

CITY OF GRANDE PRAIRIE

REQUEST FOR INFORMATION

FLEET MANAGEMENT SYSTEM RFI -01-215-09



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REQUEST FOR INFORMATION

The City of Grande Prairie invites qualified vendors to respond to a Request For Information for:

FLEET MANAGEMENT SYSTEM

The City wishes to replace both VMM and GasBoy with new products that will serve it for the next 20 years. The replacement for VMM should ideally be Windows-based, as should the replacement for Gasboy.

The proposed new Fleet Management System (the replacement for VMM) is described in this document. The proposed replacement for Gasboy is described in a separate document, available upon request from the City of Grande Prairie.

This document does not describe the current VMM system. Rather, it outlines, at a functional level, the specifications and features of the proposed new Fleet Management System. This document also does not provide details about computer operating characteristics, files or database structures: to the extent possible, it is user-oriented, rather than technical.

Documents and general information are available from the Purchasing Department, City Hall, Grande Prairie, AB or from the following websites: www.cityofgp.com/business/rfp/Default.htm or <http://www.purchasingconnection.ca>

The submission deadline for information packages will be 2:00 p.m. local time Thursday, April 9, 2009.

Responses can be delivered to the Purchasing Department, City Hall, 10205 – 98 Street, Grande Prairie, AB., clearly marked:

FLEET MANAGEMENT SYSTEM RFI -01-215-09

The City of Grande Prairie is requesting an estimate of total comprehensive cost (including project management, professional services, implementation, training, licenses, first year maintenance and support, etc.)

SUBMISSION INQUIRIES

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ISSUE DATE: March 13, 2009

INFORMATION TO PROPOSERS

Purpose of the Request for Information

The purpose of the Request For Information (RFI) is to determine the availability of fleet management systems.

In addition, the RFI is to determine an appropriate compatibility with existing hardware and software platforms that will provide high performance and reliability.

Lastly, the RFI is to determine the ability of vendors to implement such a system and provide costs of implementation for hardware, application software and on-going support.

Approximate costs relative to the above noted requirements should be provided in order to allow for development of appropriate budget requests.

Instructions to Respondents

Vendors are invited to provide information regarding a potential solution that is innovative and state of the art. All information collected and analyzed from the RFI process is planned to be used to prepare the Request For Proposal (RFP).

The Proposer is asked to submit a current set of software manuals, brochures and other related materials pertaining to the product that they are proposing. All information submitted should be in enough detail to allow the City to determine the Proposer's position from the documents received. The Proposer is requested to provide a time frame for installation from start to finish, including training.

Vendors are requested to submit information regarding their ability to stay current with the ever changing market.

Proposers shall state in their response how they want their submitted materials to be handled after our review processes. Any letter of non-disclosure or agreement on confidentiality required by the proposer should also be included with the submission.

Any costs incurred by the Proposer in preparation of the information will be borne solely by the Proposer.

The RFI summarizes the requirements from preliminary research conducted by City of Grande Prairie and contains information regarding the proposed technical solution, cost estimates and vendor capability. The vendor should document how and to what degree requirements are met. If a requirement is currently not met with an available package, the vendor is to propose how the requirement could be met and outline associated effort and costs. In addition the vendor is asked to answer every question in writing or give reference to supplementary material where the question is answered.

It is the proposer's responsibility to clarify interpretations of any item of the Request For Information documentation before the indicated closing date by contacting the Purchasing Department as indicated on Page 3 of this RFI.

SPECIAL CONDITIONS

1. Intent

The intent of the City of this Request For Information is to obtain complete information on Fleet Management systems. From the information received, the City may:

- Compile all data received and proceed with a Request for Proposal
- Negotiate an exclusive agreement with the selected proponent

2. Review Procedures

The City will form an Evaluation Committee to carefully review all submissions received.

We stress the importance of providing complete and comprehensive information with your original submission to ensure full consideration.

List and detail everything your firm can offer the City.

3. Response

Four (4) copies are to be submitted to assist in evaluation, in addition to the complete details requested, we ask that you enclose a summary of your offer, giving a quick overview of everything you are prepared to offer the City.

4. Confidentiality

The City will keep all information on this project confidential.

5. Reference

Please provide a minimum of 3 references of similar venues utilizing your product, including contact names and phone numbers.

6. Timeline

March 13, 2009 – issue RFI

March 27, 2009 – last day for questions

April 3, 2009 – City to have answered all questions

April 9, 2009 – deadline for submissions

FUNCTIONAL SPECIFICATIONS

1. Background

1.1 Introduction

Grande Prairie is a medium-sized city located in north-western Alberta, Canada. It has a population of about 50,000, and serves a market area of between 450,000 and 500,000 persons. Grande Prairie ("The City") was incorporated in 1958, and is at present a major hub for trading and commerce in the Canadian Northwest.

1.2 Fleet Systems

Fleet Systems is a City department that operates a fully equipped and staffed vehicle repair facility. It is responsible for maintaining the City's fleet of vehicles, which includes cars, trucks and vans together with specialized equipment such as road sweepers, graders, sanding trucks, riding lawnmowers and other units.

Fleet Systems also maintains the vehicles of certain other municipal agencies – among them the fire department, local utility company, police, ambulance service and bus service – that have entered into service agreements with the City.

In addition to repair and maintenance services, Fleet Systems also provides fuel for vehicles. It operates automated fuel pumps that are used by City vehicles, and the vehicles of other agencies and customers. The pumps are unattended and controlled through a fuel management system.

1.3 Volumes: Vehicles and ancillary equipment

As of January 2008, approximate numbers were as follows:

City-owned vehicles

- 250 cars, trucks, graders, sweepers, etc.
- 1000 ancillary units (lawn mowers, compressors, generators, snow blades, etc.)

Vehicles belonging to other agencies

- less than 100 Fuel pumps
- 2 pumps, at one location

1.4 Current Systems

Fleet Systems uses a software package called VMM (Vehicle Maintenance Management System) to track vehicle repairs and costs. VMM is an excellent product: it is stable, it collects all necessary vehicle repair and operational data, and it generates the reports that Fleet Systems staff need for day-to-day and administrative use. It however runs on an IBM AS/400 computer, whereas most other City systems are Windows-based. AS/400 support is not available in Grande Prairie, and both the hardware and software are currently supported from Vancouver, almost 1000 km away. The City's AS/400 computer is also reaching the end of its useful life.

Fleet Systems uses Gasboy software to manage its fuel pumps. Gasboy collects fuel data for each vehicle and passes it to VMM, where it is added to the vehicle's maintenance records. Like VMM, Gasboy has been in use for many years.

1.5 Need for new systems

The City wishes to replace both VMM and GasBoy with new products that will serve it for the next 20 years. The replacement for VMM should ideally be Windows-based, as should the replacement for Gasboy.

The proposed new Fleet Management System (the replacement for VMM) is described in this document. The proposed replacement for Gasboy is described in a separate document, available upon request from the City of Grande Prairie.

This document does not describe the current VMM system. Rather, it outlines, at a functional level, the specifications and features of the proposed new Fleet Management System. This document also does not provide details about computer operating characteristics, files or database structures: to the extent possible, it is user-oriented, rather than technical.

1.6 Units of measure

The proposed new Fleet Management System will use metric, rather than imperial or US, measures of volume, weight and dimensions.

1.7 A Word About Gender

In the interests of readability, we use the masculine form in this report. If this offends you, please substitute *she* for *he* wherever appropriate.

2. System Overview

2.1 Introduction

This document contains only the functional specifications for the new Fleet Management System. It does not describe the Gasboy replacement system, for which a separate “specifications” document is available.

The new Fleet Management System (“FMS”) tracks City and customer vehicles from the day they are acquired to the day they are sold or disposed of. All costs (including acquisition and disposal costs) and revenues are recorded. The FMS also develops a complete work and life history for each vehicle – its users, fuel usage, repairs, maintenance history, accidents, and so on. This section provides an overview of the FMS and its components.

2.2 Definitions

The terms *vehicle*, *other equipment*, *fitted-out unit* and *customer*, as used in this document, have the following meanings:

Vehicle	any self-propelled vehicle that needs a licence plate in order to travel on public roads.
Ancillary equipment	any other “non-vehicle” item that Fleet Systems wishes to track – for example, snow blades, trailers, lawnmowers, compressors, generator sets, chainsaws, truck-mounted cranes, and so on.
Fitted-out unit	A vehicle with ancillary equipment mounted on it – for example, a truck with a genset and compressor bolted to its cargo area.
Customer	A municipal entity (police, ambulance, fire department, transit service, etc.) that is not a City department, but whose vehicles are maintained by Fleet Systems.
User	The City department that is the primary user of a vehicle.

2.3 Background

Fleet Systems supplies vehicle repair and maintenance services to internal *users* (other City departments) and to external *customers*.

Work done

While Fleet Systems is equipped to handle most repair and maintenance work, it does not do body work and some specialized repairs. These are contracted out.

Internal users

A City department wishing to purchase a vehicle include the necessary funds in its budget. Once the funds are approved, the department releases the funds to Fleet Systems. Fleet Systems then purchases the vehicle, which becomes its property. Fleet Systems then rents the vehicle back to the department.

After acquisition, Fleet Systems supplies the fuel and handles all warranty, maintenance and repair work for the vehicle during its life. The Centre invoices the “owner” department each month for a fixed rate that includes repairs and consumables, including fuel. A pre-determined amount (shown in the annual budget) is contributed to the Equipment Replacement Fund (ERF).

When the vehicle eventually has to be replaced, Fleet Systems buys the department a new vehicle from the replacement funds that have built up over the years. For users, hence, capital costs are incurred only once, upon first purchase. After that, the monthly fee contributes to the funds needed to purchase a replacement vehicle.

For internal users, Fleet Systems attempts to work on a revenue-neutral basis. Any revenue surpluses are returned to the Equipment Replacement Fund.

External customers

External customers obtain only warranty, maintenance and repair services from Fleet Systems. They buy their own vehicles, and replace them when needed.

Service fees / hourly rates

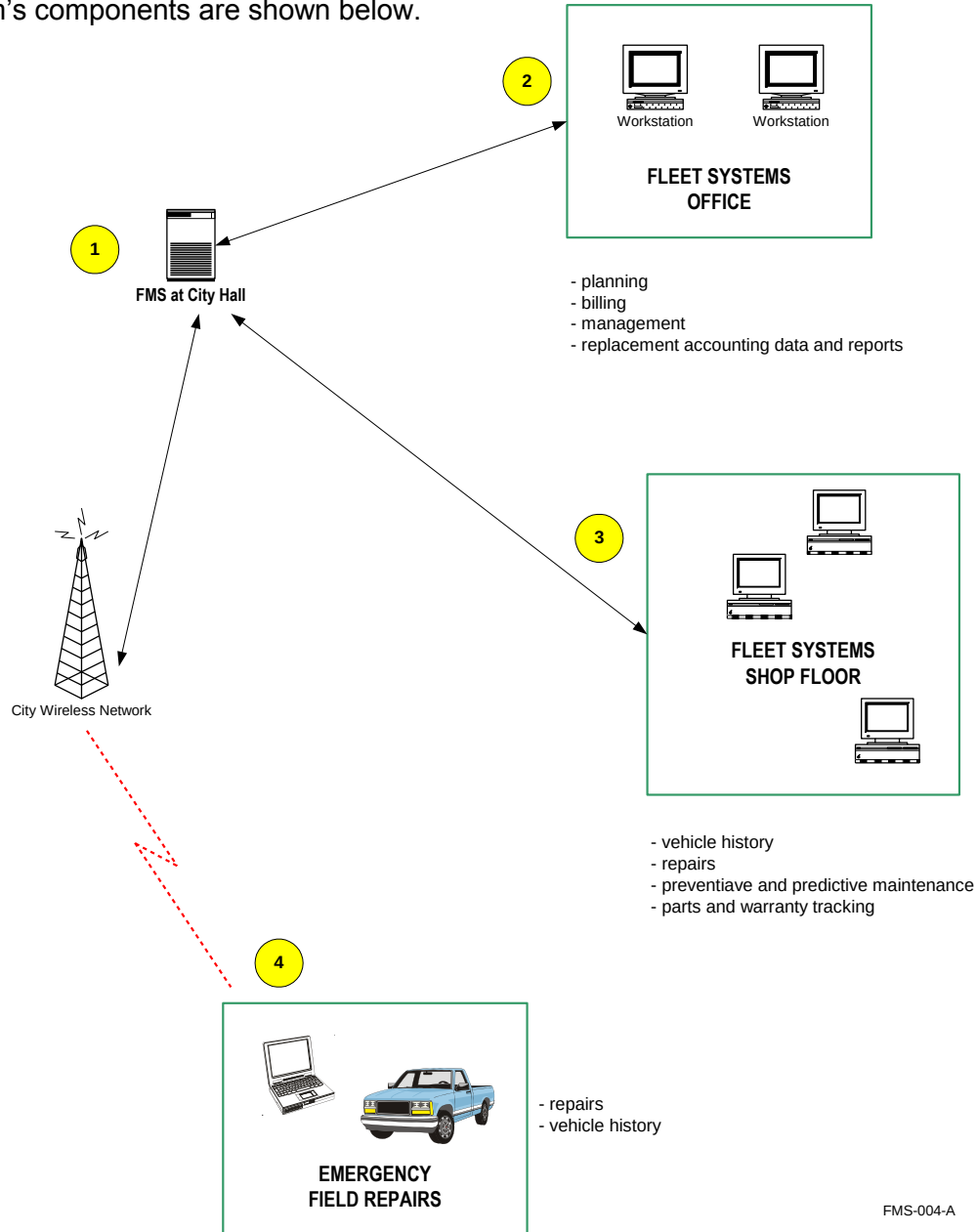
External customers pay higher hourly rates than do City departments. Fleet Systems currently uses three different hourly rates, but there is no theoretical limit to the number of rates that it can use at any one time.

2.4 The FMS at a glance

The Fleet Management System is a powerful software application that assists Fleet Systems with all its operational requirements. It:

- maintains a complete inventory of vehicles and the equipment fitted to them
- maintains complete repair and other records for all vehicles and major equipment
- tracks mileage, fuel consumption, repairs, inspections and scheduled maintenance
- helps with scheduling of preventative maintenance activities
- prepares monthly invoice data so that customers can be billed
- assists managers at Fleet Systems with planning and other needs
- helps managers calculate billing rates for the next year
- computes and provides all necessary replacement information (vehicles to be replaced in the year, replacement cost, accrued revenue/loss, depreciation, etc.)

The system's components are shown below.



The diagram shows just some of the features that the FMS offers.

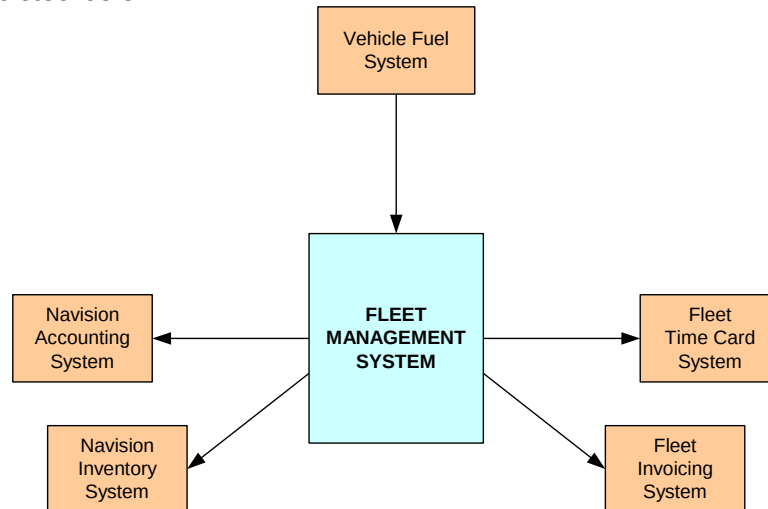
1. The software itself is installed on a server at the City's Data Centre. From there, it is available to mechanics and managers at Fleet Systems and in the field.
2. At Fleet Systems, terminals located within the office give supervisors an instant view of activity on the shop floor. They can schedule work, and check on its progress. The terminals can additionally display administrative and historical data, and allow managers to analyse cost and revenue data for planning and other purposes.
3. Terminals located on the shop floor allow mechanics to instantly call up a vehicle's history, to view its repair manual on-line, add repair data to its history, and to enter their time card data after they have worked on the vehicle.
4. Grande Prairie is implementing a city-wide wireless network. Once this is operational, mechanics performing emergency field repairs will be able to call up a disabled vehicle's repair history using a portable PC or tablet computer. They will be able to view the on-line repair manual for the vehicle, and type in information about the field repairs they performed. They can also leave a note for the next mechanic.

Interfaces

The FMS connects to five other systems:

Vehicle Fuel System (“VFS”)	This is the City’s automated fuelling system. Users and customers fill their vehicles from the gas pumps controlled by the system. After fuelling, the VFS transmits the vehicle ID number, together with fuel data, to the FMS.
Fleet Time Card System	This system, custom-built for Fleet Systems, stores and manages mechanics’ time records, then passes the data on to the City’s payroll system for payroll-calculation purposes.
Fleet Invoicing System	This system, also custom-built, accepts billing data from the FMS and prepares invoices for customers (i.e., for external agencies whose vehicles are maintained by Fleet Systems).
Navision Accounting System	The FMS automatically sends invoicing data for internal users (City departments) to the City’s Navision central accounting system. As required, manual accounting entries are also posted by Fleet Systems managers to the system.
Navision Inventory System	The Fleet Stores Section maintains an inventory of vehicle standard spare parts (filters, oil, brake assemblies, hoses, wipers, and so on.) Inventory is controlled through Navision’s inventory module.

The interfaces are depicted below.



FMS-002

Expansion

Grande Prairie is growing. Within a few years, Fleet Systems will open a second Service Centre. That Centre will be similar to the existing Service Centre, with the same terminals, system access and features. Vehicles will not need a “home base”, but will be able to go to either location for repairs.

FMS services to other communities

Fleet Systems may decide to make the FMS available to surrounding small towns for a fee. These towns would set up their own vehicle Service Centres, but would use the FMS to manage their fleets. The FMS is able to support any number of such additional user groups.

3. ID numbers and Codes

3.1 Introduction

The coding scheme used by the FMS allows for considerable flexibility in numbering and data retrieval. While the system uses numerous codes, only the more important ones are described below.

Coding scheme

The new FMS will not require Fleet Systems to change the ID numbers or codes it currently uses. Fleet Systems can continue to use its present coding system, or can expand the codes so that they capture more precise data about the department's operations.

The code examples provided in this section are for illustrative purposes only.

3.2 Vehicle and Equipment ID numbers

City vehicles

Upon acquisition, each vehicle is given a unique 5-digit Vehicle ID number. That number stays with the vehicle for its entire life at the City, and is never re-used. All fuel, repair and other data for the vehicle is recorded against that number, so that a complete and comprehensive vehicle history can be retrieved at any time. The ID number is made inactive when the vehicle is finally retired or disposed of, effectively preventing any further data from being recorded against it. However, the information remains available for viewing and management use.

City vehicle ID numbers start at 00000, and extend up to 39999, allowing up to 40,000 vehicles to be initially managed. Additional vehicles will be assigned five-character alphanumeric ID numbers (0000A through 3999A, 0000B through 3999B, and so on.)

Rental vehicles

Fleet Systems often rents vehicles for City use, typically for up to six months at a time, and has to provide repairs and service for these vehicles. Rented vehicles are treated just like City vehicles, and given ID numbers ranging from 40000 to 49999.

Customers' vehicles

These are vehicles purchased by other agencies that are maintained by Fleet Systems. These vehicles are also assigned unique ID numbers.

ID numbers for customer vehicles start at 50000 and extend up to 69999, allowing up to 20,000 vehicles to be initially tracked. As for City vehicles, additional vehicles will be assigned five-character alphanumeric IDs.

Ancillary equipment

Ancillary equipment (whether intended for use by itself or mounted on a City vehicle) can also be tracked even if it does not require maintenance, repairs or fuel. Examples include riding lawnmowers, snow blades, spreaders, generator sets, compressors, and so on. Each of these pieces of ancillary equipment is assigned a unique ID number and tracked by FMS.

ID numbers for ancillary equipment start at 70000 and extend up to 99999, allowing up to 30,000 items to be initially tracked. Additional items will be assigned five-character alphanumeric IDs.

3.3 User and Customer ID numbers

Fleet Systems assigns a unique ID number to each City department and to each external customer. The ID number may be up to 4 alphanumeric characters in length.

FMS imposes no restrictions on how a number is created or assigned, but Fleet Systems may wish to segregate numbers into easily-identified groups. Here are some suggestions:

- **City department ID numbers** may be alphabetic abbreviations, and easily remembered. For example:
PK for the Parks Department, and
TR for the Transportation Department
- **ID numbers for external customers** might always start with the letter “G” or with a number. For example,
GFD for the Grande Prairie Fire Department
GER for the Grande Prairie Emergency Response Department
GRC for the RCMP in Grande Prairie
3TR for the Transportation department of a neighbouring town, whose vehicles are being maintained by Fleet Systems

and so on. In these examples, a simple coding scheme has been embedded within each group to allow quick visual identification of the type of customer.

3.4 Display of ID numbers on vehicles

The vehicle ID number is 5 digits in length. However, leading zeros in the ID number do not have to be entered into FMS: when inquiring about vehicle ID 00091, for example, the mechanic simply types in “91”.

The same approach is used when applying ID decals to the vehicle. For vehicle 00091, only the number “91” needs to be shown. However, as a convenience, the department’s ID number can also be applied onto the vehicle. For example, if vehicle 91 belongs to the Parks (“PK”) department, the decal could read

91 PK

Note that the FMS does not need the department number in order for a mechanic to look up a vehicle – the “PK” on the vehicle is strictly a convenience for the mechanic’s use. If vehicle 91 is transferred at a later date to the Transportation (“TR”) department, the vehicle ID number does not change. However, the decal is simply changed to read:

91 TR

3.5 Type and sub-type codes for vehicles, ancillary equipment and fittings

Type codes

Within FMS, each vehicle, item of ancillary equipment or fitting is assigned a “type” code that identifies what type it is. The type code is 4 characters in length, and there are no restrictions on how code numbers are created or assigned. Here are some examples:

AU	Automobile
TH	Truck, heavy
TL	Truck, light
EH01	Equipment, heavy-duty, type 01
GEN	Generator
COM	Compressor
SB	Snow blade
WL	Warning light

And so on. Type codes are compulsory – one code must be assigned to vehicle, piece of ancillary equipment or fitting.

“NF” Code

Currently, Fleet Systems uses the code “NF” to indicate a non-fleet vehicle (a vehicle belonging to an external customer). That code is no longer required, since the FMS now uses a customer ID number to identify customers. The introduction of the customer ID number allows all vehicles, whether City-owned or customer-owned, to be given identical Type and Sub-type codes.

Sub-type codes

In addition to the compulsory “Type” code, an optional 4-character sub-type code can also be assigned. The sub-type code allows for further classification of vehicle, equipment and fittings. Here are some examples:

Type code	Sub-type code	
GEN	05	<i>Generator, 5KW capacity</i>
GEN	10	<i>Generator, 10KW capacity</i>
SB	LT	<i>Snow blade for light truck</i>
SB	HT	<i>Snow blade for heavy truck</i>
TCR	01	<i>Truck-mounted crane, 1T capacity</i>
TCR	02.5	<i>Truck-mounted crane, 2. 5T capacity</i>
TCR	05	<i>Truck-mounted crane, 5T capacity</i>

While sub-type codes are optional, they have to be created, set up within the FMS, and linked to a type code before they can be used.

Each “sub-type” can only be used in conjunction with its parent “type” code. In the example above, the sub-types “LT and “HT” can only be used with parent “SB”. The sub-type “05”, however, has been defined twice – once for generators, and once for truck-mounted cranes, with different meanings for each: when used with a generator, it indicates a 5 KW machine; for a truck-mounted crane, it indicates a 5 T capacity. The code “TCR-10” would however be invalid, even though a sub-type code 10 exists, if the sub-type “10” has not been defined for truck-mounted cranes.

3.6 Class and Sub-Class codes for management use

In addition to the various codes described above, each vehicle or item of ancillary equipment is assigned a “Class” and “sub-class” code for billing and management use. These codes are not used on the shop floor, nor on a day-to-day basis.

Class code

The Class code allows vehicles and ancillary equipment to be grouped in a way that is meaningful when developing billing rates and performing similar analyses. It is a management tool that provides a different “view” of the fleet than that seen by mechanics. The code is 6 alphanumeric characters in length. Codes are created as needed and added to the FMS; however, each vehicle or item of equipment must be assigned a Class code.

Here are some sample Class codes:

BUS	bus (school bus or transit bus)
CAR	car
VAN	van
HTRUK	heavy truck
LTRUK	light truck
ROAD	road cleaning equipment
ERTH	earthmoving equipment
ATT10	attachments costing under \$10,000
ATT25	attachments costing between \$10,000 and \$25,000
ATT25G	attachments costing more than \$25,000

Sub-class codes

Each Class code can be further divided into any number of Sub-Classes. Sub-Class codes are optional – they may be set up for some Class codes, and not for others. Sub-Class codes, too, are for Fleet management use only.

3.7 Component codes and repair codes

Fleet Systems’ main job is to perform maintenance and repairs on vehicles and equipment. Repairs and repair codes are hence an important part of the FMS.

Component codes

For repair purposes, a vehicle is made up of major components: chassis, body, engine, transmission, drive train, wheels and axles, main electrical, accessory electrical, interior, truck box, attachments, etc. In the FMS, each component is given a four-character Component code, for example:

CH	Chassis
BODY	Body
EN	Engine
ELM	Electrical, main
ELA	Electrical, accessory
WHL	Wheels and axles

And so on. The codes are created and defined by Fleet Systems, and new codes may be added at any time. (Alternatively, Fleet Systems may retain its existing codes.)

Repair codes

Repair codes are four characters or less in length; for each, a “standard time” (expected time needed to complete the repair) may optionally be specified by Fleet Systems.

Each repair code is also associated with one or more Component codes. For example, the following repair codes may be defined by Fleet Systems:

TMI	Tune up, minor
TMJ	Tune up, major
TBR1	Timing belt, replace
OF	Oil and filter change

These codes all pertain to engine work, so they would be associated with the “EN” (engine) component code.

Ideally, each repair code should be unique, but this is not mandatory. If a repair code is unique, the mechanic can simply use the code by itself to indicate the type of work he has performed on a vehicle, and the FMS will automatically assign it to the correct component. If, however, duplicate repair codes exist, the FMS will prompt the mechanic to indicate the component to which the code applies. Consider this example:

Component code	Repair code	
ELM	ALN	Headlight alignment
WHL	ALN	Wheel alignment

Since the repair code “ALN” can mean two different things, the FMS would need to know which Component the mechanic worked on, and so would prompt the mechanic for the correct Component code.

3.8 Customer category codes

Fleet Systems can divide its customers into 10 categories, and charge each group a different hourly labour rate and fixed monthly charge. Customer category 0 is reserved for internal (City) customers, while Categories 1 through 9 are assigned to external customers.

3.9 Service Centre ID number

This 2-character code, intended for future use, identifies the Service Centre at which work was performed.

Each Service Centre is given a unique Service Centre ID number (example: “01” for the existing Centre, “02” for the second Service Centre, etc.). The FMS automatically attaches the Service Centre code to each item of work done at that Centre. After Fleet Systems opens its second Service Centre, this code will allow management to analyse the workloads at each location for planning and other purposes.

3.10 Vendor numbers

Vendors supply spare parts or services (such as body repair or painting) that the Service Centre is not equipped to offer. Some vendors offer both parts and services. The FMS provides complete

tracking and management for all vendors, with each vendor being assigned a unique vendor number.

3.11 Work Order numbers

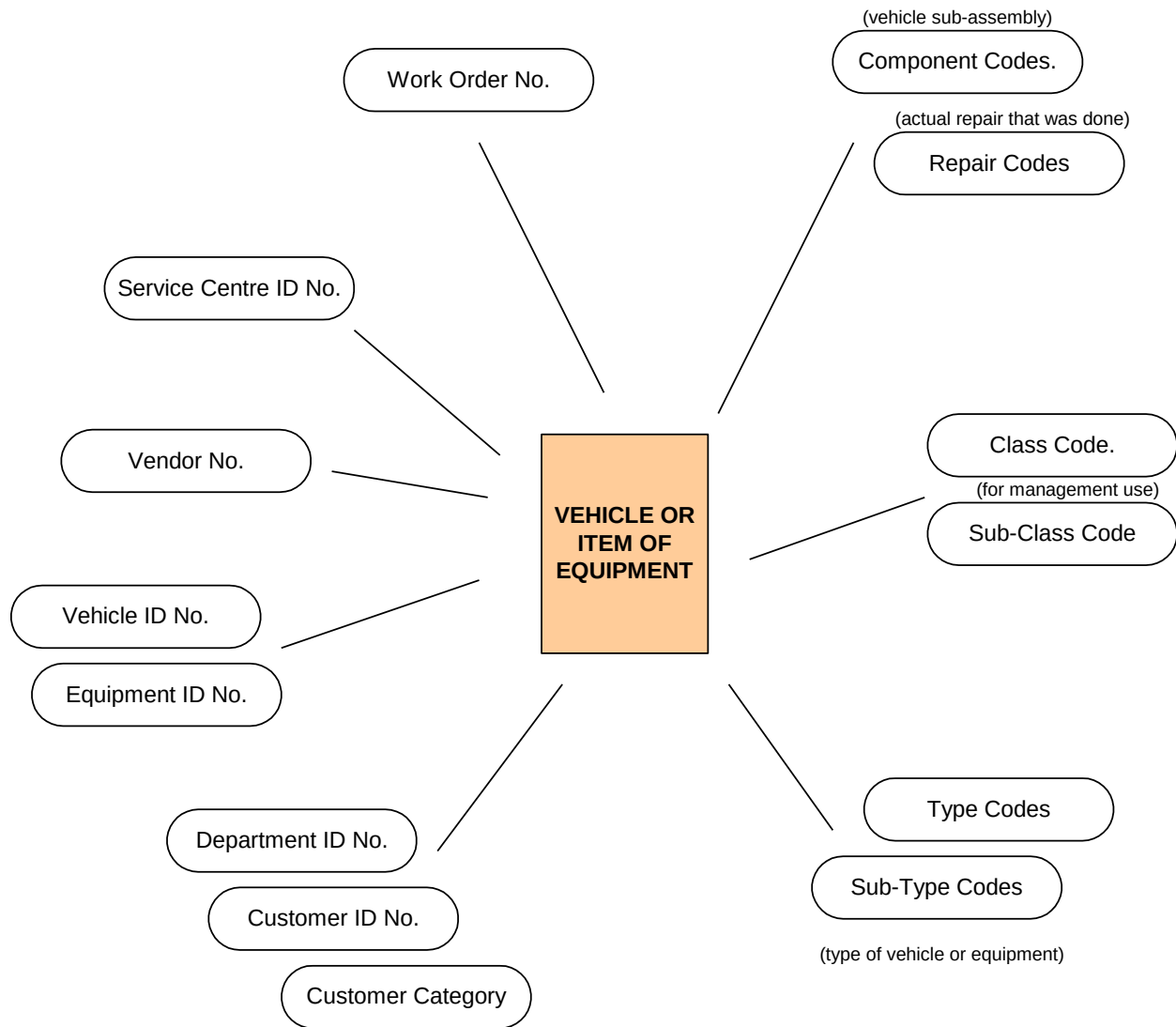
All Work Order numbers are automatically and sequentially assigned by the FMS. It is not necessary to “embed” a Service Centre ID number within the Work Order number, since the FMS separately keeps track of the Service Centre at which work was performed (see 3.9, *Service Centre ID number*).

3.12 FMS Codes – a summary

The FMS provides a comprehensive set of codes to track vehicles and their repairs. While the codes may appear intimidating at first glance, they are in reality very easy to use since most of them are “built in” to the system and automatically assigned. The codes are summarised below and shown diagrammatically on the next page.

Code	Purpose / use
Vehicle ID no. / Equipment ID no.	Identifies a vehicle or piece of equipment
Department no. / Customer no.	Identifies City department or external customer
Vendor no.	Identifies vendors (parts vendors, sublet vendors, etc.)
Work Order no.	Identifies specific work done on a vehicle on a specific date
Type code	Identifies the type of vehicle (car, light truck) or equipment
Sub-type code	Further classification of the “Type” code
Class code / sub-class code	Alternate classification method (for management use)
Component code	Major component of a vehicle (body, engine, etc.)
Customer category code	Code used to determine billing rates
Repair code	Specific repair done to a component
Service Centre ID	Identifies the Service Centre at which the repair was done
Labour Rate code	Specifies the hourly labour rate to be used

Here, in diagrammatic form, are the major codes associated with vehicles, equipment and Work Orders within the FMS:



FMS-005

4. Vehicle and Equipment Inventories

4.1 Introduction

Each City vehicle and each piece of ancillary equipment is recorded in the FMS inventory. This section briefly describes the inventory classification system and its use.

4.2 A typical city vehicle

A typical City truck might be equipped with one or more of the following:

- a) truck box / compressor / generator / crane mounted on the truck bed
- b) snow blade in front / sand spreader at the back
- c) warning flasher on top, back-up warning beeper, and two-way radio

Items (a) and (b) are expensive. Fleet Systems needs to track them individually, and to know where they are at any time. Items in group (c) may be relatively inexpensive, and Fleet Systems may simply need to know that these items have been installed on a vehicle. (At the same time, the City may also operate unmarked cars that carry no flashers, beepers, truck boxes or other accessories.)

To help track vehicles and their attachments, the FMS maintains an inventory file of vehicles and equipment, and a “reference” file of fittings.

4.3 Inventory File

Two types of items are recorded in this file:

- Vehicles (City and customer)
- Ancillary equipment (items “a” and “b” in the example above)

City vehicles

Each City vehicle is assigned a unique ID number (in the range 00000 through 49999), which stays with it for as long as Fleet Systems maintains it. See Section 3.2 for more details on ID numbers.

Customers' vehicles

Each customer vehicle is given a unique ID number starting at 50000 and going up to 69999.

Other equipment

All other self-propelled, mobile or other equipment that Fleet Systems wishes to track is entered into this inventory. It includes things as diverse as snow blades and compressors, and other items such as Zamboni machines, riding lawnmowers, winches, chainsaws, pneumatic hammers, and so on. Unique ID numbers are assigned to each item, starting at 70000 and going up to 99999.

4.4 “Fittings” Reference File

Warning flashers, back-up warning beepers and other relatively inexpensive items are installed on almost all vehicles. Fleet Systems needs to know which of these has been installed on each vehicle. The fittings are tracked through the Fittings reference file.

The Fittings reference file is not an inventory file, but merely a list of part numbers of standard items (such as warning flashers and back-up warning beepers) that have been fitted on vehicles, together with their purchase price and date of purchase.

Fittings are not given individual ID or inventory control numbers. The FMS simply adds their part numbers and purchase price to the vehicle's record when they are installed, but does not track each individual fitting.

4.5 Fitted-Out Vehicles

Many City vehicles are "fitted out" with ancillary equipment. A light truck, for example, might be equipped with a snow blade, an electric winch, a yellow overhead light and a back-up warning beeper, while a large truck may have all of these items together with a salt spreader, a genset and a crane.

The FMS tracks each piece of ancillary equipment installed on a vehicle. It also records the fittings used on the vehicle.

Tracking of other equipment

When a piece of equipment is mounted on a truck, its ID number is linked to the truck, and the item is "taken out" of the Fleet Systems inventory – it is no longer available for installation on any other vehicle.

Recording of fittings

When a fitting (back-up beeper, flashing light, etc.) is installed on a vehicle, the FMS merely records its part number against the vehicle. Since no inventory control exists for this fitting, it is not "taken out" of inventory; instead, the FMS assumes that Fleet Systems had a sufficient quantity on hand for the job.

4.6 Inquiry capability

Staff may wish to know which ancillary equipment is mounted on a vehicle (*"what do we have on vehicle 12345?"*). Alternatively, they may want to know where a particular accessory is (*"where is our sand spreader, ID 75432?"*). The FMS answers these questions instantly, displaying all relevant information, as shown in these examples:

For example, a simple inquiry on vehicle "12345" might display the following:

Vehicle	ID 12345	Truck
	2008 Ford F-150	Model XLT
	5.4L SOHC V-8	4-speed automatic trans.
	SuperCab	8' Styleside box
	Licence: KNC 942	Expires end of: APR 2009
	User: Transportation Dept	

Equipment mounted	ID 75432	2008 Tipco AC3 Sand Spreader
	ID 79937	2004 Miniboss Snow Plow
	ID 98112	Marietta CM 200 two-way radio

Attached fittings	MB16X	Dual halogen light bar
	KVA-76	Back-up warning beeper
	CC-88743	Warning lights
	CD-9AFF	Side-mounted floodlight
	CD-9AFF	Side-mounted floodlight
Permits / Inspections		None

Note:

- only basic vehicle information is shown, since the staff member did not ask for cost or service history, etc.
- ID numbers are shown for the vehicle and the “Other equipment”, since each of these items is being individually tracked
- only manufacturer’s part numbers are shown for the “fittings”, since these items are not individually tracked

To continue with the example, a look-up on accessory “75432” might result in the following display:

Base unit	ID 75432	Sand Spreader
	2008 Tipco AC3	15 cfm rear-mount
Mounted on	ID 12345	2008 Ford F-150 truck
		Licence: KNC 942
		User: Transportation Dept.

Other “look-ups” or inquiries

Inquiries using other codes are also permitted. A list of all vehicles fitted with “snow blades for heavy trucks” can be obtained by asking the FMS to display all vehicles on which fittings of type SB-HT have been mounted. (“SB” and “HT” are the type and sub-type codes for snow blades and heavy trucks, respectively.)

Inquiries can also be performed by licence plate number, VIN, year of manufacture, name of manufacturer (Ford, Hino, etc.), and so on.

5. Data Collection

5.1 Introduction

The FMS continually collects data about each vehicle. Initial data collection occurs when the vehicle first enters service; subsequently, data is collected every time refuelling, repair, maintenance or other noteworthy event occurs.

Data on ancillary equipment is captured when it is first put into service; if applicable, repair and usage data is subsequently collected.

5.2 Vehicle “master data”

When a vehicle first enters the Fleet Systems inventory, the FMS records at least the following data about it:

Basic vehicle data (type, manufacturer, year, model, serial number, etc.)

Vendor / car dealership, if known

Purchase date and cost (may not be available for customers' vehicles)

Engine size, fuel type, fuel rating (L/100 km)

Set-up cost (stripes, decals, labour costs, etc.)

Ancillary equipment mounted on vehicle (and costs)

Fittings mounted on vehicle (and costs)

Recommended service intervals and type of service required

Metering method (litres consumed, kilometres, running hours, etc.)

Replacement rule (usage, hours, age, etc.)

Estimated replacement year

Vehicle photograph(s)

Licence plate number and expiry date *

Insurance data – insurer, policy number, expiry date *

Inspection – whether mandatory 6-month or 12-month inspection is required

Photographs

* Licence plate expiry date, insurer name, insurance policy number and policy expiry date can all be easily updated by staff through a simple one-step global “Find and replace” feature.

The vehicle is also assigned a unique ID number together with type, sub-type, class, sub-class and other codes, as described in Section 3.

The FMS uses this basic information, together with fuel and repair data accumulated over the life of the vehicle, to help staff determine asset life and replacement costs, and set the appropriate rental, service and billing rates.

Photographs

An unlimited number of photographs may be added to each vehicle's file. Staff may include a caption with each photograph (example: “Accident damage March 21, 2007”). Normally, only the first photo is displayed when an inquiry is made about the vehicle, but “scroll buttons” at the bottom of the photograph allow the user to view the other photos.

5.3 Ancillary equipment “master data”

When an item of ancillary equipment first enters Fleet Systems’ inventory, the following data is recorded about it:

Basic equipment data (type, manufacturer, year, model, serial number, etc.)

- Vendor, if known
- Purchase date and cost
- Set-up cost (stripes, decals, labour costs, etc.)
- Replacement rule (usage, hours, age, etc.)
- Estimated replacement date
- Type of repairs possible (actual repair / parts reconditioning / parts replacement)
- If applicable: engine size, fuel type, fuel rating (L/100 km) (if applicable)
- If applicable: metering method (litres consumed or running hours)
- Equipment photograph(s)
- Link to on-line installation/removal instructions
- For seasonal equipment:
 - suggested installation date
 - suggested removal date

Each item of ancillary equipment is assigned a unique ID number.

Again, any number of photographs of each item may be included as part of its master data. Normally, only the first photo is displayed when an inquiry is made, but “scroll buttons” at the bottom of the photograph allow the user to view the other photos.

5.4 Fittings data

Within the FMS, fittings such as emergency lights and back-up beepers are not considered inventory items, and hence cannot be individually tracked. The FMS merely records their part numbers, descriptions, and purchase costs. When a fitting is installed on a vehicle, this information is copied from the Fittings data file to the vehicle’s file.

Each fitting must be assigned a Type and an optional Sub-Type code. (See Section 3 for details about these codes.) The codes are used only to help organise the fittings into categories, so that they can be easily retrieved and used.

Two photographs of the fitting may be included as part of its master data. Normally, only the first photo is displayed when an inquiry is made, but a “scroll button” at the bottom of the photograph allows the user to view the other photo.

5.5 Shared usage by City departments

For billing purposes, each City vehicle must be assigned to at least one City department. At the end of each month, the FMS creates an invoice for the vehicle, which is then paid by the department.

Two or more departments may however share a vehicle, in which case each department is billed based on its declared usage. FMS handles such situations by allowing any number of departments to share a vehicle. The ID number of each such department is entered into FMS, together with its declared “percentage of use”. (The percentages must add up to exactly 100.)

There is no theoretical limit to the number of departments that may share the use of a vehicle, and the list may change from month to month. However, a department may be added to the list only at the start of a month, and deleted only at the end of a month. Similarly, changes to the declared “percentage of use” may only be made at the end of a month.

Changes in ownership and usage

The FMS tracks and maintains records of all ownership and usage. If a vehicle is permanently transferred from one department to another, the record of ownership by the previous “owner” is retained in the FMS’s files. Through this way, a complete picture of the life of a vehicle can be re-created at any time.

5.6 Fuel consumption data

Vehicles

Each time a vehicle obtains fuel from a City pump, the automated fuel system sends the following data to the FMS:

- Date
- Time
- User ID number (ID number of the person who operated the pump)
- Vehicle ID
- Odometer or hour-meter reading
- Number of litres pumped
- Type (gasoline / diesel / LNG etc.)
- Grade of fuel (regular, mid-grade or premium)

The FMS adds the data to the vehicle’s record, and then analyses it to determine whether to adjust the maintenance intervals and schedules for the vehicle. If fuel consumption appears excessive, the FMS can also suggest that an inspection be carried out.

Fitted-out units

For fitted-out units (i.e., vehicles with ancillary equipment mounted on them), usage data about the ancillary equipment is captured and transmitted to FMS only when the equipment is refuelled. If the equipment has an hour meter, the hour-meter reading is obtained; if it does not, then only the fuel data is recorded by FMS.

Rented vehicles and equipment

For rented vehicles, odometer readings are additionally obtained from rental reports and invoices that show mileage “out” and “in”.

Manual data entry of fuel and odometer readings

Fuel is often purchased from a non-City pump, as can happen when a City employee is away from Grande Prairie on city business in a City vehicle. The employee is expected to record the odometer reading, the number of litres pumped, the dollar value of the purchase, and the purchase date. This data can later be manually entered into the FMS and added to the vehicle’s record.

5.7 Recording of engine diagnostic codes

Engine diagnostic codes are obtained from two sources:

- directly, through maintenance or repair work done at the Service Centre
- from the automated fuel system

During repairs

The FMS has the ability to accept engine diagnostic codes either directly from a vehicle, or from the device used to read the codes. It stores the codes as part of the repair records for the vehicle.

From the automated fuel system

In the near future, City vehicles will be equipped with transponders that will identify the vehicle to the automated fuelling system, thereby speeding up the fuelling process. If intelligent transponders are installed, they will transmit odometer or hour-meter readings together with engine diagnostic codes to the fuelling system each time the vehicle is refuelled. The fuelling system, in turn, will transmit the data to FMS, which will store them with the repair records for the vehicle.

Any person obtaining fuel must first identify himself or herself to the automated fuelling system by using a City ID card. The ID card number is also passed to FMS so that charges can be assigned to the correct department.

5.8 Repair data

Any maintenance or repair work done on a vehicle or item of equipment requires a Work Order.

Work Orders specify the work to be done on the vehicle ("replace the tires"), or the problem to be diagnosed and corrected ("the engine won't start"). The time spent by the mechanic doing the work is recorded against the Work Order; so too are any parts that have to be installed, or any work that has to be done by an external contractor. In many ways, Work Orders are the most important single component of the FMS, and collect the most valuable data.

FMS records all work done on the vehicle as a result of a Work Order. Data collected includes the following:

- Work Order number
- component codes (see Section 3)
- repair codes (see Section 3)
- mechanic(s) who worked on the vehicle
- total time spent on the job
- parts installed, and their cost
- work sub-let to external contractor(s)
- odometer or hour-meter reading
- mechanic's comments
- photographs (if applicable)

Preventative maintenance is considered repair, and the data listed above is also collected for preventative maintenance jobs.

Work Orders are discussed in detail later in this document.

5.9 Parts data

Fleet Systems maintains an inventory of the most commonly needed spare parts (typically, filters, pumps, alternators, bearings, gaskets, antennae, and so on). The inventory of these parts is not within FMS but, rather, maintained by the City's Navision Inventory Management System. However, when a part is installed on a vehicle, data about the part is entered into FMS and stored as part of the Work Order.

5.10 Recording of other events

Information about accidents and other events involving the vehicle can be added to its file at any time in the form of text entries, photographs and comments. The information may be viewed or retrieved at any time.

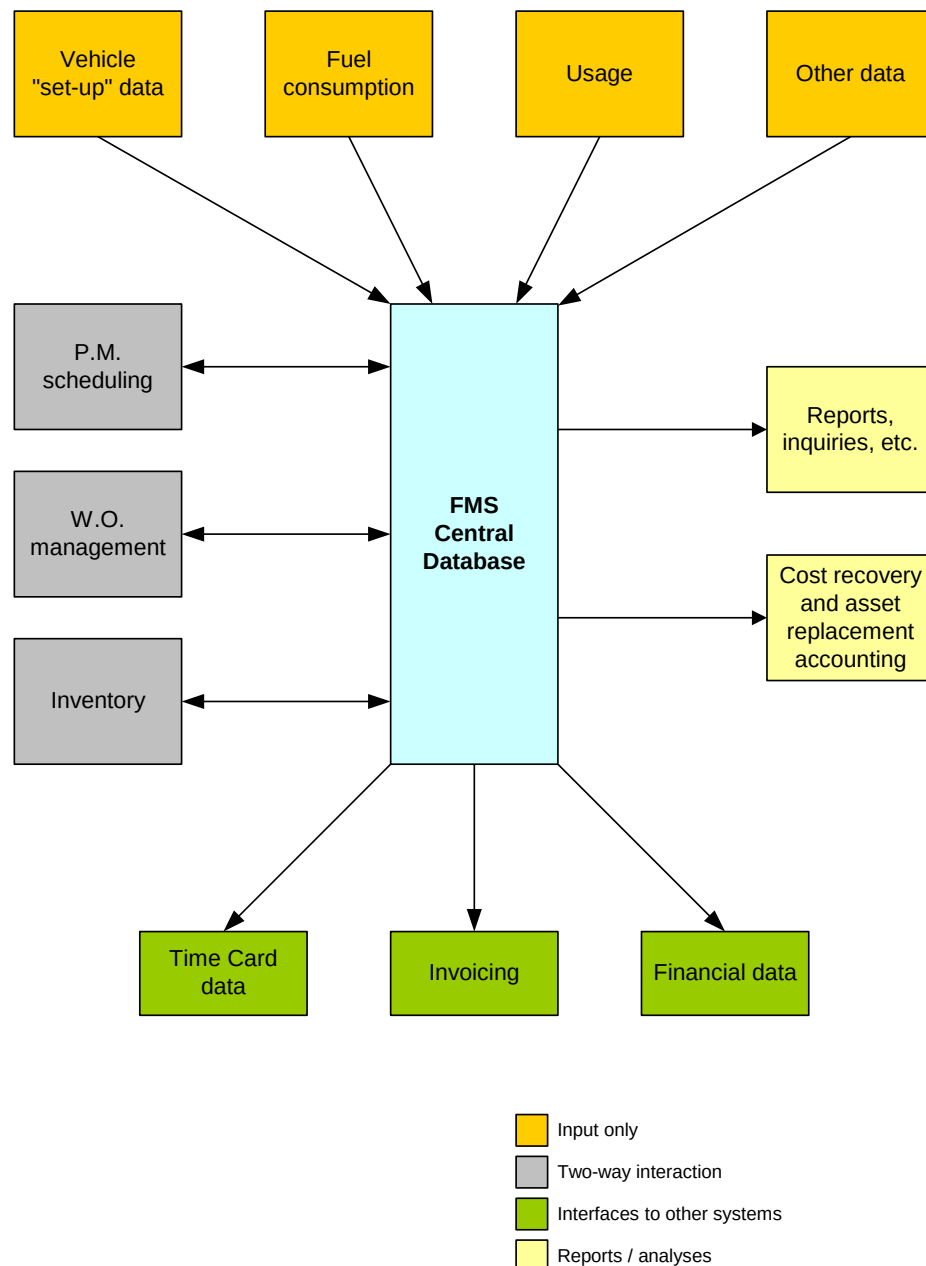
5.11 Manual data entry

The FMS allows staff to enter or update data for a vehicle or ancillary equipment.

- Master data can be updated or corrected at any time.
- Work Orders can be corrected or changed for up to 4 months after they have been closed.

5.12 Data, functions and features

A “data and functions” view of the FMS is shown below.



6. Work Orders

6.1 Introduction

All Fleet Systems work is managed and controlled through Work Orders. Work Orders are hence the single most important component of the FMS. They collect the repair and maintenance data that is used to determine whether a vehicle's maintenance schedule should be adjusted, and when a vehicle should be replaced. The data are also used by managers to analyse vehicle reliability and to help with decisions about staffing levels and the in-house repair skills needed. Work Order costs, together with Fleet Systems overheads, help determine labour and billing rates for the next year and provide indicators about the efficiency of the Centre's operation.

This section briefly discusses the use of Work Orders within the FMS.

6.2 General features

- A Work Order is used to assign work to a mechanic. The work must be such that it can be done by one or more mechanics, and can be completed using the facilities and equipment within the Service Centre. If work **also** has to be performed at an external facility, a separate Work Order is created for that work, and the two Work Orders are linked within FMS.
- While most Work Orders contain only one repair or job, the FMS allows any number of jobs to be assigned to a Work Order.
- One Work Order can be linked to one or more other Work Orders. When any of the linked Work Orders is viewed by Fleet Systems staff, the system flashes a message warning the staff member that other Work Orders exist that are linked to this one. Those other work Orders can then be viewed if necessary.
- Work Orders can stay open indefinitely, and can be changed for up to four months after they have been closed.
- Each Work Order is reviewed by a supervisor who either:
 - sublets it to an external vendor, or
 - assigns it to a mechanic.
- Work Orders are manually created when unscheduled repairs of any kind have to be performed.
- The system constantly monitors scheduled maintenance and inspection work schedules, and alerts the supervisor when such work is due. The supervisor then reviews the work that should be done, and either approves or postpones it. The FMS then automatically generates Work Orders for the approved jobs.

6.3 Status

Within the FMS, Work Orders can be tracked by its status. A Work Order can be in any one of six states:

Status	Explanation
Created	The Work Order has been created. The vehicle may or may not be at the Service Centre.
Assigned	The Work Order is assigned to a mechanic, but he has not started work on the vehicle.
In progress	The mechanic is working on the vehicle.

Waiting for parts	The mechanic has ordered parts; work on the vehicle has stopped.
Waiting for mechanic	The parts have arrived, but the mechanic has not re-started work.
Completed	The job is done. The vehicle is ready to leave the Service Centre, and the mechanic is ready for another job.

6.4 Work Order data

At a minimum, the following data is collected for each Work Order:

General data	Date and time ID number of assigned mechanic ID numbers of other mechanics who worked on the job
Vehicle	ID number Odometer / hour meter reading on arrival ("In" reading) Odometer / hour meter reading on departure ("Out" reading) Time in / time out (time the vehicle entered and left the Service Centre)
Repair	Component code(s) Repair code(s) and standard time needed for each Time work started / time work stopped (multiple entries permitted)
Status	Start time and end time in each state
Supplies	Parts installed, and their cost Non-standard shop supplies
Notes	Mechanic's notes, photographs and comments

Items to note:

- More than one mechanic may work on a Work Order.
- More than one vehicle component can be repaired, and more than one repair code can be recorded for each component

The FMS uses the collected data to calculate the following additional items of information for the Work Order:

- Total elapsed time for Work Order (from creation to completion)
- Time spent in each state (created – assigned – in progress – waiting – etc.) in hours, and as percentage of the total elapsed time

The FMS obtains parts costs automatically from the City's Navision inventory system when the parts are in stock. If parts have to be ordered, their cost is recorded in Navision and flows from there to the Work Order.

Automated "look ahead"

Whenever a Work Order is opened for a vehicle, the FMS checks to see whether the vehicle is also due for preventative maintenance or inspection in the near future. If so, the FMS displays an "alert" message, and the person who has opened the Work Order can then decide whether or not to add that PM or inspection to the Work Order.

6.5 Changes to Work Orders

Jobs may be added to a Work Order at any time until it is marked "Completed". Cost and time data may be adjusted or added for a further four months after the Work Order has been completed.

6.6 Changes to completed Work Orders

After a Work Order is completed, it is not immediately closed. Repair codes can be changed if needed.

The mechanic records his time using the Time Card system. Once the mechanic's time card has been approved, the Time Card System adds the mechanic's time to the Work Order. The time cannot be changed once it is posted to the Work Order..

As explained elsewhere, some parts costs and third-party costs may not be available for up to 60 days after a Work Order has been completed. These costs can be added to the Work Order when they become available.

After four months, (approximately 125 days), the Work Order is considered fully closed and no further changes are normally permitted. However, Fleet Systems supervisors do have the ability to make further adjustments if necessary.

6.7 Retrieval of completed Work Orders

Completed Work Orders are retained on-line by the FMS for at least five years, or until they are moved (by Fleet Systems) to an archive or back-up file. While on-line, they may be viewed at any time by a mechanic or manager; after they have been archived, it may take up to one day before they can be brought back on-line for viewing.

6.8 Interfaces to Time Cards and Inventory System

Work Orders are connected to the Time Card system. Each time a mechanic clocks on and off on a Work Order, he actually creates an entry in his Time Card. The mechanic can create multiple entries on his Time Card for a single Work Order.

Work Orders are similarly connected to the City's Navision inventory control system. Parts obtained for a Work Order from Fleet Systems' inventory ("Fleet Stores") are automatically added to the Work Order.

6.9 Queries

Fleet Systems management can check on the status of one or more Work Orders at any time. The person making the inquiry can request either a summary of one or more Work Order(s), or complete details. The inquiry can be further refined to display Work Orders that are in a certain state (for example, "Waiting for parts", or "Assigned"), or have been completed in the last two days, or been assigned to a specific mechanic, or are more than " x % " complete, and so on.

7. Maintenance

7.1 Introduction

The FMS uses built-in formulae, together with manufacturers' recommendations, to suggest both preventative and predictive maintenance ("PM") schedules. The algorithms can be adjusted by Fleet Systems to better meet the needs of individual vehicles.

7.2 Calculation of PM Schedule

Each vehicle has a manufacturer-recommended schedule for PM activity. Typically, oil and filter changes occur most often. Lubrication might be recommended at every second or third oil change, minor tune-ups less often, major tune-ups even less frequently, and replacement of one or more engine parts at some other interval. The recommended schedule usually states that certain PM work be done "every *x* kilometres or *y* months, whichever occurs first", or "at *xx* kilometres or *yy* months".

In its default mode, the FMS uses these standard recommendations to develop a maintenance schedule for each vehicle. However, the system also permits Fleet Systems managers to specify other adjustment factors and calculations that should be used to modify the schedule. The result is a PM regimen that is better suited to the City's vehicles than that recommended by the manufacturer. The adjustment factors are briefly described below.

Odometer and fuel readings

Some City vehicles, of necessity, spend their days parked, but with their engines running (idling). The distance they travel is very low, and a typical manufacturer's recommendation of an oil change "every 10,000 km or 6 months" may actually prove harmful. These vehicles need more frequent PMs.

The FMS obtains vehicle fuel consumption and odometer readings from the automated fuel system. The system can be instructed to use this data, together with the date of the most recent PM activity, to determine whether the vehicle requires more frequent maintenance. The Fleet Manager or Supervisor can create a formula that takes into account fuel consumption, hours of use and odometer readings in order to adjust the recommended PM dates.

Time of year

The Canadian winter is especially hard on engines. Fleet Systems staff can specify an adjustment factor for each month of the year. The factor, based on average temperatures during that month, will cause the PM schedule to be shortened during winter months and to revert to normal during the summer.

Manual over-rides

Once the FMS has been set up to calculate PM schedules, it will print a report showing the schedules for each vehicle, or for each type (class) of vehicle. Fleet Systems managers can review the schedules and make manual changes to them. The FMS accepts these changes and uses them to adjust the PM dates.

7.3 PM and Inspection Scheduling

Once the PM scheduling function has been set up to management's satisfaction, the FMS manages the PM function by providing advisory reports to management.

“Scheduled PM” and “Scheduled Inspection” reports

Under government regulations, certain vehicles have to be inspected at regular intervals, and a written Inspection Report has to be prepared. See Section 7.4 for more details.

At the start of each month, the system reviews each vehicle’s file to determine whether the vehicle requires:

- 1) PM work and / or
- 2) an inspection.

It then prints a report showing the PM jobs and inspections that **should be performed** that month, and the predicted (standard) man-hours each job will take. A weekly report is also printed each Friday that shows PM and inspection jobs that should be scheduled for the week after next (i.e., 10 days ahead).

Managers review the “Suggested PM and Inspection” report, keeping in mind other repair jobs and garage work that is going on. They then indicate to the FMS which PM or inspections jobs they wish to schedule for the coming week, and which jobs should be deferred. The FMS then prints a revised report showing the scheduled PM and inspection activity for the month.

A similar process is used for the weekly report. Managers adjust the dates as needed, and then tell the FMS to use the adjusted report to schedule the work.

Automated reminders

The FMS maintains a contact list for each City department and each customer. One week before the scheduled PM or inspection date, the FMS sends an automated e-mail reminder to the contact person, requesting that the vehicle be brought to the Service Centre on a specific date. The e-mail also asks the contact person to phone Fleet Systems to confirm that the date is acceptable. A second e-mail is sent one day before the scheduled date.

Printing of Work Orders

Each evening, the supervisor instructs the FMS to print the PM and/or Inspection Work Orders for the next day. The supervisor can add jobs to any Work Order if necessary.

7.4 Assistance with preparation of Inspection Reports

Fleet Systems has to submit formal Vehicle Inspection Reports to the Government of Alberta at 6- and 12-month intervals for certain vehicles. The FMS simplifies and partially automates the process.

One month before the due date, the FMS prints a report listing all vehicles for which Inspection Reports are needed.

When it is time for an inspection, the FMS retrieves the preventative maintenance done on the vehicle during the preceding period and displays it on the Vehicle Inspection screen together with the list of items that must be inspected. The mechanic examines the vehicle and records the results of his inspection on a special data entry screen displayed by FMS. When the inspection is complete, the mechanic instructs FMS to “fill out” the Government form. FMS does this either by printing an image of the form on a laser printer, or by using an impact (dot matrix) printer to directly print the data onto a blank Government form

A manager reviews the form, then signs and sends it to the appropriate Government department.

The FMS stores the Inspection Report in the vehicle’s history files (as part of the “Other data” for the vehicle). Reports may be viewed at any time by managers and mechanics.

8. Repairs

8.1 Introduction

Repairs can be unscheduled (the vehicle breaks down) or pre-booked (the vehicle can be used, but needs attention in the near future). They can also be recommended by the FMS.

8.2 Unscheduled repairs or service checks

If a vehicle breaks down, it may either be towed in to the Service Centre, or may have emergency repairs performed on it at the breakdown site.

Tow-in repairs

A supervisor completes a Work Order, which is then printed and assigned to a mechanic.

Repairs at remote site

If the City's proposed wireless network is not yet operational, the mechanic will review the vehicle's service record and history while at the Service Centre before driving to the breakdown site to repair or re-start the vehicle. Once the wireless network is operational, however, the mechanic will drive directly to the site with a wireless-equipped notebook PC. He will have full remote access to the FMS: he will be able to create a Work Order, view the vehicle's history, call up repair manuals, and enter the repair codes of the work he performs. He will also be able to update his time card remotely.

Changing the "next service" date

The FMS automatically calculates the "next service" date for a vehicle (see *Section 7, Preventative Maintenance*). This date can however be adjusted at any time by the mechanic who performs unscheduled repairs on the vehicle, or by a supervisor. The date is adjusted by entering any of the following;

- a new date ("*May 15, 2009*")
- an adjustment time period in days ("*delay the PM date by 14 days*")
- a delay/advance percentage factor ("*advance the next PM date by 25%*").

8.3 Pre-booked repairs

A driver may phone and request a service appointment because of some perceived problem with the vehicle. In this case, a convenient date is chosen and a Work Order is created within FMS but not printed.

The FMS includes an automated "reminder e-mail" feature which Fleet Systems may opt to use. If this option is activated,

- The FMS sends an e-mail to the customer (or City department) confirming the date and time of the service appointment.
- One day before the scheduled date, the FMS sends a second "reminder" e-mail.

If the reminder e-mail feature is not used, Fleet Systems staff will have to manually remind drivers or departments of scheduled appointments.

8.4 Service recommended by the FMS

If intelligent transponders are installed on City vehicles, they will send engine diagnostic codes to the FMS each time a vehicle is fuelled (see 5.7, *Recording of engine diagnostic codes*). The FMS will be capable of analysing the codes to determine if a vehicle is in need of repair. If repair is needed, the system will flash a warning to the supervisor, who will confirm the diagnosis and instruct the FMS to schedule a service appointment.

Once the appointment is scheduled, the FMS will send confirmation and reminder e-mails to the department, as described above.

8.5 Performance of repairs

Repair work

After the mechanic is given a Work Order, he starts work on a vehicle. The FMS transmits the Work Order number to the Fleet Systems' Time Card system, and the Time Card System is then able to interact with the mechanic. The mechanic enters the time he spends on the vehicle directly into the Time Card System, together with the appropriate repair codes for the work. Time entry is very simple: the mechanic simply clicks a "Start" or "Stop" button on the screen, and then selects a repair code from a drop-down list of codes. The Time Card System permits the mechanic to start and stop work many times while working on the vehicle. At the end of the day, the Time Card System sums up the mechanic's start and stop times and posts a total time to the Work Order.

Spare parts may be issued by the Parts Department from its inventory, or ordered from an external supplier. In both cases, parts data is added to the Work Order after it has been reviewed by a supervisor for accuracy.

If the mechanic directly buys parts from an external supplier (using either a Purchase Order or a Quick-Pay cheque), he enters the parts information directly into the Work Order.

9. Billing, Accounting and Analysis

9.1 Introduction

Fleet Systems bills its customers monthly, with billing data being calculated by the FMS. In addition, Fleet Systems managers use FMS cost data, labour rates, industry figures and other information to calculate the rates they will charge for the next year.

9.2 Class codes, sub-class codes and customer categories

Class and Sub-class codes are used for billing and analytical purposes, as explained in Section 3. A “Class” is an alternate method of classifying a vehicle. Class codes can be set up to identify cars, vans, school buses, transit buses, light trucks, and so on. Each Class can (optionally) be divided into Sub-Classes. Each vehicle must be assigned a Class/Sub-Class code.

A similar approach is used for customers. Customers can be divided into 10 categories, with each category being charged a different billing rate.

The FMS permits an unlimited number of billing rates to be specified per Class/Sub-Class combination. Managers set up the rates in a “billing table” within FMS. In the example below, only 10 billing rates are shown; in reality, any number of rates can be defined.:

		Customer categories, and the charge (\$) for each Category									
Class	Sub-Class	1	2	3	4	5	6	7	8	9	10
LTRUK	HT	185	190	195	200	215	220	225	230	235	240
LTRUK	1T	195	205	210	215	220	225	230	235	250	260
Etc.											

In the above example, a customer in category 4 who is using a light 1-ton truck (LTRUK – 1T) would pay a charge of \$215.

Unique billing rates

Certain vehicles may require special billing rates. Here are some examples:

- An armoured van (used to pick up cash from City arenas), with its unusual equipment and features, may merit a unique billing rate.
- One type of vehicles (for example, a basic Ford half-ton truck) may be charged out at different pool rates to different customers.

The FMS permits any number of such unique or special rates to exist.

9.3 Pool vehicles

Fleet Systems may establish a central pool of vehicles that are rented to individual departments as needed. Such pool vehicles are assigned their own Class/Sub-Class codes, with their own special daily, weekly and monthly rates. When a pool vehicle is rented to a department, it gets assigned to that department within FMS. At the end of each month, or when the rental period is over, the FMS calculates the total number of rental days and prepares the necessary billing data.

The FMS handles all pool accounts through a series of simple vehicle “check out” and “check in” screens which capture all relevant data needed for billing: renting department, driver information, date out, date in, kilometres travelled and damage. It then uses this data to prepare billing data which is reviewed by a Fleet Systems supervisor. After the supervisor approves the billing, the department is billed.

9.4 Labour rates

The FMS supports up to 10 different labour rates for use with Work Orders – one rate per category of customer. (For more information on customer categories, see 9.2 above.)

9.5 Fixed charges

The fixed charge paid by a customer for a specific vehicle is determined by the Class and Sub-Class code of the vehicle, and by the customer category code. Since there are any number of customer categories (see Section 9.4 above), each combination of a Class/Sub-Class code can have any number of fixed and rental charges associated with it. When billing a customer, FMS uses the customer category to determine the correct rate to use. In the example on the next page, a Category 4 customer would pay a fixed charge of \$190 for a one-ton light truck (Class/Sub-Class code LTRUK – 1T).

		Customer categories, and FIXED CHARGES (\$) for each Category									
Class	Sub-Class	1	2	3	4	5	6	7	8	9	10
LTRUK	HT	105	110	115	120	125	130	135	140	145	150
LTRUK	1T	160	170	180	190	200	210	220	230	240	250
Etc.											

In this example, the fixed monthly charge for a 1-on light truck (LTRUK – 1T) is \$190.

9.6 Capital recovery charges

Capital recovery charges are calculated for each Class/Sub-Class combination, and stored in a “Capital Recovery Table” within FMS. Here again, if necessary, 10 different charges can be stored per Class/Sub-class, one for each Customer category.

9.7 Monthly billing

At the end of each month, the FMS prepares billing data for each vehicle. Internal (City) customers are billed a fixed rate each month.

External customers are billed the sum of the following:

- Fixed charges** (as specified by the vehicle’s Class/Sub-Class code)
- + **Work Order charges** (actual repair charges incurred during the month)
- + **Fuel charges** (either actual or marked-up)
- + **Capital recovery charges** (from the Capital Recovery Table for the vehicle’s Class/Sub-Class code)

The billing data is reviewed by a Fleet Systems manager, who can then adjust any billing amount as needed.

Once the billing data appears correct, the FMS forwards it to other systems for further processing:

- Data for external customers is transmitted to Fleet Systems’ custom-built Invoicing System, which prints invoices that are sent to these customers.
- Data for internal users (City departments) is transmitted to the City’s Navision Accounting system, which debits each customer’s account.

Within FMS, capital recovery charges are maintained separately for each vehicle, rather than in a single corporate account. The accumulated amount available to replace any vehicle can hence be displayed at any time.

9.8 Cost recovery and asset replacement accounting

The FMS includes a software module that assists with cost recovery and replacement accounting. The module uses all available data to automatically calculate the total cost of each vehicle since purchase, and its annual operating cost. Built-in algorithms determine vehicle reliability, and poorly-performing vehicles are automatically highlighted. Fleet Systems makes this information available to external customers upon request.

Calculations are performed at least annually, and more often as required. They can be done for one vehicle, a group of vehicles, or all vehicles. Additionally, Fleet Systems managers can adjust the formulae to better suit their requirements.

The software additionally compares Fleet Systems' billing against its actual costs. This information is used by management to set the billing and other rates for the next year. Rates may be changed as often as needed, as dictated by labour conditions or other factors.

New and old rates

Using the data and reports generated by the FMS, the managers set the new rates to be used, and enter them into the FMS together with a start date. From that start date onwards, the new rates are used. No end date is needed – the FMS uses the rates until they are superseded by new rates.

Whenever a new set of rates is introduced, the FMS moves the old rates to its historical file, together with their start and stop dates. Obsolete rates are hence never deleted, but kept on file for historical and other purposes.

Rate calculations

For City (internal) customers, Fleet Systems attempts to work on a revenue-neutral basis. Rates are hence set at a level that should help recover all overhead, labour and other costs. Managers calculate the new rates by reviewing the reports prepared by the FMS. They factor in currency exchange rates, the expected replacement cost of vehicles at some future date, current and projected wage rates, increases in parts costs and overheads, and a number of other variables. Finally, they arrive at a set of base rates to use for internal customers.

The base rates are increased by some mark-up factor for each category of customer. Finally, the rates are entered into the FMS together with a start date. The new fixed charges are entered into the Fixed Charges table (see Section 9.5 above); the new labour rates are entered into the Labour Rate table (see Section 9.4 above); and the capital recovery rates are entered into the Capital Recovery table (see Section 9.6 above).

Automated updates to replacement cost

Whenever a new vehicle is purchased, the FMS uses its purchase price to automatically review and, if necessary, adjust the predicted replacement cost of similar units in the system. This is best understood through an example:

1. In 2008, Fleet Systems buys a base-model 2008 Ford F150 truck for \$28,700.
2. Within the system, a similar 1998 Ford F150 is scheduled for replacement in 2009. To date, this vehicle has only \$23,675 accumulated in its replacement fund. Obviously, not enough money has been set aside to fully fund the purchase of the replacement vehicle.

FMS highlights this a potential problem, and prints a report for management to use.

At the same time, FMS also checks similar vehicles that are scheduled for replacement in the following years (2010 onwards). It performs a number of complex calculations to determine whether their replacement costs should also be adjusted, and prints additional reports for management use.

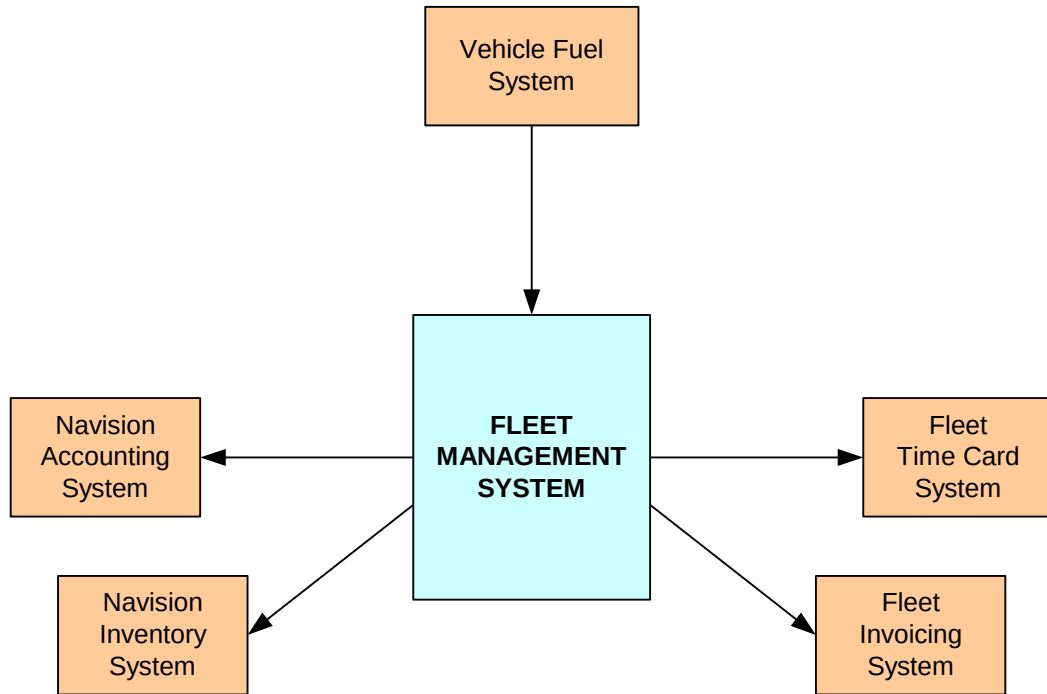
Management reviews the reports and then decides whether or not FMS should update the anticipated replacement costs for those vehicles. When told to proceed, FMS automatically makes the necessary adjustments so that the replacement amounts collected will in future closely match the predicted replacement costs for the vehicles.

On demand, the system prints a report for any vehicle showing its original cost, maintenance costs to date, fuel costs to date, replacement cost, and suggested replacement year. It can also print a report showing all vehicles (and equipment) scheduled for replacement in a particular year, together with the total funds needed to replace them (i.e., their total replacement cost).

10. Interfaces

10.1 Introduction

The FMS communicates with other City applications, both to receive data from them and to send them data. Those interfaces, and their requirements, are outlined in this section.



FMS-002

10.2 Automated Fuel System interface

Before a driver can pump fuel from the City's automated fuel management system, he first has to identify himself. He then has to enter a vehicle ID number which the fuel system checks against its internal database. If the number is found to be valid, the driver is asked for an odometer reading that is also checked for validity. Fuel can be pumped only after these checks are successfully completed.

After fuelling is complete, the fuel management system sends vehicle and fuel data to the FMS. If engine diagnostic codes were obtained from an intelligent transponder, they also are sent. At the least, the following data are transmitted:

- Date
- Time
- User ID number
- Vehicle ID
- Odometer or hour-meter reading
- Number of litres pumped
- Type (gasoline / diesel / LNG etc.)
- Grade of fuel (regular, mid-grade or premium)

Data transfer is not all one-way. The fuel management system's vehicle database is also updated regularly by the FMS.

- When a vehicle is deleted or temporarily removed from the FMS, the system sends the vehicle ID number to the fuel system so that the vehicle can be marked "inactive".
- When a vehicle is added to the FMS, the system sends at least the following data to the fuel management system, which then updates its own database:

- Vehicle ID
- Type of fuel
- Starting odometer / hour-meter reading
- Fuel rating (litres per 100 km, etc.)
- Transponder type (none / basic / intelligent)

10.3 Navision Accounting System interface

- The FMS compiles billing data for each City vehicle, but it does not print invoices. Instead, it sends the invoice data to the City's Navision Accounting System. Navision creates the necessary accounting entries to debit each City department its invoice amount.
- Fleet Systems managers also create and submit journal entries to Navision to adjust any accounts or amounts.

10.4 Invoicing System interface

The FMS compiles billing data for each customer vehicle maintained by Fleet Systems, but, again, it does not print invoices. Instead, it sends the billing data to the custom-built Invoicing System, which prints invoices that are then sent to customers.

10.5 Time Card System interface

The FMS interacts with Fleet Systems' custom-built Time Card System. Work Order numbers are sent from FMS to the system, and mechanics' time is accumulated there. Aggregated time data is then returned back to the FMS, which adds it to the Work Order.

10.6 Inventory System interface

Spare parts are issued by the Parts Department from its inventory, or ordered from an external supplier and then issued upon receipt.

- FMS sends its Work Order data to the Navision inventory system
- Navision returns the data with parts numbers and costs attached.

However, if the mechanic directly buys parts from an external supplier (using either a Purchase Order or a Quick-Pay cheque), he must enter the parts information directly into the Work Order.

11. Ease of Use

11.1 Introduction

The FMS is extremely easy to use. Mechanics, supervisors and managers need a minimum of training with the system because of its use of colour, its intuitive menus and the extensive help built into it. This section outlines some of the many user-friendly features built into the system.

11.2 Features

Windows application

Because the FMS is a standard Windows application that follows Windows conventions, its screens and layouts are easily understood by mechanics and managers alike.

Colour

The FMS makes extensive use of colour for all information displays. Items needing urgent attention, for example, are shown in red, while warnings are in yellow. Screens are not crowded but laid out for ease of comprehension, with “tabbed” displays being used to organise data logically.

Double-click feature

Double-clicking on summarized entries, such as a one-line Work Order entry showing time and costs, causes a new window to open which shows all the details pertaining to that entry. Similarly, double-clicking on a single vehicle in a list of vehicles causes complete details about that vehicle to be shown in a new window. This feature works whenever the information on screen is a summary, or a total (total hours, total costs, etc.).

Drop-down menus

Users of the FMS do not need to memorise any of the many codes used within the system. Whenever a code is needed, the FMS provides either a drop-down list or a “right-click” display. Right-clicking on any data field that requires a code will cause a new window to open that displays all valid codes for that field.

Context-sensitive help

To obtain help about any data item, the user simply places the cursor within that data item and presses the F1 key (or does something similar). To obtain general help about a screen, the user places the cursor in an unused area of the screen and then presses the F1 key.

User-written help

Fleet Systems staff can write their own Help text and add it to the system’s built-in help screens. User-written text can be added to an individual data field, or to the general help for a screen. It can either replace or supplement the system’s built-in help.

11.3 Solving the “many users, one workstation” dilemma

There are a limited number of FMS workstations on the shop floor, and a much large number of mechanics. On a busy day, three or more mechanics may share the same workstation, and they would find it very inconvenient and time-consuming if they had to sign off (or log out) each time one of the other mechanics wanted to use the system. The FMS makes use of the mechanic’s Building Access card to offer a powerful “user-switching” feature that virtually eliminates this inconvenience.

Each mechanic carries a City-issued, RFID-based Building Access card that enables him to enter Fleet Systems offices, the Service Centre and other City buildings. To enter a building, the mechanic merely places the card next to a proximity card reader. The same card is used by the FMS to enable mechanics to call up their jobs (their “sessions”) on an FMS workstation. It operates as follows:

1. On arrival for work, Mechanic “A” logs into the FMS with his user name and password.
2. He then opens a Work Order or calls up some other FMS display.
3. When he is done, he shuts down his display through a simple keystroke combination (Ctrl and F10, for instance). He is still logged on, but his session is now saved and no longer visible on-screen.
4. Mechanic “B” can now use the workstation.
5. When mechanic “A” returns to the workstation, he may discover that mechanic “B” has forgotten to shut down his display. Mechanic “A” simply places his Building Access card against the card reader located next to the workstation. The FMS recognises that mechanic “A” wants to use the workstation again. It saves and closes Mechanic B’s session, and immediately re-starts mechanic A’s session. He can now continue where he left off.

12. Reports and Inquiries

12.1 Introduction

In addition to a large number of standard reports, the FMS provides users with the ability to define their own, custom reports, and to save these reports for later use.

By default, all reports are displayed on-screen. For most users and in most cases, this will prove sufficient. If a printed copy is required, the user merely clicks a button at the bottom of the screen, and the FMS prints the report.

12.2 Standard reports

Many FMS reports are in summary form, and display only one line per item – for example, the “Vehicle Master List” shows one line per vehicle, and hence many vehicles per screen. To obtain a detailed report about any item shown in a summary report, the user simply double-clicks on the item, and a new screen opens to display all available detail for the selected item.

The FMS offers **at least** the following standard reports.

Master lists

- Vehicle List
- Fitted-Out Vehicles List
- Equipment List
- Fittings List
- Internal customers
- External customers

FMS Master lists

- Department List
- Mechanics List
- List of Codes
- List of vendors / suppliers

Preventative Maintenance reports

- PMs scheduled for next period
- In progress
- Completed during a specific period

Consumption reports

- Parts
- Fuel and oil consumption
- Mileage

Planning and analysis

- Labour costs to date / for month
- Overhead costs to date / for month
- Revenues to date / for month

Work Orders

- Active / In progress / Completed
- Processed during a specified period

Vehicles and Equipment reports

- Repair history for a specific vehicle/item
- “Down time” report
- Parts cost and usage
- Labour costs to date
- Total costs to date
- Acquisition / disposal costs
- Event and accident history
- Replacement-cost information
- Equipment Replacement Fund reports

Billing reports

- for the month
- by customer
- by mechanic
- by vehicle
- by type of work done

Anomalous items

- Excessive mileage
- Excessive fuel / oil consumption
- Repair record better than average
- Repair record worse than average

Standard inquiries

At any time, staff can search the files by licence number, licence expiry date, VIN, manufacturer, vehicle type, insurance company, insurance policy expiry date, user department – or any other data field. FMS provides a powerful, yet simple-to-use “inquiry” screen that allows very complex searches to be performed. For example, staff can request a report showing all vehicles:

whose VIN **starts** with “FBXA3G”
and who are insured with ING Insurance
and whose insurance policy expires on May 31, 2009 **or** November 30, 2009.

This can be done in one search operation.

Find-and-replace feature

FMS also allows one-step updates to vehicle records. If, for example, Fleet Systems changes insurance companies, staff can update all affected vehicle records through the find-and-replace screen in one step:

<i>Find</i>	insurance company	= AXA Insurance
	expiry date	= July 31, 2009
<i>Replace with</i>	insurance company	= ING Insurance
	expiry date	= July 31, 2010
	Policy number	= 37376653-FTA

Here, in one operation, all vehicles insured by AXA, with an insurance expiry date of July 31, 2009, have had their information updated to show the new insurance company (ING), the new insurance policy expiry date (July 31, 2010) and the new policy number.

12.3 Custom reports

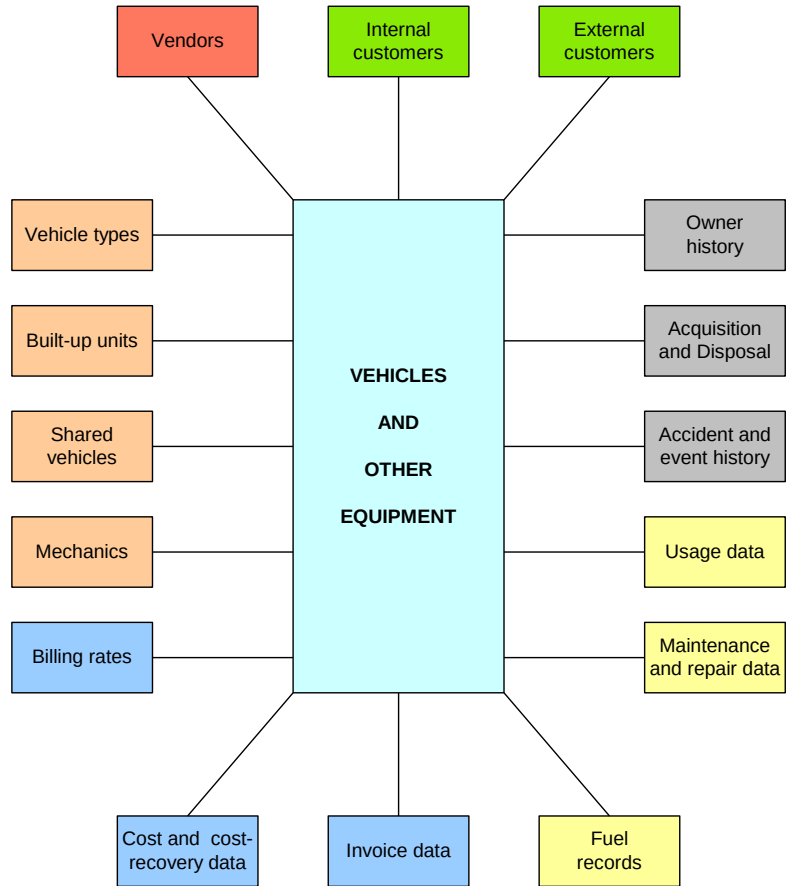
Fleet Systems staff can design their own reports at any time, and save them for repeated use. Reports are prepared using either the FMS’s built-in report creator, or a third-party software program such as Crystal Reports.

12.4 On-line access to service manuals

Most vehicle manufacturers provide their parts and service manuals on CD or DVD. Fleet Systems copies these to hard disk, and the FMS then makes them available on-line for use by mechanics. When a mechanic needs to consult a service or parts manual, the FMS displays a simple menu that lists all the available manuals for each manufacturer. The mechanic selects the manuals he wishes to view, and the FMS displays it on-screen within a few seconds. If necessary, the mechanic can print one or more pages and take them with him to the vehicle he is working on.

12.5 Inquiry capability

The diagram below shows the major types of data collected by the FMS. All of this data can be viewed by authorised users, and can be included in the custom reports that are created by Fleet Systems staff.



Data collected by the FMS

FMS-001-A

13. Users, System Security and Data Migration

13.1 Introduction

Mechanics, supervisors, part-time (or temporary) staff and managers will all use the FMS. This section describes the security features that will protect the FMS and its data.

13.2 Users

The FMS recognises five types of users:

- Data entry staff (and temporary staff)
- Mechanics
- Supervisors
- Managers
- System Administrator

Data entry staff have access to the fewest features and reports, while the System Administrator has complete access. Other users enjoy varying levels of capability.

System Administrator

This person manages the FMS. He has full access to all FMS features. In addition, he manages user accounts: he determine the “permissions” each type of user will have, sets up new users, changes users’ privileges as needed, and deactivates their accounts when they resign. All-powerful, he can also create and delete any data files.

Initial set-up of user types

When the FMS is first implemented, the System Administrator sets up the user profiles. For each **type** of user, the Administrator specifies:

- the menus that persons of this type may use
- the reports that may be viewed and/or printed
- the system functions that may be accessed
- whether files can be deleted by this type of user

Once this initial set-up of user types is complete, set up of individual users is a very simple process.

User set-up

When a new employee starts work at Fleet Systems, the System Administrator needs only to know what type of user this employee is (data entry staff, mechanic, supervisor or manager), and whether he is temporary or permanent. The Administrator then sets up this employee within the FMS; for temporary employees, he also enters an expiry date for the account. The employee is now set up on the FMS, and can use it immediately.

Special permissions for some users

Some users may temporarily need access to features that they are normally not permitted to use. The FMS allows such “special permissions” to be easily set up. The System Administrator merely selects the additional features from a list, and enters an expiry date or period of validity for each. The FMS then adds these features to the list of things the user can do.

Sign-on

All users have to sign on to the system with their user name and password. Passwords can be changed by each user at any time, and the FMS does not require users to select a new password every 3 months, as is the case with other City applications.

Mechanics have additional sign-on privileges, as described in Section 11.3.

13.3 Data Migration from VMM

Fleet Systems currently uses the VMM software package to manage its fleet operations and maintenance. Over the years, VMM has built up a large database of valuable historical operational data (purchase costs, repair history, operating costs, replacement funds, etc.) on each and every vehicle that Fleet Systems has managed or is currently managing.

This historical data is vitally important to Fleet Systems. The new Fleet Management System must be able to accept and use this data and make it available to Fleet Systems managers and mechanics. "Migration" of the data from VMM to the new system will be part of the "set-up" process that must be completed before the new system can become operational.

Most of the historical data will be automatically converted and migrated to the new system. However, there will be a certain amount of data that will require manual conversion, or manual processing together with conversion, before it can be entered into the new system. This will be done by Fleet Systems.

Appendix 1: Technical Requirements

The FMS has the following technical features. It:

- is a Windows application
- is fully compatible and compliant with Windows Vista
- uses the MS-SQL database
- is coded in a standard Windows-compliant language.

It allows custom reports to be easily developed by City staff, either through a built-in report-creation option, or through the Crystal Reports software package.

The FMS software is installed at the City's data centre, which is located at City Hall. Fleet Systems offices (and the Service Centre) are approximately 5 km away. The application is controlled and managed by staff at Fleet Systems, but its functioning and technical maintenance are the responsibility of the City's IT Services Department.

The software can be remotely upgraded and managed by the vendor. Software defects ("bugs") can similarly be corrected remotely, so that on-site visits by the vendor are rarely if ever required.

Appendix 2: List of Features

This appendix summarises the many features that the new Fleet Management System should have.

“Page” (the first column below) refers to the page number of this report where further de-tails about the feature may be found.

Page	Feature	Es- sential	Op- tional
Basic features			
2	Supports all features in current VMM system	X	
7	Supports wireless terminals in the field	X	
8	Allows vehicles to be serviced at any City Service Centre	X	
8	Supports two or more municipalities	X	
25	Allows vehicles to be serviced by external agencies	X	
24	Tracks rented vehicles on long-term rental contracts	X	
53	Assist with migration of data from existing VMM system	X	
Vehicles			
9	All repairs and expenses tracked by vehicle	X	
9, 10	Tracks city vehicles, rented vehicles and customer vehicles	X	
10	Tracks ancillary equipment	X	
17, 18	Tracks ancillary equipment mounted on vehicles	X	
21, 22	Comprehensive “master” data for vehicles and equipment		
ID numbers and codes			
9, 10	Unique ID for each vehicle	X	
9, 10	Unique ID numbers for ancillary equipment	X	
10	Unique ID number for each City department	X	
10	Unique ID number for each customer	X	
11	“Type” and “sub-type” codes	X	
12	Class and sub-class codes	X	
13, 14	Component, repair and customer-category codes	X	
14	10 or more customer categories	X	
15	Two or more Service Centres	X	
15	Vendor IDs	X	
15	Automatically assigns Work Order numbers	X	

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Inventory			
17	Comprehensive vehicle inventory	X	
17, 18	Ancillary items inventory	X	
18, 22	"Fittings" reference file and data	X	
18	Comprehensive inquiry capability	X	
26	Master data can be manually updated	X	
Work Orders, data collection, billing			
23	Shared usage results in split billing (two invoices)	X	
24	Fuel data automatically added to vehicle record	X	
25	Engine diagnostics codes from fuel system or mechanic	X	
25	Repair data collected (from Work Orders)	X	
26	Parts data collected (from Work Orders)	X	
26	Data on other events (accidents, etc.) can also be captured	X	
28, 38 ff	Different labour rates permitted	X	
29	Work orders can be tracked by status / % completed	X	
29	Comprehensive work order data collected	X	
30	Work orders can be changed even after completion	X	
31	Work orders interface to Time Card and Inventory systems	X	
31	Comprehensive inquiry / reporting about Work orders	X	
47	"Many users, one workstation" capability	X	
Preventative Maintenance			
32, 33	"Intelligent" PM scheduling with manual over-ride	X	
32-34	Automated PM and inspection scheduling and reminders	X	
34	Assistance with provincial "Inspection Reports"	X	
32-34	PM data collected	X	
Repairs			
35, 36	Unscheduled and scheduled repairs permitted	X	
35, 36	Full tracking of repairs performed by external agencies	X	
37	Interface with inventory system	X	

Billing and accounting			
38	Supports billing matrix with fixed and variable charges	X	
38, 39	Unique billing rates	X	
39	Pool (internal "rental") vehicles	X	
39	Different labour rates	X	
39	Fixed charges	X	
40	Capital recovery charges	X	
41-42	Cost recovery / asset replacement accounting	X	
42	Reporting capability	X	
Reports			
48-49	Full list of standard reports	X	
50	Custom reports supported (Crystal Reports or other package)	X	
50	On-line access to product / service manuals	X	
49	Comprehensive inquiry capability	X	
Interfaces			
43-44	Interfaces to Fuel System	X	
43-44	Interfaces to Fleet Time Card System	X	
43-44	Interfaces to Fleet Invoicing System	X	
43-44	Interfaces to Navision Accounting System	X	
43-44	Interfaces to Navision Inventory System	X	
Users of the system			
48	Five types of users (capabilities set by management)	X	
48-49	Varying view, print and process capability	X	
Technical features			
	Fully Windows Vista compatible and compliant	X	
46	Ease of use; intuitive	X	
46	Screens make extensive use of colour		X
46	Context-sensitive and user-written "Help"	X	
46	Many users easily use one workstation	X	
54	MS-SQL database	X	
54	Coded in a standard Windows-compliant language	X	
54	Normalised database	X	
	Source code in escrow, if necessary	X	
	Allows new features / modules to be easily added	X	
54	Runs on City's server (not a web-based application)	X	
	Remote support of software by vendor	X	