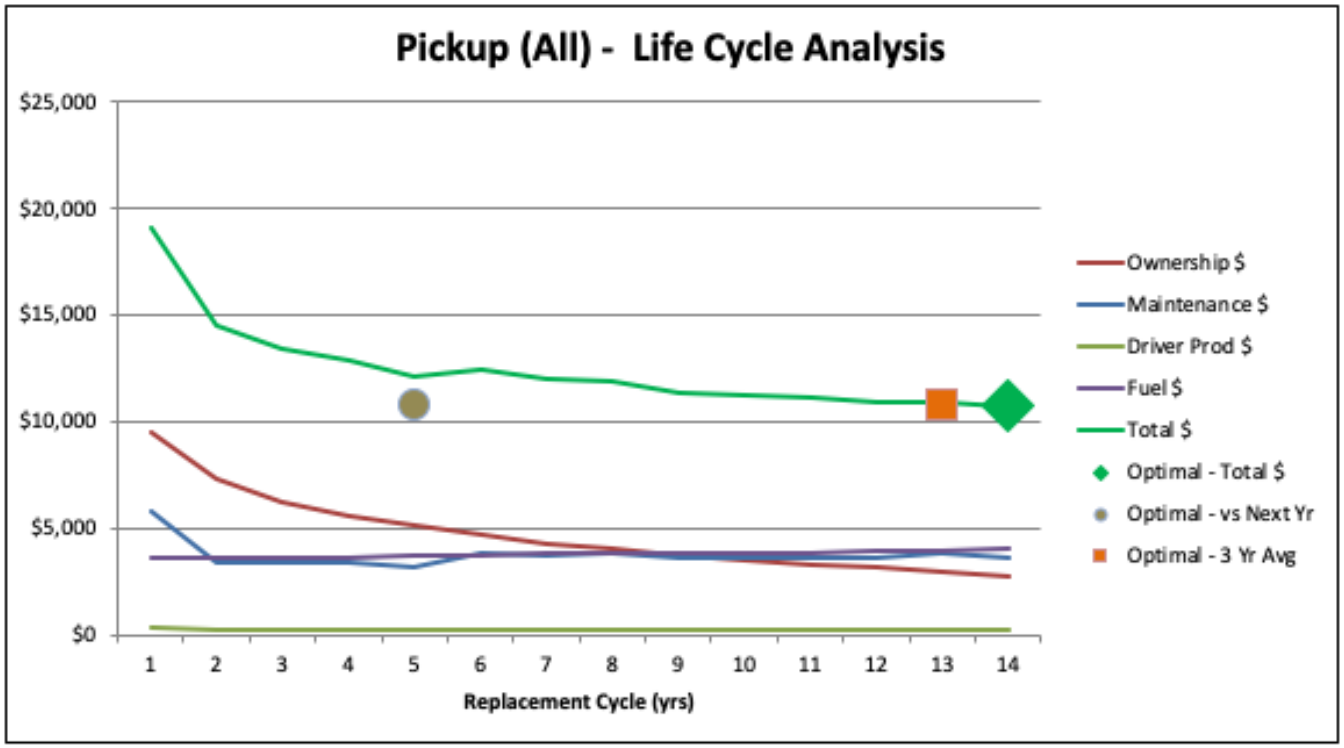
Category	Review Period - Average Annual KMs or Hrs. Travelled	Review Period - Quantity of Fuel Used (liters of fuel consumed in review period)	Review Period - Downtime Days	Review Period - Preventive Maintenance (PM) costs for review period (PM includes oil changes and lubes, inspections)	Review Period - Repair Costs (reactive, unplanned repair costs for period)	Review Period - Annual GHGs produced (tonnes, combustion)	Review Period GHG Intensity	Review Period - L/100 km	Review Period - Downtime Cost per Day	Review Period - Downtime Cost for Period	Review Period - PM as % of All Parts/Labour	Review Period - Annual Fuel Costs	Review Period - Cost of Capital	Review Period - Total Cost for Period (R&M, Fuel, Capital & Downtime)	Review Period - Cost per KM	Review Period - Availability (%)	Review Period - Unit Age (Months)	Review Period - Unit Age (Years)
Equipment	**100**	**67**	**2.4**	**$ -**	**$ 1,119**	**0.1**	**1.1**	**63.3**	**$ 100**	**$ 245**	**0%**	**$ 34**	**$ 263**	**$ 1,549**	**$ 15.49**	**99.1**	**113.8**	**9.5**
Power Washer	100		0.0	$ -		-	-	-	$ 100	$ -		$ -	$ 370	$ 370	$ 3.70	100.0	55.0	4.6
Steamer	100	100	2.2	$ -	$ 890	0.2	1.5	100.0	$ 100	$ 216	0%	$ 36	$ 261	$ 1,404	$ 14.04	99.2	117.6	9.8
Tank, water	100	37	2.9	$ -	$ 1,347	0.1	0.9	36.5	$ 100	$ 295	0%	$ 36	$ 254	$ 1,798	$ 17.98	98.9	116.2	9.7

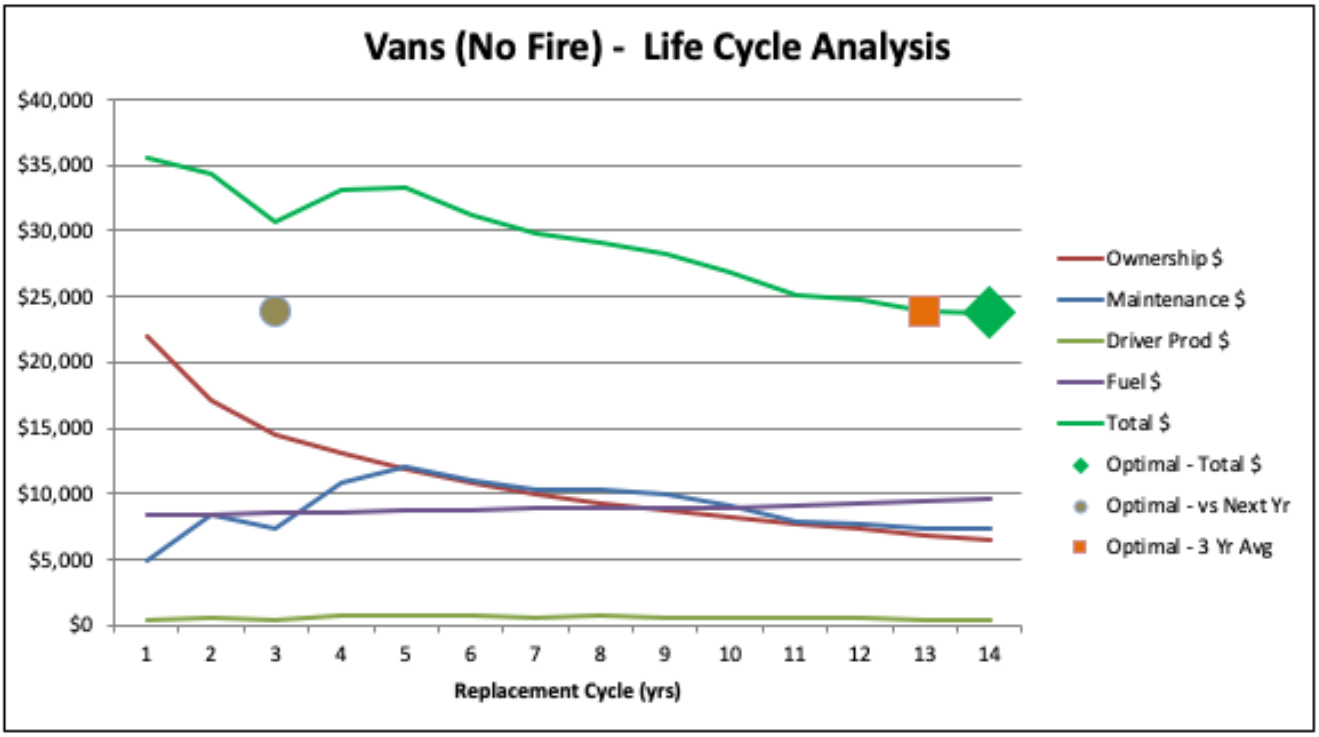
Trailers

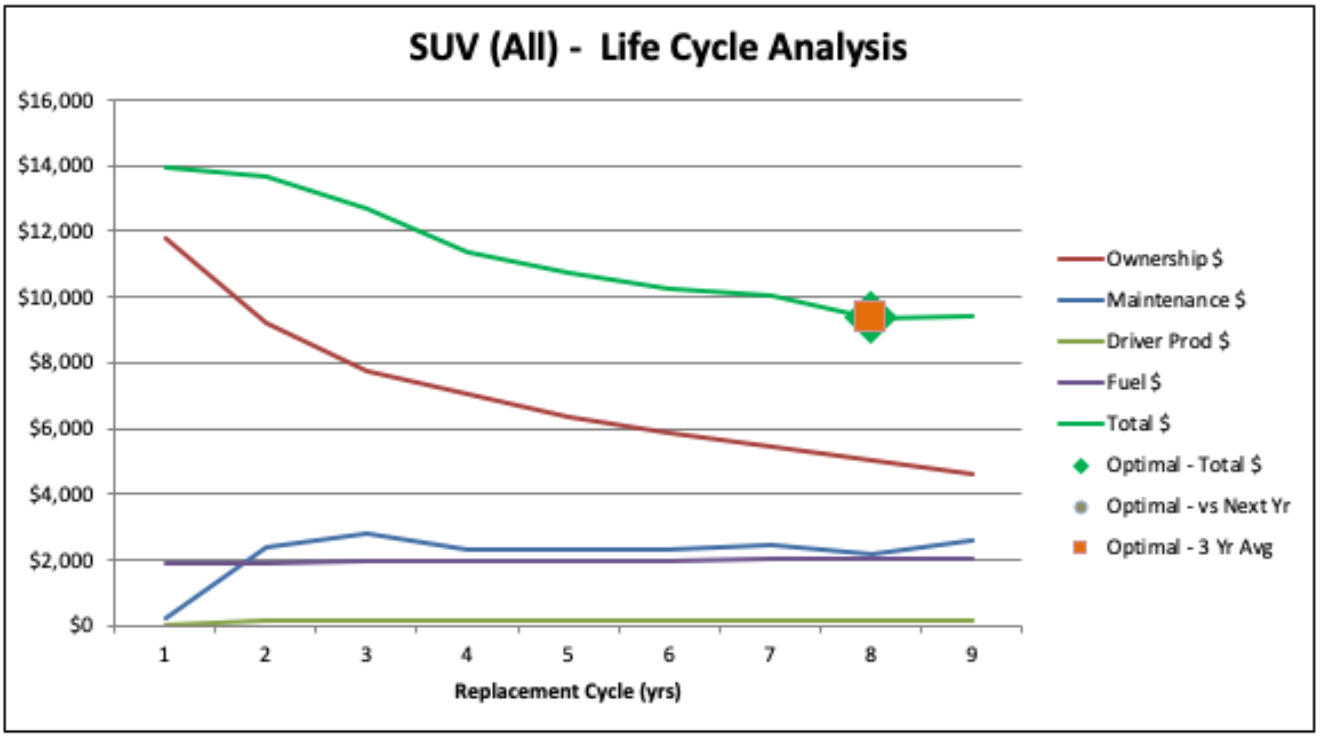
Category	Review Period - Average Annual KMs or Hrs. Travelled	Review Period - Quantity of Fuel Used (liters of fuel consumed in review period)	Review Period - Downtime Days	Review Period - Preventive Maintenance (PM) costs for review period (PM includes oil changes and lubes, inspections)	Review Period - Repair Costs (reactive, unplanned repair costs for period)	Review Period - Annual GHGs produced (tonnes, combustion)	Review Period GHG Intensity	Review Period - L/100 km	Review Period - Downtime Cost per Day	Review Period - Downtime Cost for Period	Review Period - PM as % of All Parts/Labour	Review Period - Annual Fuel Costs	Review Period - Cost of Capital	Review Period - Total Cost for Period (R&M, Fuel, Capital & Downtime)	Review Period - Cost per KM	Review Period - Availability (%)	Review Period - Unit Age (Months)	Review Period - Unit Age (Years)
Trailer	**0**	**209**	**1.4**	**$ -**	**$ 771**	**0.0**	**7.6**	**290.0**	**$ 200**	**$ 281**	**0%**	**$ 16**	**$ 266**	**$ 1,142**	**#####**	**99.5**	**152.4**	**12.7**
Asphalt	-	269	0.0	$ -		0.7			$ 200	$ -		$ 267	$ 1,366	$ 1,633		100.0	39.0	3.2
Boat	-		0.2	$ -	$ 150	-			$ 200	$ 36	0%	$ -	$ 4	$ 115		99.9	289.0	24.1
Float, large	-		2.0	$ -	$ 837	-			$ 200	$ 407	0%	$ -	$ 96	$ 1,340		99.2	238.0	19.8
Float, medium	-		1.5	$ -	$ 612	-			$ 200	$ 297	0%	$ -	$ 57	$ 966		99.4	235.0	19.6
Small	-		1.8	$ -	$ 981	-			$ 200	$ 352	0%	$ -	$ 172	$ 1,250		99.3	98.3	8.2
Trailer	1	29	1.1	$ -	$ 609	0.0	7.6	290.0	$ 200	$ 222	0%	$ 4	$ 602	$ 1,284	$1,027.30	99.6	136.0	11.3

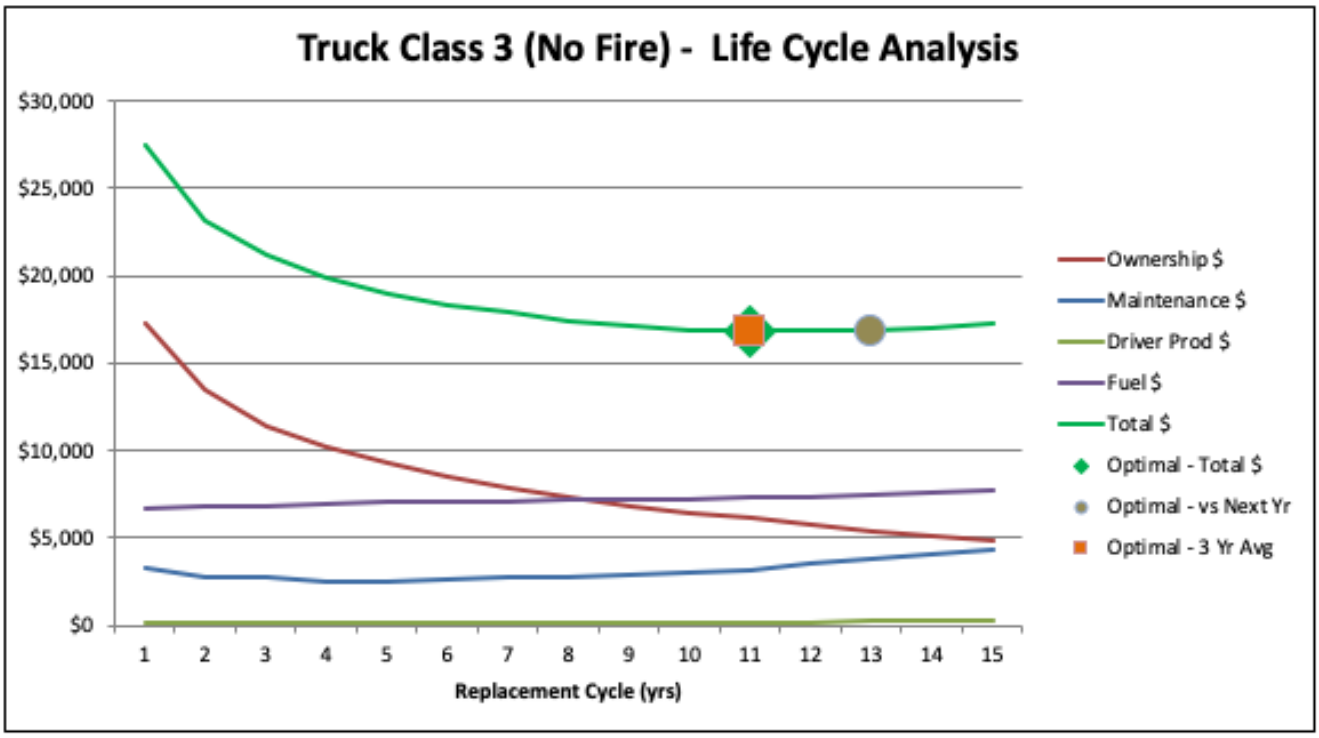
Appendix “B” – Lifecycle Analysis Charts

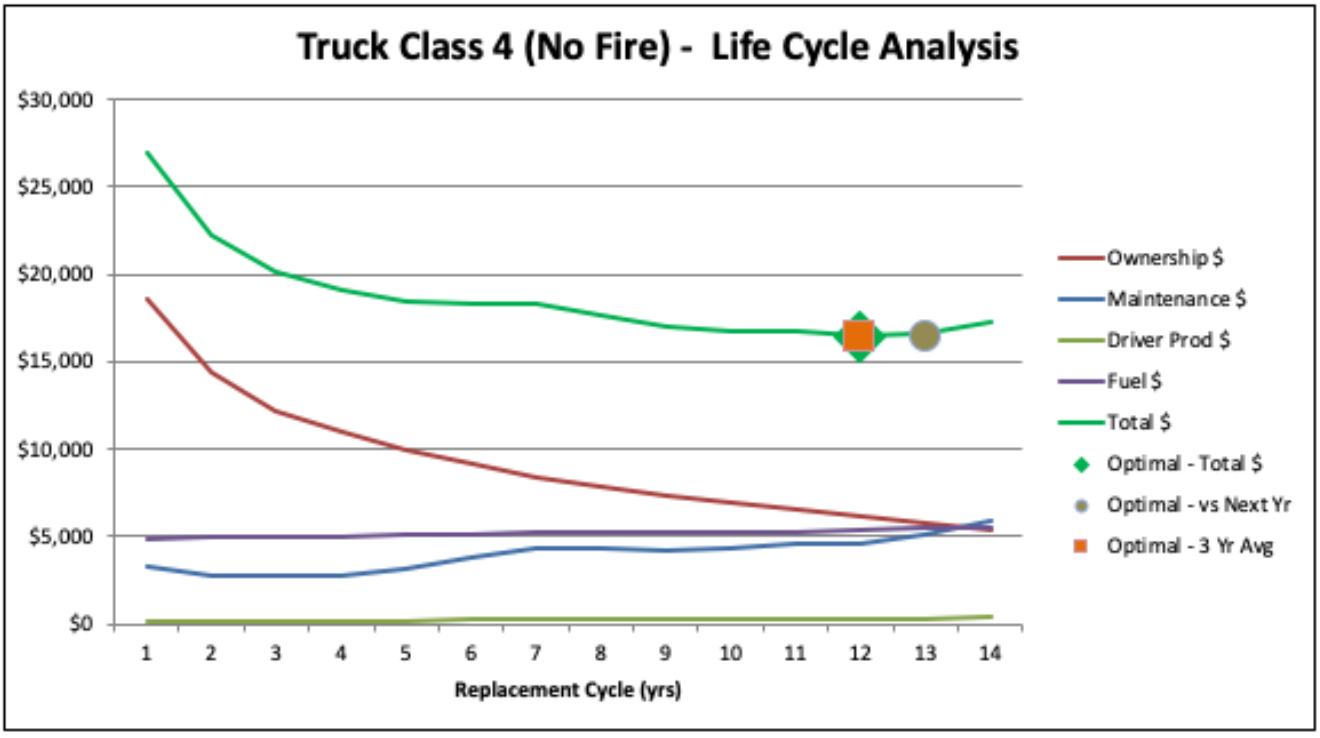


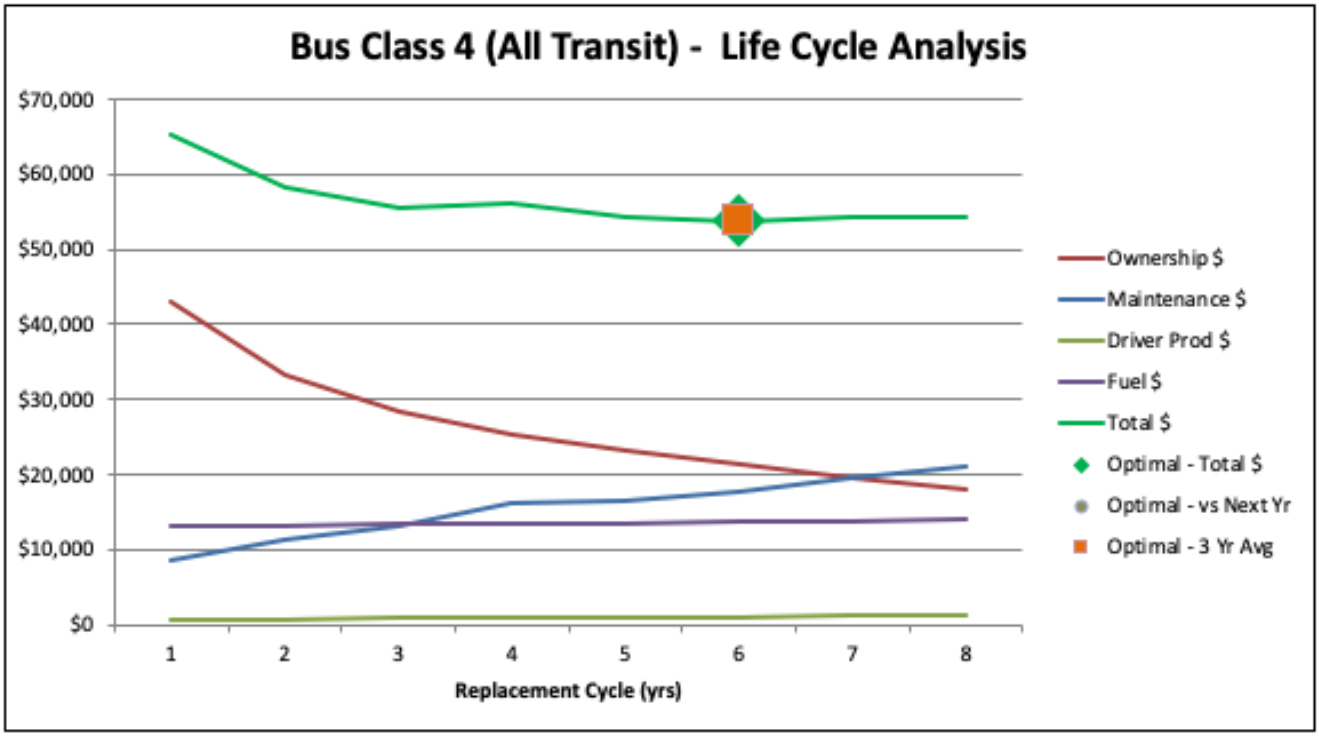


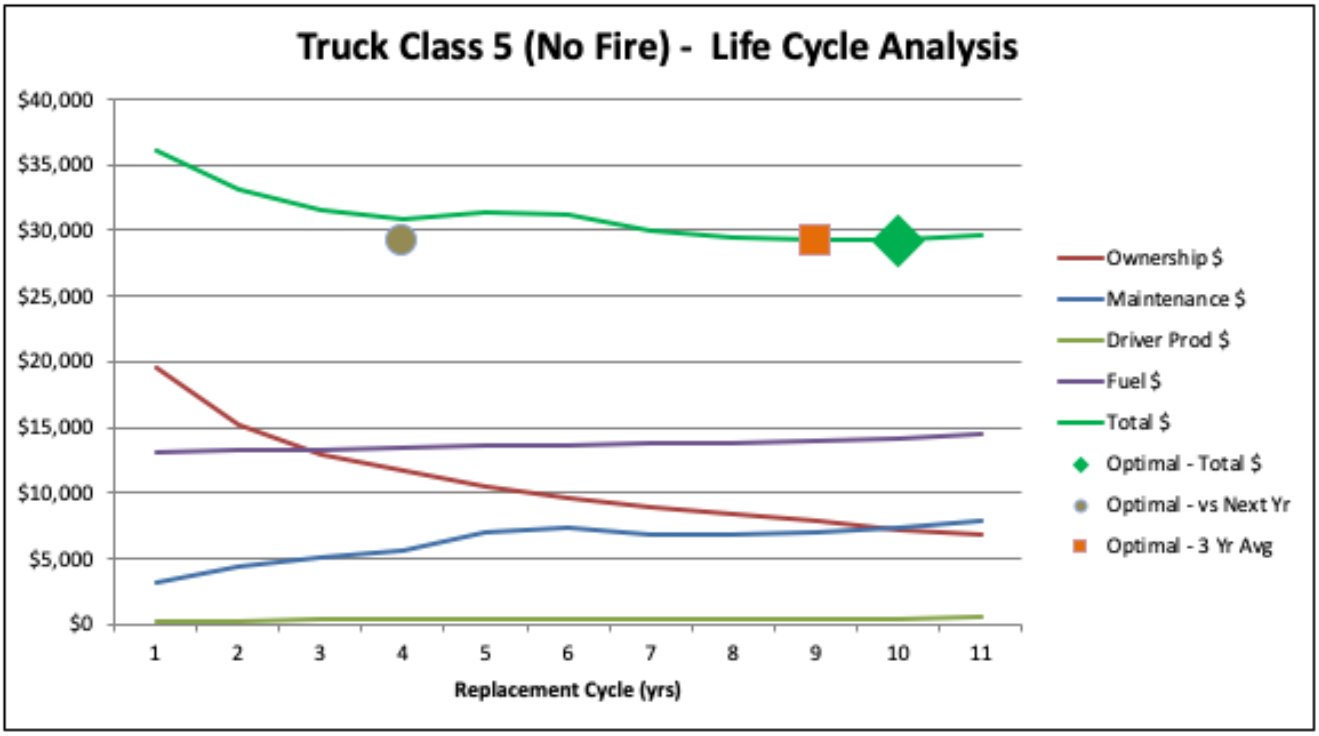

Vans (No Fire) - Life Cycle Analysis
$40,000
$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Replacement Cycle (yrs)
Ownership $
Maintenance $
Driver Prod $
Fuel $
Total $
Optimal - Total $
Optimal - vs Next Yr
Optimal - 3 Yr Avg

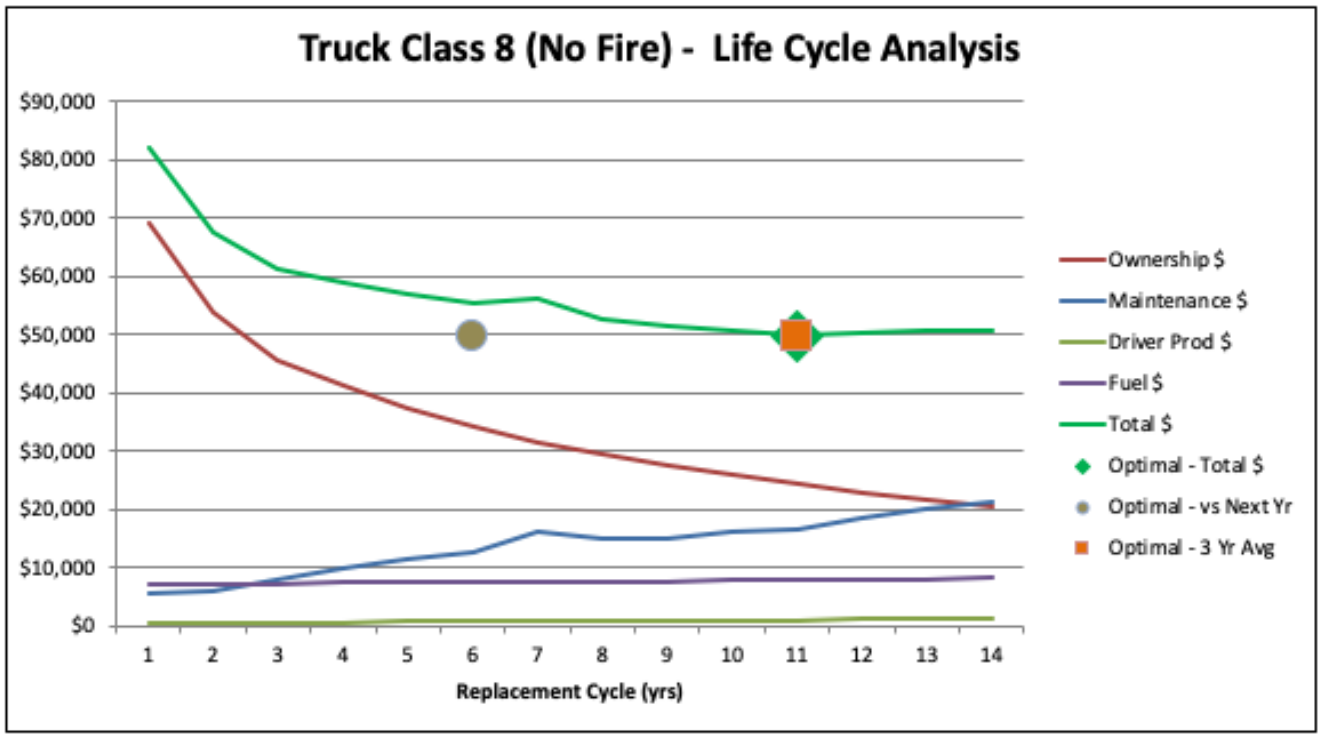

SUV (All) - Life Cycle Analysis
$16,000
$14,000
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$0
1
2
3
4
5
6
7
8
9
Replacement Cycle (yrs)
Ownership $
Maintenance $
Driver Prod $
Fuel $
Total $
Optimal - Total $
Optimal - vs Next Yr
Optimal - 3 Yr Avg

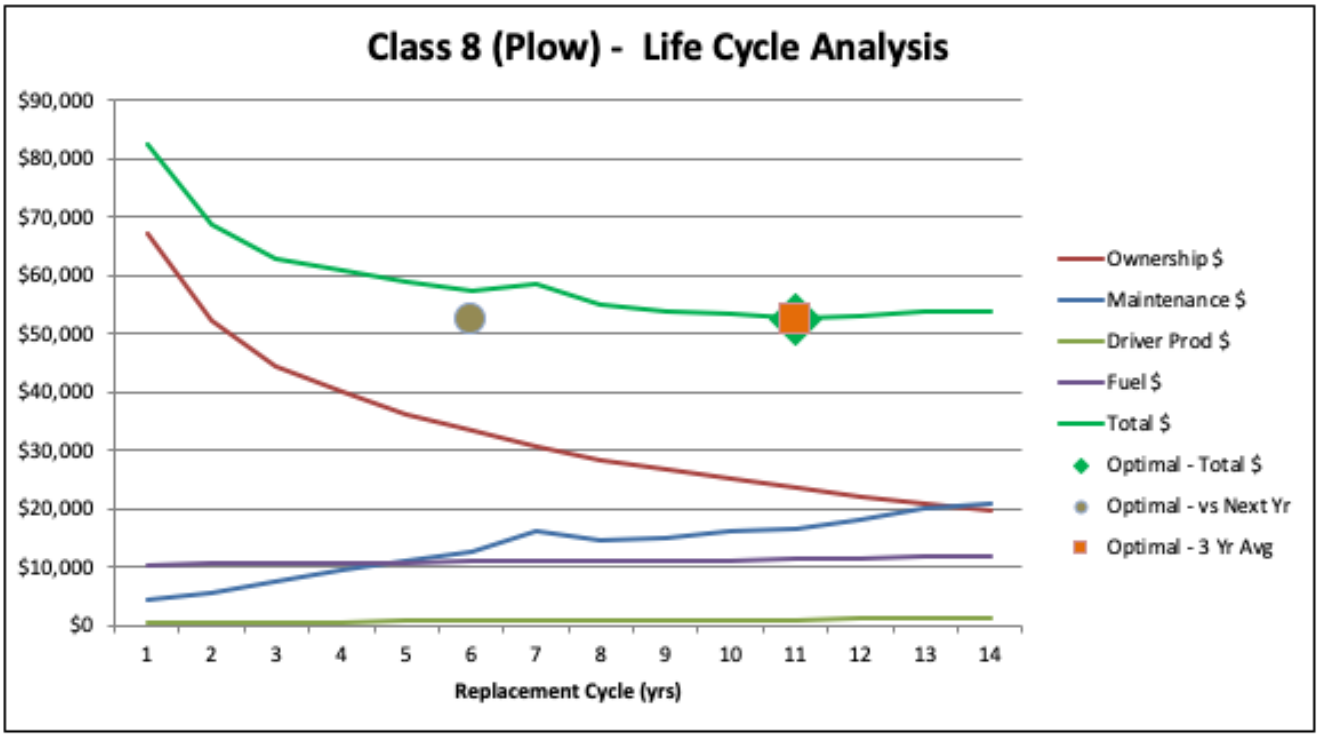

Truck Class 3 (No Fire) - Life Cycle Analysis
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Replacement Cycle (yrs)
Ownership $
Maintenance $
Driver Prod $
Fuel $
Total $
Optimal - Total $
Optimal - vs Next Yr
Optimal - 3 Yr Avg

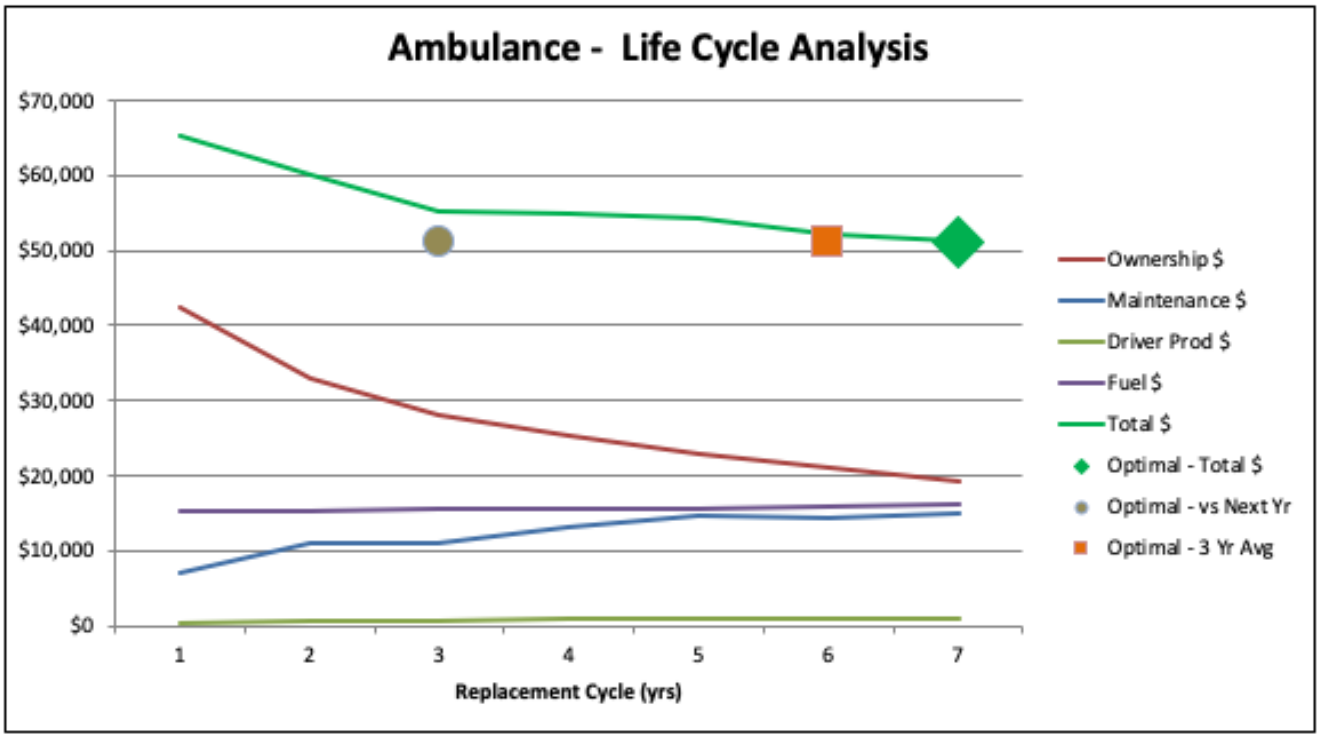

Truck Class 4 (No Fire) - Life Cycle Analysis
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Replacement Cycle (yrs)
Ownership $
Maintenance $
Driver Prod $
Fuel $
Total $
Optimal - Total $
Optimal - vs Next Yr
Optimal - 3 Yr Avg


Bus Class 4 (All Transit) - Life Cycle Analysis
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
1
2
3
4
5
6
7
8
Replacement Cycle (yrs)
Ownership $
Maintenance $
Driver Prod $
Fuel $
Total $
Optimal - Total $
Optimal - vs Next Yr
Optimal - 3 Yr Avg


Truck Class 5 (No Fire) - Life Cycle Analysis
$40,000
$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
1
2
3
4
5
6
7
8
9
10
11
Replacement Cycle (yrs)
Ownership $
Maintenance $
Driver Prod $
Fuel $
Total $
Optimal - Total $
Optimal - vs Next Yr
Optimal - 3 Yr Avg


Truck Class 8 (No Fire) - Life Cycle Analysis
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Replacement Cycle (yrs)
Ownership $
Maintenance $
Driver Prod $
Fuel $
Total $
Optimal - Total $
Optimal - vs Next Yr
Optimal - 3 Yr Avg


Class 8 (Plow) - Life Cycle Analysis
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Replacement Cycle (yrs)
Ownership $
Maintenance $
Driver Prod $
Fuel $
Total $
Optimal - Total $
Optimal - vs Next Yr
Optimal - 3 Yr Avg


Ambulance - Life Cycle Analysis
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
1
2
3
4
5
6
7
Replacement Cycle (yrs)
Ownership $
Maintenance $
Driver Prod $
Fuel $
Total $
Optimal - Total $
Optimal - vs Next Yr
Optimal - 3 Yr Avg

Appendix “C” - About Fleet Analytics Review

Fleet Analytics Review™ (FAR) is a software tool developed by the RSI-FC team in 2016. It was designed to provide a “deep dive” into big data for fleet review projects that require complex fleet analysis.

For the Kawartha Lakes review, FAR was our teams *‘tool of choice’* as we will discuss in greater detail in this section of our report. FAR has been used as the foundational analysis and a data modeling platform for our work in helping fleets achieve optimal levels of efficiency and cost-effectiveness.

The FAR process uses historical cost metrics and vehicle operating data (i.e., miles/km-driven, fuel usage, repair and maintenance costs, unit age, acquisition cost, cost of capital, downtime, residual value, etc.) to establish financial and service levels (i.e., utilization, availability/uptime). FAR highlights exception units – vehicles that are performing in a sub-standard way in terms of cost and performance; it identifies the reason(s) why, thereby enabling management action(s).

Data Modeling in FAR

In fleet management, costly errors can multiply quickly. For example, if a fleet acquires a vehicle type that turns out to be a poor performer – such as a brand/make/model that turns out to have poor reliability or high failure rates, the impact can be negative and costly. But multiply that impact many times – such as in a fleet which has chosen to standardize on purchasing many hundreds of these poor-performing units, the cost increases exponentially -- it can become insurmountable for some enterprises. Similarly, management processes under consideration should be evaluated through data modeling as well to assess their cost/ benefit to the fleet. Hence, the criticality of completing full analytical reviews and pilot testing before large scale commitments are made.

With FAR baselines established, via exception management, our software is then used by our analysts to model, analyze and evaluate go-forward plans and identify potential issues – ahead of their actual implementation, thereby avoiding potentially costly mistakes. FAR takes into consideration the operating expense (Opex) implications and determines whether any capital expense (Capex), investment will be offset by Opex reductions. FAR is also used to model and evaluate/assess all manner of fleet best practices ahead of implementation.

Using FAR to Assess Preventive Maintenance Programs

FAR is used by our team to assess the effectiveness of a fleet’s preventive maintenance practices. FAR calculates the ratio of a fleets spending (parts and labour) on preventive maintenance (PM) versus the cost of completing “reactive” repairs (reactive repairs are unplanned vehicle or component failures and/or breakdowns). We refer to this statistic as “PM Ratio”.

By calculating PM Ratio for over 150 municipal fleets and plotting the data against vehicle availability (uptime) rates for each fleet in this manner, we now use this data to evaluate the effectiveness of a fleet's PM activities and how effective its PM programs are in reducing reactive repairs (breakdowns/failures).

Under-spending on PM is risky and will result in increased downtime, breakdowns and work plan disruption for vehicle users due to unreliable vehicles. Over-maintaining a fleet's vehicles is also costly, and as well, wasteful of resources while being disruptive for user groups. The science of modern fleet management is confidently knowing, via reviews of historical data, the correct amount and frequency of PM required to maintain an acceptable level of uptime. FAR is used by our team to make this assessment.

By analyzing the fleet's PM Ratio as we've described, followed by a thorough review of the actual PM tasks and practices being completed by vehicle technicians/mechanics during their PM inspections, we identify if there are gaps and/or shortcomings that can be addressed. This approach will be employed in our fleet review recommendations to Kawartha Lakes management.

Business Case Approach

FAR is used by our team to determine balanced go-forward, long-term vehicle replacement capital requirements and as well, any business process changes being contemplated for the fleet. The FAR tool makes this analysis based on business case modeling, return on investment, and cost/benefit analysis.

FAR Tool Will Be Licensed to Kawartha Lakes

FAR is user-friendly and simple to use; it is based on MS Excel and it will be licenced in perpetuity, free-of-charge to the City of Kawartha Lakes for its own use post-project, if the City chooses to do so.

Recent Enhancement and Upgrades to FAR. Beginning with FAR V30.5 (beta), the tool features upgrades and enhancements to its functionalities. These include:

FAR's Fuel-Efficient Green Fleet Planning Tools. FAR now includes several new powerful "green fleet planning" tools. These tools will be used to evaluate the financial and greenhouse gas (GHG) impacts of switching the City's vehicle fuels from fossil-based (gas or diesel) to (for example) alternate and/or renewable fuels or electric. In the FAR Input Form, users may now make choices as to fuel-switching (for example, changing all gas or diesel-powered vehicles in specific categories to E85, B5-B100 biodiesel, hybrid, plug-in hybrid, battery-electric, compressed natural gas – even hydrogen fuel cells.

FAR calculates the net cost and GHG reduction of the fuel-switch being considered, taking into consideration not just the fuel/electricity costs, but the change in fuel efficiency, and as well any costs of infrastructure such as installing a CNG fueling station, or electric vehicle chargers, etc.

Enhanced Vehicle Replacement Cost/Benefit Analysis. Comparisons and analysis regarding: a) aging a vehicle (or vehicles) that are now due for replacement to an ensuing year or, b) replacing the vehicle(s) in the

present budget year, is now based on the actual, average historical peer fleet cost data from our proprietary municipal fleet database.

In FAR, when a vehicle(s) is due for replacement, the tool calculates the annual cost for a new replacement vehicle(s) (including capital, fuel, repairs, PM and downtime) and compares that amount to the actual average cost for a similar vehicle that is one-year older (using data from our peer fleet database). In doing so, it predicts the impacts of aging vehicles with relative certainty based on real-world historical cost data from our municipal fleet database.

FAR displays the cost/benefit of replacing each unit that is due for replacement in the 5-yr. Capex plan tab - in blue font each vehicle that will save Opex if it is replaced, and red font if it will incur more Opex. This is a significant change - it eliminates all guesswork or sketchy assumptions and supplants it with real peer fleet operating cost data by model year and vehicle categories we've collected since 2006.

Fuel Usage and GHG Reduction for New Vehicles. For each vehicle that is due for replacement over the next five years, FAR calculates the fuel usage increase/reduction (liters and cost) that will result from the vehicle replacement. This is an excellent way of forecasting whether a contemplated switch to a different

Data Collection

RSI-FC began with data collection for review and analysis. CKL's fleet data included: a list of vehicles and equipment; makes/models/years of each unit, kilometers-travelled, fuel used, repair and preventive maintenance costs; and other data points as available. This raw dataset was entered into our Fleet Analytics Review™ (FAR) software tool to establish CKL fleet's baseline.

Establishing the fleet's baseline was the foundation from which to begin analysis and formulate a plan. The baseline identified the fleet's current-day status by calculating several Key Performance Indicators (KPIs), and positioned CKL fleet's statistics relative to municipal peers.

By calculating individual vehicle and equipment type by average performance it was possible to assess each unit's performance relative to the average statistics for similar vehicles in the fleet. As a result, exception units were identified – those with better or worse performance relative to similar vehicles in the fleet.

Operational Statistics

With the baseline established we next plotted CKL's key operational statistics (KPIs) alongside data averages for comparable municipal fleets, derived from RSI's municipal fleet database. The objective of this step was to direct our review into areas having potential gaps and identify possible sub-standard performance. These results highlighted where opportunities for improvement may be feasible, and underscored areas for further investigation by our team.

Appendix “D” – About Best Management Practice Review

Best Management Practices Review™ (BMPR) is a critical first step in the fleet review process. The BMPR process was designed to provide our project team an inside look at the City’s fleet operations. BMPR enabled our team to become familiar with Fleet’s business processes and practices in a methodical manner. In turn, this knowledge is used to inform and guide our work on, and our recommendations for the City of Kawartha Lake’s Fleet Review.

Best Management Practices Review, or BMPR™ - [bump-er] - is an RSI-FC process that methodically and efficiently explores and audits a fleet’s management business practices, processes, policies and legislative compliance to identify gaps or areas of risk exposure. BMPR™ highlights areas where there may be gaps and/or opportunities for improvement relative to North America's 'best in class' fleets.

The Evolution of BMPR

Over the past decade our team observed that specific best management practices (BMPs) are applicable to fleets of all business sectors. These BMPs range from business structure, human resources and maintenance practices through to operational policies. We determined that proactive fleet managers would value an impartial, third party, ground-up BMP review of their operations to identify opportunities for improvement.

By means of our BMPR™ software we systematically perform gap analysis to identify specific areas where peer fleets have successfully implemented viable BMPs. The BMPR™ software template includes up to 200 topics of fleet management in 16 specific areas of interest (see table below).

By completing the BMPR™ process at the outset of our Kawartha Lakes project our team was able to become quickly familiar with the City’s operations and fleet practices, to aid in planning a roadmap to fleet improvement. BMPR explores what's working in the fleet (and what isn't), areas of potential risk exposure and new best management practices that will enhance financial, environmental and service level performance to "best-in-class" standards of excellence.

Our BMPR interviews examines up to 16 areas of focus:

1. Fuel Procurement and Distribution
2. Accidental Damages
3. Vehicle Safety
4. Environment
5. Policies and Procedures
6. Procurement
7. Performance Management
8. Communications
9. Asset Management
10. Vehicle Specifications
11. Finance
12. Operating and Capital Budgeting
13. Information Technology
14. Human Resources
15. Fleet Operations
16. Preventive Maintenance

RSI-FC completed a series of 'best management practices reviews' by means of our proprietary BMPR™ business tool. The BMPR consisted of separate meetings with personnel knowledgeable from each sub-set of the fleet to learn about the operational practices and procedures of each. In total, four BMPR meetings were conducted virtually via GoTo Meeting™ (www.gotomeeting.com) and by telephone or e-mail. The BMPR meetings included:

- Fleet and Transit
- Paramedics
- Fire
- Police

For maximum efficiency and in consideration of staff time off-the-job to attend our research meeting, we used our BMPR software-based template thereby ensuring an effective and productive sharing of information. The BMPR discussions included 16 topics and ~200 questions. For thoroughness, we assigned three of our senior consultants to these sessions to ensure all information was accurately captured.

After successfully completing the above preparatory steps, our team gained a well-informed working knowledge of Fleet and Transit Services and CKL's sub-set fleets.

Appendix "E" – About Life Cycle Analysis

RSI-FC specializes in, and has completed lifecycle analysis for dozens of fleets in Canada and the U.S. Our highly evolved and proprietary RSI-FC Life Cycle Analysis (LCA) process and software tool[36] will be used by our team to illustrate the total life cycle cost of owning and operating each fleet vehicle type and/or category for Kawartha Lakes. LCA uses historical cost data for each vehicle category to determine at what age units should be considered for replacement.

Through our LCA processes, RSI-FC generated the following data fields: average capital cost, value, maintenance and repair cost as the vehicle ages (parts and labour), downtime -- as assessed by (if available) total work order numbers (i.e. shop visits for reactive repairs) as the vehicle ages, km/yr., and fuel consumption as well as engine hours, and/or power take off hours, among other fields where additional data is available.

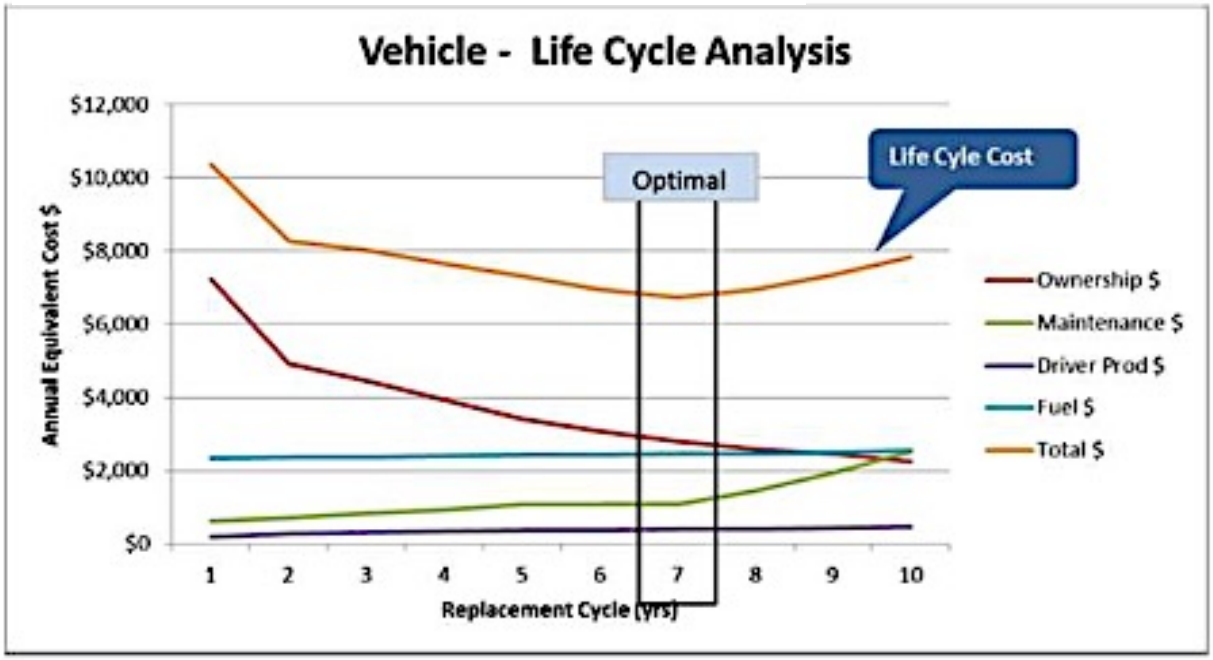
Replacement cycle recommendations will be determined by age and kilometers-driven. In addition, RSI-FC will evaluate additional criteria including engine hours and where applicable, power takeoff (PTO) hours. These additional operating metrics will become part of the overall mix of LCA determining factors.

RSI-FC developed vehicle retention recommendations for Kawartha Lakes based on LCA results and determine an overarching retention strategy that describes the optimal replacement cycles for all types of vehicles in the fleet.

As shown in the *LCA Example* (below), ideally, optimal replacement occurs before the rollup of costs rise and reliability/safety is reduced, and before major capital expenditure or refurbishment is necessary.

[36] RSI-FC will licence our proprietary LCA tool in perpetuity to Kawartha Lakes for its own use post-project. The LCA tool that will be employed for Kawartha Lakes was last refreshed in 2017 and calibrated for maximum accuracy.

LCA Example



In most cases, the increased cost of capital for newer vehicles will be offset by the reduced cost of fuel, repairs and downtime. However, the flipside of this is that, if vehicles are replaced prematurely, value may be lost and total cost of ownership will increase.

The skill of balancing this is a specialty for RSI-FC team – we have completed lifecycle analysis (LCA) for dozens of municipal and corporate fleets and we have developed our specialized LCA software tool for this purpose.

LCA and Long-Term Capital Planning

A fleet long-term capital planning (LTCP) software tool was developed by our Fleet Challenge team in 2016. The LTCP tool is component of FAR which complements Life Cycle Analysis. LTCP calculates five-year (or longer) fleet capital replacement plans with the objective of balancing go-forward budgets and in doing so, avoiding year to year cost spikes.

The RSI-FC LTCP tool calculates and displays whether replacing vehicles due for replacement would save the organization money or cost additional money, on a unit by unit basis. LTCP also forecasts the GHG reduction impacts of vehicle replacements.

The Capital Budget Balancing Act

RSI-FC believes that municipal fleet management's prime responsibility is vehicle availability – "uptime". This means ensuring that safe and reliable fleet vehicles, of the right type, size and capacity are ready each day

when needed, whether that is for the municipality's employees to conduct their daily routines or, for example when the municipality experiences a severe storm or another extreme weather event.

For the municipal fleet manager, this can be a delicate balancing act – preventing budget overruns despite inflation, rising costs for vehicles, parts and fuel and unseen factors while ensuring that the fleet is modern, safe and reliable, and that vehicles are suited to internal user needs.

LCA assists fleet managers in analyzing their operations and prioritizing those strategies that optimize vehicle life and return on investment. Some vehicles in poor or unsafe condition may require replacement before the criteria is met. Conversely, some vehicles may be in good condition and exceed the criteria and not warrant replacement, therefore recommended replacement criteria should be used as a guide.

Optimizing vehicle retention rates is a data intensive practice and a proper vehicle LCA will return significantly higher end-of-life return on investment. This can then be cycled back into fleet purchasing budgets, or utilized to offset other capital expenses.

The Long-Term Capital Planning tool is a semi-automated system that calculates the financial impacts then empowers fleet managers to make the ultimate, logic-based, well-informed business decisions to either: "replace", "defer to next year" or "dispose" of units due for replacement. The tool calculates and displays the impacts of those choices, thusly enabling balanced multi-year capital budget planning that helps avoids the undesirable "saw tooth" budget effect.

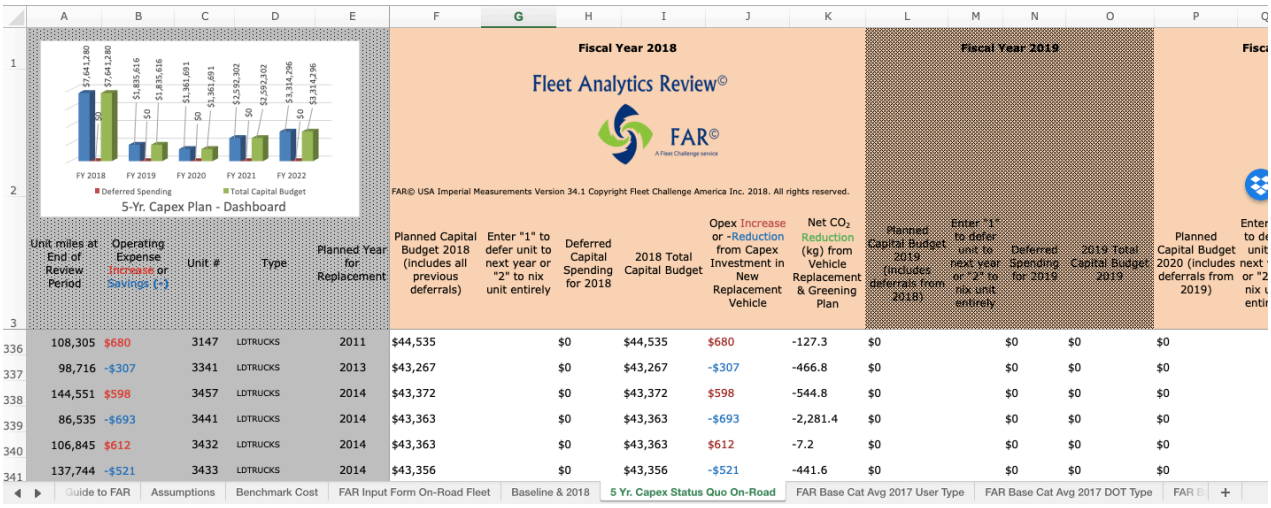
Using LCA data and our Long-Term Capital Planning tool, a capital budget will be prepared for five years in advance. This then enables the smoothing of annual cost spikes, keeping the average age of the fleet to an acceptable level that providing the lowest cost and highest uptime.

Vehicle data is input into the Long-Term Capital Planning tool from the fleet's FAR baseline data. The tool (sample screen shown) then calculates capital budgets, which are displayed, based on the fleet managers LCA determinations and accounting for inflationary increases. A capital budget is then automatically calculated for each year of the ensuing five-year[37] period.

In a recent software enhancement, V30.5 now includes calculations around GHG impacts (+ or -) stemming from vehicle replacements and capital budgeting. *(please see LTCP Screen Capture) (below)*

[37] The tool has been configured for five years, however it can be adapted to calculate longer-term budget plans.

LTCP Screen Capture



Previously Deferred Vehicle Purchases. Typically, for first-time users of the LTCP tool, a cost spike will result in year one due to pent-up (previously deferred) vehicle procurements. Therefore, the next step in the process for the fleet manager or their delegate, is to review his/her five-year capital plan and make "replace" or "defer" decisions based on their own knowledge of their fleet vehicles and their condition, as well as organizational plans and objectives.

If, for example, management's decision is to defer a vehicle replacement until the following year, the cost of its replacement is then - by a simple keystroke - automatically added to that year's budget plus an allowance for inflationary increase. This step ensures that the fleet manager is empowered with rationalizing his/her capital budgets based on data-driven analysis, and their own knowledge of their fleet and municipal realties.

Municipal Fleet Database

With data from our past work in completing fleet reviews since 2006 and until the present-day, we have compiled a 50,000-vehicle peer fleet statistical database. It is unique – we know of no other organization with this type of statistical information. Our database is used by our team for comparative purposes and to inform our recommendations, and our clients, as to what is reasonably possible and achievable in the context of cost-efficient fleet management.

Our database contains real-world operational data for municipal (and many corporate) fleets. From this data, we know -- with relative certainty -- the average total cost of ownership and many other service level statistics for all vehicle types, from passenger sedans all the way up to Class 8, tandem-axle trucks; this data can be grouped/sorted/segmented by vehicle age and vocation and other attributes.

Our database contains powerful information used by our team during our work in evaluating recommended options for our municipal fleet clients. Based on this real-world fleet data, we know with relative certainty what the financial, service level and GHG emissions reduction impacts will be if (for example) the fleet is allowed to age, versus what would happen if the fleet is refreshed with newer vehicles, or what the outcomes

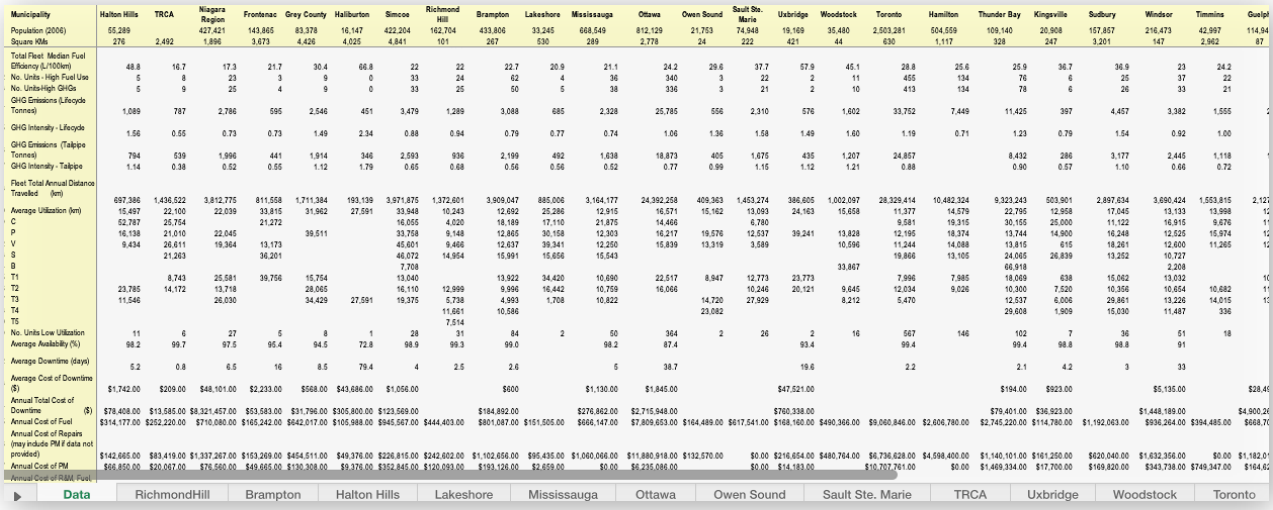
would be if the fleet vehicles receive less (or more) preventive maintenance inspections, or (again this is just an example) if larger (or smaller, lighter-duty) vehicles are specified in the future.

Screen Capture of RSI-FC Municipal Peer Fleet Statistical Database (below) shows a section of our municipal peer fleet database.

Please note that we have compiled ~ 100 KPI's for our municipal fleet partners.

Note: Our municipal fleet database is important data for positioning the City of Kawartha Lakes fleet baseline performance relative to its peers and for data modeling that will be completed by our team. It is extremely valuable for benchmarking and identifying initiatives and practices that have helped other municipalities achieve improvements. RSI-FC has compiled this data over the past 15 years and to our knowledge, no comparable data is owned by or available from any other organization.

Screen Capture of Municipal Fleet Statistical Database



Municipality	Halton Hills	TRCA	Niagara Region	Frontenac	Grey County	Haliburton	Simcoe	Richmond Hill	Brampton	Lakeshore	Mississauga	Ottawa	Owen Sound	Sault Ste. Marie	Uxbridge	Woodstock	Toronto	Hamilton	Thunder Bay	Kingsville	Sudbury	Windsor	Timmins	Guelph
Population (2006)	55,289		427,421	143,865	83,378	16,147	422,204	162,704	433,806	33,245	668,549	812,129	21,753	74,948	19,169	35,480	2,503,281	504,559	109,140	20,908	157,857	216,473	42,997	114,94
Square KMs	276	2,492	1,896	3,673	4,426	4,025	4,841	101	267	530	289	2,778	24	222	421	44	630	1,117	328	247	3,201	147	2,962	87
Total Fleet Median Fuel Efficiency (L/100km)	48.8	16.7	17.3	21.7	30.4	66.8	22	22	22.7	20.9	21.1	24.2	29.6	37.7	57.9	46.1	28.8	25.6	25.9	36.7	36.9	23	24.2	
No. Units - High Fuel Use	5	8	23	3	9	0	33	24	62	4	36	340	3	22	2	11	455	134	76	6	25	37	22	
No. Units-High GHGs	5	9	25	4	9	0	33	25	60	5	38	336	3	21	2	10	413	134	78	6	26	33	21	
GHG Emissions (Lifecycle Tonnes)	1,089	787	2,786	595	2,546	451	3,479	1,289	3,088	685	2,328	25,785	556	2,310	576	1,602	33,752	7,449	11,425	397	4,457	3,382	1,555	2
GHG Intensity - Lifecycle	1.56	0.55	0.73	0.73	1.49	2.34	0.88	0.94	0.79	0.77	0.74	1.06	1.36	1.58	1.49	1.60	1.19	0.71	1.23	0.79	1.54	0.92	1.00	
GHG Emissions (Tailpipe Tonnes)	794	539	1,996	441	1,914	346	2,593	936	2,199	492	1,638	18,873	405	1,675	435	1,207	24,857		8,432	286	3,177	2,445	1,118	
GHG Intensity - Tailpipe	1.14	0.38	0.52	0.55	1.12	1.79	0.65	0.68	0.56	0.56	0.52	0.77	0.99	1.15	1.12	1.21	0.88		0.90	0.57	1.10	0.66	0.72	
Fleet Total Annual Distance Travelled (km)	697,386	1,436,522	3,812,775	811,558	1,711,384	193,139	3,971,875	1,372,601	3,909,047	885,006	3,164,177	24,392,258	409,363	1,453,274	386,605	1,002,097	28,329,414	10,482,324	9,323,243	503,901	2,897,634	3,690,424	1,553,815	2,121
Average Utilization (km)	15,497	22,100	22,039	33,815	31,962	27,591	33,948	10,243	12,692	25,286	12,915	16,571	15,162	13,093	24,163	15,658	11,377	14,579	22,795	12,958	17,045	13,133	13,998	12
C	52,787	25,754		21,272			16,055	4,020	18,189	17,110	21,875	14,466		6,780			9,581	19,315	30,155	25,000	11,122	16,915	9,676	11
P	16,138	21,010	22,045		39,511		33,758	9,148	12,865	30,158	12,303	16,217	19,576	12,537	39,241	13,828	12,195	18,374	13,744	14,900	16,248	12,525	15,974	12
V	9,434	26,611	19,364	13,173			45,601	9,466	12,637	39,341	12,250	15,839	13,319	3,589		10,596	11,244	14,088	13,815	615	18,261	12,600	11,265	12
S		21,263		36,201			46,072	14,954	15,991	15,656	15,543						19,866	13,105	24,095	26,839	13,252	10,727		
B							7,708									33,867			66,918			2,208		
T1		8,743	25,581	39,756	15,764		13,040		13,922	34,420	10,690	22,517	8,947	12,773	23,773		7,996	7,985	18,069	638	15,062	13,032		10
T2	23,785	14,172	13,718		28,065		16,110	12,999	9,996	16,442	10,759	16,066		10,246	20,121	9,645	12,034	9,026	10,300	7,520	10,356	10,654	10,682	11
T3	11,546		26,030		34,429	27,591	19,375	5,738	4,993	1,708	10,822		14,720	27,929		8,212	5,470		12,537	6,006	29,861	13,226	14,015	13
T4								11,661	10,586				23,082						29,608	1,909	15,030	11,487	336	
T5								7,514																
No. Units Low Utilization	11	6	27	5	8	1	28	31	84	2	50	364	2	26	2	16	567	146	102	7	36	51	18	
Average Availability (%)	98.2	99.7	97.5	95.4	94.5	72.8	98.9	99.3	99.0		98.2	87.4			93.4		99.4		99.4	98.8	98.8	91		
Average Downtime (days)	5.2	0.8	6.5	16	8.5	79.4	4	2.5	2.6		5	38.7			19.6		2.2		2.1	4.2	3	33		
Average Cost of Downtime ($)	$1,742.00	$209.00	$48,101.00	$2,233.00	$568.00	$43,686.00	$1,056.00		$600		$1,130.00	$1,845.00			$47,521.00				$194.00	$923.00		$5,135.00		$28,49
Annual Total Cost of Downtime ($)	$78,408.00	$13,585.00	$8,321,457.00	$53,583.00	$31,796.00	$305,800.00	$123,569.00		$184,892.00		$276,862.00	$2,715,948.00			$760,338.00				$79,401.00	$36,923.00		$1,448,189.00		$4,900,26
Annual Cost of Fuel	$314,177.00	$252,220.00	$710,080.00	$165,242.00	$642,017.00	$105,988.00	$945,567.00	$444,403.00	$801,087.00	$151,505.00	$666,147.00	$7,809,653.00	$164,489.00	$617,541.00	$168,160.00	$490,366.00	$9,060,846.00	$2,606,780.00	$2,745,220.00	$114,780.00	$1,192,063.00	$936,264.00	$394,485.00	$668,70
Annual Cost of Repairs (may include PM if data not provided)	$142,665.00	$83,419.00	$1,337,267.00	$153,269.00	$454,511.00	$49,376.00	$226,815.00	$242,602.00	$1,102,656.00	$95,435.00	$1,000,066.00	$11,880,918.00	$132,570.00	$0.00	$216,654.00	$480,764.00	$6,736,628.00	$4,598,400.00	$1,140,101.00	$161,250.00	$620,040.00	$1,632,356.00	$0.00	$1,182,01
Annual Cost of PM	$66,850.00	$20,067.00	$75,560.00	$49,665.00	$130,308.00	$9,376.00	$352,845.00	$120,093.00	$193,126.00	$2,659.00	$0.00	$6,235,086.00		$0.00	$14,183.00		$10,707,761.00	$0.00	$1,469,334.00	$17,700.00	$169,820.00	$343,738.00	$749,347.00	$164,62
Annual Cost of R&M, Fuel																								

Data | RichmondHill | Brampton | Halton Hills | Lakeshore | Mississauga | Ottawa | Owen Sound | Sault Ste. Marie | TRCA | Uxbridge | Woodstock | Toronto

Shown in *Example of Municipal Fleet KPIs (below)* is an example of how our database can be used for making fleet to fleet comparisons. In this example is shown a sampling of several Key Performance Indicators (KPIs) from the ~100 KPIs in our municipal database. These KPIs are particularly valuable in completing the type of fleet review services sought by the City of Kawartha Lakes.

Example of Municipal Fleet KPIs

Key Performance Indicator (averages)	Urban	Rural
Fleet Age (total fleet)	5.7	5
Utilization (kilometres, per unit)	15,532	26,707
Median Fuel Efficiency (total fleet)	29.9	32
Operating cost (cost per km/unit)	$2.13	$1.53
Maintenance Ratio (PM: Reactive)	.50	.45
Availability (uptime)	96.6%	93.9%
Area covered per vehicle (km^2)	788	3,090
Constituents served per vehicle	881	1,123
GHG Intensity (kg/km)	.83	.88

Appendix "F" – Fleet Surveys

Survey Name: Fleet Technicians - City of Kawartha Lakes Survey
Response Status: Partial & Completed
Filter: None
Oct 11, 2020 2:13:54 PM

1. Please rate the following questions about job satisfaction.

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Very poor/very strongly no	Poor/no	No opinion	Good/yes	Very good/very strongly yes
Overall, how would you rate your level of job satisfaction?	0 0%	2 33%	0 0%	2 33%	2 33%
What is the likelihood you would refer someone to work at the City of Kawartha Lakes Fleet and Transit Services?	0 0%	0 0%	3 50%	3 50%	0 0%
What do you feel is the likelihood that your personal career goals and aspirations will be met in Fleet & Transit Services?	0 0%	3 50%	1 17%	2 33%	0 0%
Do you feel your current job is your only career option in Fleet & Transit Services?	0 0%	0 0%	0 0%	3 50%	3 50%
Does another job within Fleet and Transit Services that would get you off the shop floor some day have appeal to you?	0 0%	1 17%	1 17%	3 50%	1 17%

2 Comment(s)

2. Please provide your candid feedback on the following questions. As always, we invite your comments in the text box below.

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Almost never	Not often	No opinion	Sometimes	Most of the Time
Do you feel valued at work?	0 0%	0 0%	0 0%	3 50%	3 50%
Do you receive recognition for your work from the person you report to in Fleet & Transit Services?	0 0%	0 0%	0 0%	3 50%	3 50%
Do you feel that Fleet & Transit Services management takes your opinions seriously?	0 0%	0 0%	0 0%	2 33%	4 67%
Do you feel Fleet & Transit Services management is transparent in their actions?	0 0%	0 0%	1 17%	2 33%	3 50%
Are you comfortable giving upwards feedback to your immediate supervisor?	0 0%	0 0%	0 0%	2 33%	4 67%
Are you comfortable giving upwards feedback to fleet management?	0 0%	0 0%	0 0%	0 0%	6 100%
Do you feel your co-workers give each others respect in the workplace?	0 0%	0 0%	0 0%	4 67%	2 33%
Do you have fun at work?	0 0%	1 17%	1 17%	2 33%	2 33%

3 Comment(s)

3. Thinking of the tools and shop equipment you work with and the fleet garage work environment, please rate the following statements.

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Very Poor	Poor	No opinion	Good	Very Good
The tools and shop equipment provided by Fleet & Transit Services are suitable for the work I do.	0 0%	0 0%	0 0%	4 67%	2 33%
Tools and shop equipment are maintained properly.	0 0%	0 0%	0 0%	4 67%	2 33%
The garage bays and workspace are suitable for me to carry out my duties.	0 0%	1 17%	1 17%	3 50%	1 17%
The garage and facilities are clean, organized and well-maintained.	0 0%	0 0%	1 17%	4 67%	1 17%
Garage lighting is good.	0 0%	0 0%	1 17%	2 33%	3 50%
Heating and ventilation are adequate.	0 0%	1 17%	1 17%	1 17%	3 50%
Workplace Hazardous Materials Information System (WHMIS) information is available to me readily for the products I am working with.	0 0%	0 0%	2 33%	1 17%	3 50%
I have adequate understanding and training in WHMIS.	0 0%	0 0%	2 33%	2 33%	2 33%
I am provided suitable safety and personal protective equipment to complete my job.	0 0%	0 0%	0 0%	3 50%	3 50%
	0	0	0	2	4

I believe management places a high emphasis on worker safety.	0%	0%	0%	33%	67%

5 Comment(s)

4. Regarding safety training, please rate the following statements.

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Rarely	Not enough	No opinion	Yes	Very often
Safety training is provided to me regarding safe work procedures and practices.	0 0%	0 0%	0 0%	6 100%	0 0%
I receive training for new fleet equipment and vehicles.	0 0%	2 33%	0 0%	3 50%	1 17%
I receive safety training on new technologies such as electric vehicles.	2 33%	0 0%	3 50%	1 17%	0 0%
I receive safe driver training for the types of fleet vehicles I maintain.	0 0%	1 17%	2 33%	3 50%	0 0%
I receive training on new shop equipment and tools before I am expected to use them.	0 0%	1 17%	1 17%	4 67%	0 0%

1 Comment(s)

5. Thinking of skills training, please rate your responses to the following statements.

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	No	No opinion	Yes
I would be interested in completing more skills-training if it meant moving to a higher pay scale/rate.	0 0%	0 0%	6 100%
I would be interested in completing more skills-training without moving to a higher pay scale/rate.	1 17%	1 17%	4 67%
Management encourages me to complete more skills-training.	1 17%	1 17%	4 67%
Management will provide skills training on new technologies when added to the fleet (such as Hot Box training).	0 0%	1 17%	5 83%
2 Comment(s)			

6. Fleet and Transit Services operates on a Monday to Friday day shift basis with summer hours starting each June. In this section please provide your feedback about work schedules. Feel free to add your comments in the text box at the end of the questions.

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Very dissatisfied	Somewhat dissatisfied	No opinion	Somewhat satisfied	Very satisfied
How satisfied are you with your shift arrangement?	0 0%	0 0%	0 0%	3 50%	3 50%
How satisfied are you with the current practice of summer hours?	0 0%	0 0%	0 0%	4 67%	2 33%
1 Comment(s)					

7. This section of our survey is about garage workspace/bays. Feel free to add your comments and ideas in the text box at the end of the questions.

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Strongly no	No	No opinion	Yes	Strongly yes
Do you sometimes find it difficult to find available bays for completing repairs/maintenance?	1 17%	0 0%	0 0%	3 50%	2 33%
Do you feel the current fleet maintenance facilities would be adequate to serve an increased fleet size?	3 50%	3 50%	0 0%	0 0%	0 0%
Do you feel that the current fleet maintenance facilities are a safe work environment? (please explain which garage/facility)	0 0%	0 0%	0 0%	6 100%	0 0%

4 Comment(s)

8. This section is about your compensation package, including your pay rate, benefits package and paid vacation time. Please indicate your opinion abut the following statements.

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Strongly disagree	Disagree	No opinion	Agree	Strongly agree

My compensation package, including pay rate and scale, benefits package and paid vacation time is fair.	4 67%	1 17%	0 0%	1 17%	0 0%
My pay rate and scale are fair.	4 67%	2 33%	0 0%	0 0%	0 0%
My benefits package is fair.	1 17%	0 0%	1 17%	4 67%	0 0%
My paid vacation allowance is fair.	2 33%	1 17%	0 0%	3 50%	0 0%

5 Comment(s)

9. Finally, this is the "freestyle" section! Say your mind.... do you have additional comments or suggestions we've not covered in this survey? Whether it's about work/life balance, training, safety, hours of work... here's a chance to speak your mind. How can your department improve? There are no right or wrong answers here... all comments are appreciated and anonymous. Let's get creative!

6 Response(s)

10. How long have you been in your current position? Please note: this is an optional question - answer only if you choose to do so.

	Number of Response(s)	Response Ratio
Less that 1 year	0	0.0%
More than 1 and up to 3 years	1	14.2%
More than 3 and up to 5 years	0	0.0%
More than 5 and up to 7 years	4	57.1%
More than 7 and up to 10 years	2	28.5%

More than 10 years	0	0.0%
No Responses	0	0.0%
Total	7	100%
0 Comment(s)		

11. What best describes your role in the Fleet and Transit Services department ?Please note: this is an optional question - answer only if you choose to do so.

	Number of Response(s)	Response Ratio
Lead Technician	2	28.5%
Licensed Technician	2	28.5%
Fleet Supervisor	0	0.0%
Fleet Manager	0	0.0%
No Responses	3	42.8%
Total	7	100%
1 Comment(s)		

Appendix “G” - Case Study of Fully Bundled Lease Charges

Case Study – Toronto Hydro

At Toronto Hydro, a concept the utility described as a 'fully-bundled, total cost recovery vehicle lease system' was implemented, with inter-departmental full-service vehicle ‘lease’ charges starting in 2004. The utility’s fleet department was restructured in a way that resembled a retail full-service fleet management (leasing) company, including monthly full-maintenance vehicle lease payment invoices issued to internal user-groups.

At Toronto Hydro, the change had strikingly positive results. Key features of Toronto Hydro's monthly vehicle charges to its user departments include:

- Vehicle "lease" payments based on the cost of capital for each unit and acquisition cost apportioned over the planned life cycle
- Service Level Agreements for all user-groups that set out Fleet’s commitments and charges
- Preventive maintenance fees based on average annual PM costs for each type of vehicle
- Routine repair costs based on the average annual cost of reactive repairs for each type of vehicle

The fully-bundled lease charges for all directly-assigned vehicles at Toronto Hydro were (and still are today) transferred monthly by journal entries for all vehicles assigned to user departments/divisions. In this business model, the fully-bundled total cost recovery vehicle charges are the full responsibility of the assigned user departments.

When this plan was implemented, most of Toronto Hydro's line managers were quick to surrender under-utilized and redundant vehicles. They also became supporters of acquiring new vehicles that would cost their departments less to acquire and maintain. Their motivation was to reduce their departmental costs.

For Toronto Hydro, this new practice was a visible reminder of actual vehicle costs to managers of vehicle user departments. As a result of this change, Toronto Hydro's fleet rapidly downsized from over 1,000 units to a lean 750. The fleet’s operating costs decreased by several million dollars annually. The company, then operating in a newly deregulated business environment, continues this successful business structure today and has continued to benefit from even further reductions in fleet size and cost.

In addition to their vehicle lease charges, Toronto Hydro vehicle user departments/divisions are invoiced for the fuel consumed by their assigned vehicles. Fuel usage reports that are issued monthly to each user department/division help inform managers about the fuel efficiency of their assigned vehicle(s), and this highlights the exception units that are under their control. These reports create awareness which ensures buy-in for reducing fuel costs at the end-user levels of the organization.

For example, if a user department does not buy into fuel-use reduction practices or if it fails to guide its drivers to act responsibly around fuel conservation, only their department suffers the costs, instead of all user-groups. Departments that encourage fuel conservation benefit from lower operating costs for their assigned fleet vehicles.

Toronto Hydro's department/division managers became acutely aware of the fuel-efficiency of their vehicle assignment and fuel costs and became keenly interested in and empowered to help reduce their vehicles' fuel usage. This reduced their department's costs and as so, the entire organization became the beneficiary.

At-Fault Collisions and Negligent Damages

In the example of Toronto Hydro, the full cost of any *at-fault* collisions and *negligent* damages to vehicles are charged directly to the user department/division whose driver caused the damages. Costs for these preventable damages are not included in their vehicle lease charges.

This best management practice encourages line managers to take responsibility for their drivers who display bad driving behaviors or those who may be habitually abusive toward vehicles and equipment. The practice places responsibility for driver behaviors where it belongs – in the hands of managers who are best-positioned to deal with the issue of their drivers' poor driving habits.

Fully-Bundled Charges versus Reserve Funds

As described, Toronto Hydro's fully-bundled total cost recovery vehicle lease costs, including all fixed and variable costs, are passed on to each user department/division each month for their assigned vehicles. In that sense, fully-bundled, total cost recovery vehicle charges, as described, resemble a traditional 'reserve fund' in that assigned vehicle operating costs are calculated which fully offset the fleet department's costs for all vehicles and provide capital for replacements at the end of their useful life cycles. That's where the resemblance stops. For many municipal fleets, reserve funds tend to create a sense of entitlement in line managers. User-group managers may feel entitled to receive a new replacement vehicle despite their assigned unit still having remaining useful life. They may feel this way because their user department/division has been contributing to their assigned vehicle's capital replacement fund from the beginning (Note: City of Kawartha Lakes departments do not contribute to the asset maintenance reserve fund).

Reserve funds are typically topped up through hourly vehicle charge-out rates captured on work orders/time tickets. However, department(s) are known to hold the keys to a vehicle(s) for full days yet post only their hourly charges for a fraction of the day. This practice prevents usage of the vehicle(s) by any other departments. Consequently, if this occurs repeatedly, there will be a shortfall in the reserve fund when the time comes for replacement of the vehicle(s).

In the fully-bundled total cost recovery vehicle charges concept we've described, the Fleet Department continues to 'own' all units but transfers bundled vehicle lease costs to user departments/divisions each month, just as a third-party vehicle full-service lease provider would.

There are many advantages to this business structure. Key features of the 'fully-bundled, total cost recovery' business model concept are:

- Creates awareness of fleet which usually instills a desire to surrender under-utilized vehicles
- User-department managers and Fleet Services will share in the goal of keeping capital costs down for new, replacement units.
- Encourages fuel conservation by placing responsibility for fuel costs within the user-department/division to which the vehicle's driver reports
- Encourages accident and damage reduction by placing responsibility for costs within the user-department/division to which the vehicle's driver reports
- User-department/division managers who more carefully manage their assigned fleet vehicles can decrease their department/divisions' operating budgets

Disclaimer

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Analysis in the attached report is based on 2019 fleet data prepared by the City of Kawartha Lakes Fleet & Transit Services. In the dataset provided were a number of gaps and inconsistencies which were corrected by RSI-FC based on the best available information. RSI-FC is not responsible for errors or omissions, or for the results obtained from the use of this information. All information in this site is provided "as is", with no guarantee of completeness, accuracy, or timeliness of the results obtained from the use of this information.

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