City of Kitchener
Fleet Downtime
Lean Review

City of Kitchener

Prepared by Leading Edge Group

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1. Executive Summary

Leading Edge Group (LEG) was engaged by the City of Kitchener ("the City") to conduct a Lean service delivery review of the Fleet vehicle and equipment repair and maintenance processes. The review focused on examining how key processes are currently operating with a view to ensuring that processes can be efficient and effective as well as enhance internal and external customer satisfaction.

Methods of analysis included interviews with individuals and teams, walk throughs of work areas, analysis of existing Fleet Downtime data and the Lean process improvement technique of value stream mapping (VSM).

Findings included a lack of proper accountability for scheduling preventative maintenance and limited systematic visibility to the parts acquisition cycle, have led to these areas becoming key drivers of downtime. There are also significant gaps in communication between the various stakeholders including Fleet Mechanical, User Groups and Parts Supply.

The system for delivering and managing fleet maintenance and repairs is largely paper-based and supported by IT systems that do not have the functionality required to ensure comprehensive fleet management.

Recommendations include reducing the delays through maintaining an up-to-date list of appropriate contact individuals for each vehicle, automating notifications of status change during the vehicle repair/maintenance cycle and delivering training to enhance user accountability for proactively scheduling maintenance.

Technology needs to be leveraged to provide parts and components information to Fleet technicians, supervisors and stockroom attendants in an efficient and user-friendly manner. This would replace the fragmented way in which data is currently captured in Excel, Flint (fleet management system) and SAP.

Service level agreements between the fleet mechanical division and fleet users need to be recommunicated, as information shared is being inconsistently relayed to user group supervisors and their frontline staff.

A formal mechanism for monitoring the performance of external vendors needs to be implemented including corrective action when there are deficiencies in either quality or delivery.

Processes undertaken by the fleet mechanical and parts supply teams with respect to identifying and sourcing the appropriate parts or accessories rely heavily on user experience and institutional knowledge. There needs to be adequate documentation to support the volume and variety of parts being managed. An improved system will enable the fleet mechanical and parts divisions to continue to deliver valuable service in a more streamlined and efficient manner with improved customer satisfaction.

2. Client Requirements

Fleet management within the scope of this engagement covers a range of services including performing scheduled preventative maintenance, outfitting vehicles for changes in seasonal activities and doing repairs. The acquisition of new vehicles was not within this scope.

A robust fleet management system allows the organization to maintain the fleet efficiently and effectively, thereby reducing costs, minimizing risks and ensuring compliance with regulatory obligations.

The City of Kitchener commissioned Leading Edge Group to undertake a review of the current processes and functions carried out by the fleet management division with a view to identify opportunities for improving and streamlining current processes. The review process examined the key services offered to customers by the fleet management team so as to allow for a more transparent view of the current state.

If a vehicle or piece of equipment is out of service for repair or maintenance, it impacts service delivery for the specific area. Fleet downtime has been a recurring complaint from users. This review has focused on the repairs and maintenance processes that impact the various user groups.

The Lean technique of Value Stream Mapping was deployed to review current processes used between the fleet management team and its internal customers and allows all parties to see the end-to-end processes that are currently used to manage fleet across the City of Kitchener.

3. Sources of Information

The process was informed by some of the key staff at the City of Kitchener including the Director of Fleet, Manager of Fleet Mechanical, Manager of Fleet Planning, Director of Procurement, Manager of Service Coordination & Improvement and Supervisor of Materials Management.

In addition to this input, process information was received from managers and supervisors among the following user groups: Infrastructure Services-Fleet, Financial Services-Procurement, Community Services-Sport, Infrastructure Services-Roads & Traffic, Infrastructure Services – Gas and Water Utilities, Infrastructure Services-Parks & Cemeteries, Infrastructure Services – Sanitary & Stormwater Utility, Infrastructure Services – Facilities Management. Frontline staff from the stockroom, fleet mechanical and users of the pieces of equipment and vehicles from the previously mentioned areas were involved in the Lean Value Stream Mapping events.

Data for analysis of the downtime and stock purchase activity was provided by the Fleet Planning and Materials Management (Stores) divisions respectively.

4. Introducing Lean and Process Improvement Methodology

Lean is a systematic approach to identifying and eliminating wasteful activities in a process through continuous improvement. The key focus of Lean Thinking is identifying the value of any given process by distinguishing value-added steps from non-value-added steps and eliminating waste so that, eventually, every step adds value to that process. This is achieved by enabling the flow of a product or service at the pull of the customer, so that the service can be responsive to the customer's needs.

The term 'Lean' is applied to a process because a Lean process utilizes:

- Less operational space
- Fewer financial resources
- Fewer materials and services
- Less time to deliver a service to its customers

Lean Thinking is not a manufacturing strategy or a cost-reduction program, but a philosophy that can be applied to a variety of organizations. This is because it is focused on processes. All organizations are made up of a series of processes, sets of activities or steps intended to create value for people who are dependent on them, namely customers and colleagues.

Lean Thinking is based around the application of a number of tools and strategies aimed at streamlining all aspects of a process. These tools are intended to reduce unnecessary labour, space, capital, materials, equipment and time involved in the delivery of appropriate services to customers.

Using the principles and tools associated with Lean Thinking to reduce and eliminate waste enables organizations to increase their quality of service and become more competitive. It enables them to:

- Operate more quickly and efficiently at lower costs
- Become more responsive to the needs of customers
- Focus on quality
- Increase service levels

This helps organizations to ensure their employees experience increased job satisfaction and their customers receive the best possible service.

During a Lean review, all processes can be examined with a view to finding waste across eight common sources.

Waste	Definition
Defects	These are process outputs that need to be corrected through rework.
Over-production	Producing more information than the customer needs in order to manage the next step in the process or producing something before it is actually required.
Waiting	Wasted time waiting for the next step in the process to occur.
Non-utilized skills	Staff performing functions that are better suited to other grades of staff.
Transportation	Unnecessary movement of inventory, materials, equipment, supplies and products.
Inventory	Keeping excessive inventory and products that are not being processed which ties up money and reduces available space.
Movement	Unnecessary movement of staff members in order to complete their daily work activities.
Excessive processing	Excessive processing work that is not required by the customer and adds no value but consumes resources.

Table 1: The eight wastes

5. Background and Context

Several divisions rely on the City's fleet of vehicles and equipment in order to perform their daily work, including Roads & Traffic, Parks & Cemeteries, Gas & Water, Sanitary & Stormwater and Facilities Management as the primary users. A wide range of vehicles and equipment used by these divisions are routinely serviced and repaired by the fleet mechanical team. The number of days that vehicles are out of service for repairs has been an ongoing concern for the various user groups.

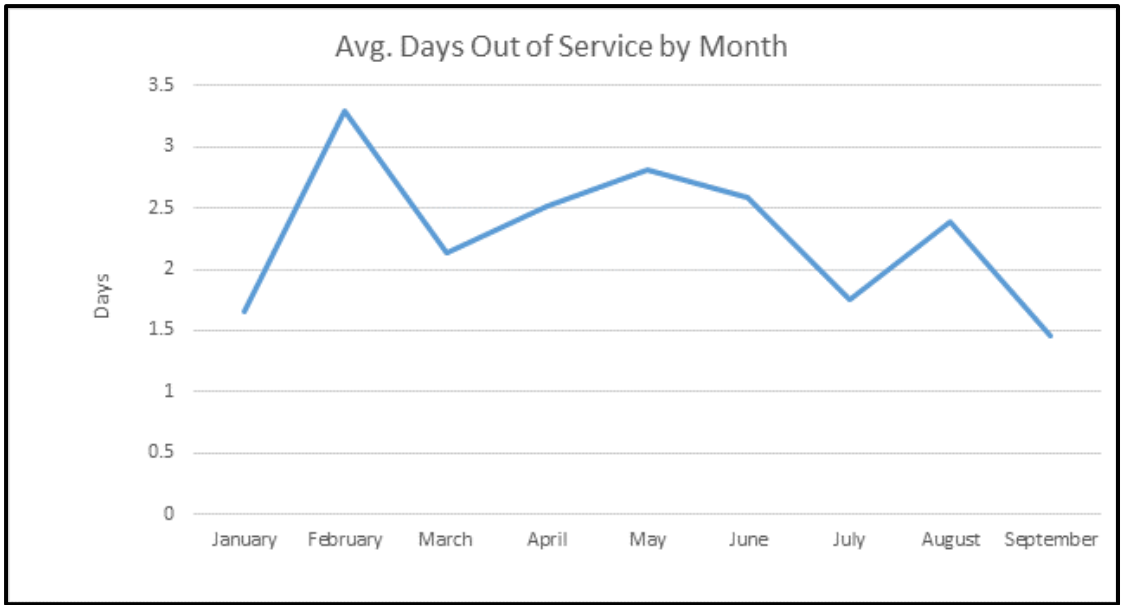


Figure 1: Average days vehicle/equipment is out of service January to September 2019[1]
([1]Downtime calculations at the City of Kitchener do not include work that is completed during off seasons which has no impact on users' ability to provide services.)

The vehicles and equipment used vary greatly in size and complexity. They range from handheld pieces of equipment all the way up to crew cab pickups, dump trucks, Vactor trucks for sewer cleaning or specialized equipment for maintaining the ice in the arena. This variability in what needs to be serviced or repaired creates the need for mechanical staff to have a broad range of expertise. The operating model is for service and repairs to be done by an in-house team with outsourcing being done on an exception basis where the internal team does not have the capacity or expertise to handle a particular job.

Some divisions have a seasonal component and are busiest at certain times of the year – for example, snow plows in winter. Yet other services are busiest in terms of fleet use at other times of the year such as the summer months – for example, road repairs. The fleet division supported by the parts team operates a 24/5 schedule in order to support the users. The variety of vehicles coupled with the multiple manufactures who supply them, creates a situation with a proliferation of parts required to keep the fleet operational.

The parts team has had a new manager since the start of this year. During his tenure he has been faced with ongoing challenges in maintaining a full staff complement due to turnover as well as leaves of absence. The team has been hampered by IT systems that are incapable of providing some of the fundamental reports required for good parts inventory management.

On the fleet mechanical side, there have also been staffing issues created by recent retirements. Concerns have also been raised about the ability to attract top talent at the current pay rates. There have also been ongoing issues with the ability to schedule preventative maintenance for some user groups. This has been a challenge as in some instances failure to do so in a timely manner would render a vehicle inoperable as it would be out of compliance with Ministry of Transportation regulations.

Most service and repairs are turned around within 2.4 days. The highest contributor is overdue maintenance, Preventative Maintenance (PM)/ Periodic Mandatory Commercial Vehicle Inspection (PMCVI) i.e. PM/PMCI averaging over 3 days. Parts unavailability is the secondary driver of downtime.

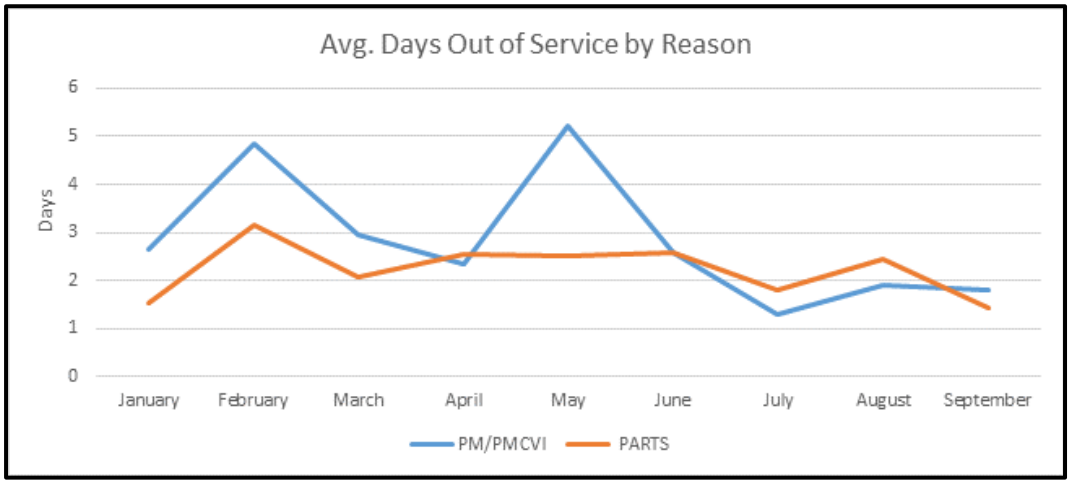


Figure 2: Average days out of service by month January - September 2019 by reason code

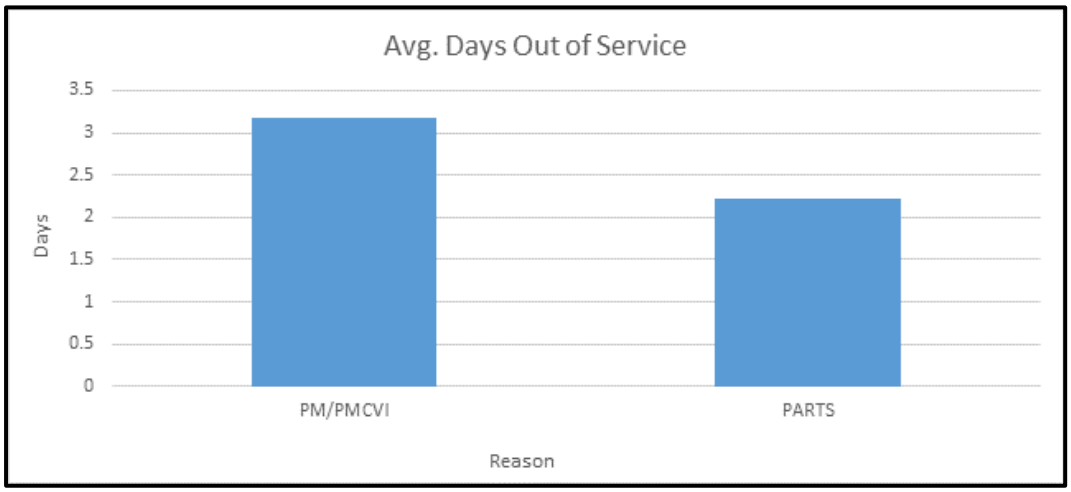


Figure 3: Average Days Out of Service January to September 2019 by reason code

6. Approach Taken

In order to understand the current state of fleet services, it was necessary to understand that the function of this division is to serve the fleet users and enable them to carry out their duties safely and efficiently. Understanding the processes that are common to the fleet management team and the fleet users would be beneficial to understanding how the fleet mechanical service currently operates.

From information provided by the fleet management team prior to the process review, it was apparent that there are multiple stakeholders involved in the delivery of service to the users. Because of their working relationship with the fleet management team and their heavy reliance on fleet for their operations, a number of divisions were selected.

Initially, phone interviews were conducted with the managers and/or supervisors of each division. Key fleet processes were discussed through a series of structured questions and process concerns were noted.

Division	Current State Review Date
Materials Management (Parts)	August 28, 2019
Procurement	September 9, 2019
Infrastructure Services	September 9, 2019
Roads & Traffic	September 16, 2019
Sanitary & Stormwater	September 17, 2019
Fleet Mechanical	September 18, 2019
Gas & Water	September 19, 2019

Table 2: Initial interview schedule

After the initial interviews it became apparent that, although the services offered by the fleet management team were consistent across the user groups, the perceptions varied with the main concerns arising around the actual vehicle downtime and the level of communication during the interactions throughout the process.

Internal Perspective/ Parts – Fleet Mechanical Interaction

When a technician requires a part in order to complete a job, the technician would walk over to the parts counter to make a request. In some instances, the technician has to wait for a stock attendant to become available after the attendant has attended to other duties. Both the technician and the parts stores attendant would then spend time together at the computer to identify the correct part needed.

Very often the same part could be described by technicians or stores attendants using different terminology. The same part could be represented in the system in multiple ways. This results in difficulty in verifying what is actually needed.

This lack of consistent data also impacts the ability to manage the parts inventory. Without consistent data it becomes difficult to determine which parts should be routinely stocked versus those that should remain as special order items. In addition, setting the min-max in order to determine appropriate reorder points for stocked items also becomes challenging.

There has been an ongoing concern about the amount of time being spent at the stools between the parts attendants and the mechanics. This interaction has been primarily around a computer screen as both parties attempt to determine exactly what part or component is required. There has been the perception that while legitimate work is being done, there is also a risk of undue socializing occurring. It had been proposed that in order to reduce the amount of non-value-added time, the stools be removed. However, due to increased staff dissatisfaction they have been left in place.

There has been inconsistency in adding service level expectations to supplier contracts. This has made it challenging to manage supplier performance, resulting in difficulty getting the right parts with the right quality at the right time. In addition, there is little guidance to the stores attendants on appropriate pricing for parts. In an effort to be as cost effective for the city as possible, stores attendants will spend time calling multiple suppliers comparison shopping weighing price versus delivery time.

In exceptional cases, the stores attendants will possess a solid grasp of technical aspects of fleet, usually they have limited prior experience in this area. This coupled with limited formal systems documentation, results in it taking an estimated minimum of 2 years for a newly hired parts attendant to become comfortable in their role and even longer to gain true mastery and proficiency. Training for the stores staff has been traditionally “by osmosis” via on-the-job observation.

Historically there has a been a lack of role clarity in terms of finding the right part needed. Some technicians would simply leave a request for parts while others would stay with the stores attendants and be fully involved in the research. This lack of clarity and consistency has in some instances led to strained relations between stores and fleet mechanical. While communication between Stores and Fleet leadership has got better there is still room for improvement. Typically, communication has been reactive and an appropriate forum to move into a proactive mode has yet to be established.

Vendors have in many instances provided limited insight into the status of ordered parts. Furthermore, the delivery process is not formalized, so there is no trigger for follow up on parts on order. This results in parts attendants having to chase vendors for updates in order to respond to queries from the technicians.

User Group Perspective

Communication breakdowns and lack of understanding of the financial allocation process has contributed to strained relations between Fleet Mechanical and user groups. When vehicles are acquired there are standard charges applied based on the estimated usage of the vehicle. When actual usage does not align with the forecast, some users are left with the impression that they have been overcharged by Fleet.
In some instances, it was felt that services were being charged back to users well in excess of prevailing market prices.

Although a lot of data on the performance of the Fleet team is captured, it is not equally leveraged by all stakeholders. There is an established monthly Fleet-User Group meeting which is currently being underutilized as a forum for gaining clarity and improving mutual understanding. From a Fleet perspective there is a lack of engagement from users. Users in turn raise the concern that engagement is difficult as the agenda does not address their felt needs.

There are often cross purposes in terms of priorities and accountabilities. Issues such as reducing idling, improving vehicle handling to reduce unnecessary repairs and proactively scheduling preventative maintenance have not had the required level of oversight. Despite large quantities of data, there has been limited traction in getting corresponding action on issues highlighted. Lack of cleanliness of the vehicles brought on for service by some users has also contributed to strained relations. In extreme instances the only remedy has been for the technicians to refuse to service the vehicle. From the users' perspective, the length of vehicle downtime has been an ongoing point of dissatisfaction. The contrasting priorities have resulted in an atmosphere of blaming in some instances.

Seasonal changeovers, although not formally within the scope of downtime, can impact the capacity of the Fleet team to deliver service to their user groups. It is challenging when activities such as mowing and leaf collection overlap with snow removal. This creates an additional demand on limited resources, as Fleet is tasked with switching over equipment while also doing regular maintenance and repairs.

Vehicle selection is out of scope for this engagement. However, some users expressed concerns about the level of input they have in the selection process and decision-making criteria, as they are the ones who ultimately pay for the acquired vehicles.

Repair/Maintenance Activities

Each operator does a daily pre-trip vehicle inspection and documents any defects observed on the Daily Vehicle Inspection Report (DVIR) which is completed in duplicate. Issues arising during operation are noted at the end of the shift. There is also a formal post trip inspection, although this is not always consistently done. One copy of the form is provided to the supervisor and then passed onto the Fleet team to initiate repairs.

There is a general lack of consensus on the Service Level Agreements (SLA) between Fleet and users. There are often conflicting views on whether or not the terms are being adhered to. In many instances, users are not aware of the actual terms and conditions outlined.

Service delays due to unavailability of parts is an ongoing source of frustration. Some users feel that for more routinely used parts, they could actually source them faster themselves than the time it takes following the formal process. Delays are often perceived by user groups as Fleet not having a sense of urgency, lacking in accountability or lack of a customer service mindset. While there is general consensus amongst users that Fleet performs well a high percentage of the time, the exceptional cases where there is poor performance tend to colour the overall perception of performance.

Lack of proactive and timely updates on the status of long-outstanding parts serves to heighten the tensions. In addition, alterations or modifications to vehicles carried out by the Fleet without consultation with the users have created issues for certain groups.

There has been an ongoing concern about the timing of preventative maintenance versus repairs. In some instances, no sooner than a repair is completed, the vehicle is taken in for scheduled maintenance. From a user perspective it would be beneficial if both activities could have been done at the time of the repairs. From a Fleet perspective, the maintenance was not yet due as it is triggered by mileage or elapsed time. Their goal is to optimize the flow through of all jobs currently underway.

Routine service including oil changes work quite smoothly in this context. However, repairs do pose a challenge. When a specialized vehicle is down for repairs then an entire crew is unable to work. On occasions, vehicles are with Fleet Mechanical for the initial 1-2 days before the determination is made that the repairs cannot be done in-house. Turnarounds for vehicles could range from a week to a month in some instances.

There is no dialogue around the need for a replacement vehicle at the time of vehicle intake. Arrangements for a replacement sometimes get initiated after a crew has been down for several days. In addition, when repairs are outsourced, the Fleet team loses control over the process as well as visibility to status. There is user frustration over lack of updates on the ETA and the fact that they need to call Fleet, who in turn calls the service provider in order to ascertain status.

The intake process also presents the concern where a user indicates that there is an issue with a vehicle and the Fleet says that it is not significant and the vehicle is still operable. This heightens tensions as users feel their input is not valued. There are also reports of vehicles being taken in on more than one occasion in order for a particular issue to be resolved.

<u>Specialized vehicles</u>

It can be difficult to schedule regular maintenance for unique high use equipment due to busy schedules. Rental of an alternate vehicle could take weeks in some instances. It is costly and time consuming to take these vehicles to a third-party shop to have repairs done. There is concern about whose responsibility it is to take the vehicle to and from the outside location.

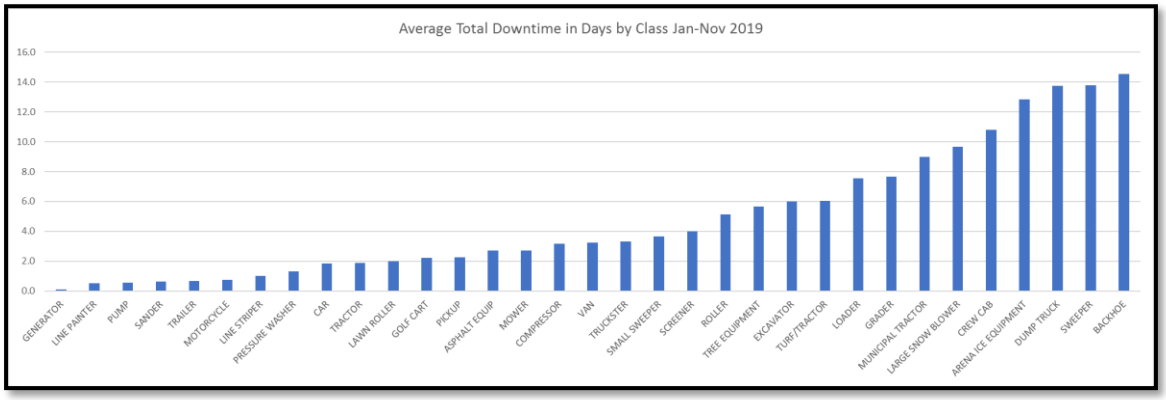


Figure 4: Average downtime by vehicle class January to November 2019

Fleet Mechanical

The overall mandate for the Fleet Mechanical team is to maintain vehicles and equipment so that they are safe and dependable.

Repairs

The repairs process is initiated when a user completes and submits a DVIR report. Fleet then makes an assessment as to whether or not the defect is major or minor and initiates next steps. This includes arranging for the vehicle to be brought in, or for third party towing. A priority is then assigned and the vehicle entered in their queue.

Once priority is assigned then a technician is assigned either based on next available or someone pulled off a current job if the incoming vehicle is deemed to be a higher priority. A priority matrix is in place across divisions which takes into account the critical need for the equipment as well as seasonality. Workflow is managed across shifts as needed.

Key challenges with the intake process include (a) a lack of clear description from the user to inform a proper diagnosis of the issue, (b) prioritizing work across various divisions needs without adequate information on specific events e.g. a full plow, and (c) balancing staffing issues such as managing vacancies and overtime.

There are service agreements in place between Fleet Mechanical and all divisions, however, they do not specify downtime. These agreements do address readiness for each season, such as salters in the winter or backhoes for the summer. Generally, user

feedback to the division is positive, however downtime as it relates to parts is an ongoing user concern.

Scheduled Maintenance

Regular maintenance is scheduled through the Flint system. Notifications go out a month prior to the due date for Ministry of Transportation required maintenance (PMCVI). Each Monday a report is sent out stating all vehicles due for preventative maintenance. The data is kept up-to-date to the extent that mileage is accurately logged each time a vehicle gets fuel. The notification is sent to the designated recipients in each division, typically supervisors who have vehicle users as direct reports. It is then up to the supervisor to notify the user and book the maintenance. In some instances, the email goes to an administrative assistant who then relays the information.

Some individuals who are the sole users of the vehicles will book the maintenance themselves. On occasion there is a breakdown in communication so that notification gets to the user with very little time left to schedule maintenance. There are also challenges in scheduling repairs and maintenance for vehicles that are taken home by employees, as these vehicles are the users' primary transportation to and from work sites and the Fleet garage. These vehicles are therefore unavailable for repair or maintenance during evening and night shifts. The fact that these vehicles are often only made available for repairs or maintenance during regular scheduled hours of operation, results in increased downtime.

Vehicles that are parked in the yard are sometimes taken in and maintenance is done overnight, so as to minimize disruption for the user. When significant defects are discovered during routine maintenance that need to be repaired, this sometimes lengthens the downtime, with the user being caught unprepared.

Status of vehicles currently out of service can be obtained in K-Hub. However, this is reactive after the vehicle has already been out of service and also many users are unaware of this functionality. While statuses can be checked in the system, there are no automatic updates sent out. While some user groups are quite collaborative, others are quite difficult to schedule as they feel they are too busy to bring their vehicles in.

Ongoing challenges for service delivery by Fleet include increase wait times for parts as lack of dialogue with user groups despite the existence of the standing Fleet-User meetings.

Vehicle Operation

Utilization patterns have a significant impact on overall operating costs and directly correlate to the frequency and cost of repair and maintenance activities. Out of route trips and unnecessary travel result in unnecessary downtime and operating costs.

Preventable collision and damage repairs have a direct impact on downtime and resulted in $254,646.18 or 3.5% of total repair and maintenance costs in 2018. Downtime for these incidents goes beyond the repair and maintenance related downtime as there is downtime associated with investigation and reporting activities.

Although significant improvement has been made with respect to driving behaviours in recent years, aggressive driving behaviours and unnecessary idling result in increased repair and maintenance requirements which directly relate to downtime. For example, one hour of idling is equivalent to 53 KM of driving.

Parts (Materials Management)

The stockroom for parts has faced challenges for most of this year due to staff vacancies which have now recently been filled. The SAP module that they are currently using is quite limited in terms of the reporting capability and metrics that are needed to manage the parts inventory. Reports such as fill rates are unavailable as well as reporting on supplier delivery times from order to fulfilment. The team also manages a utilities counter managing stocked items such as gloves or salt as well as a receiving counter. Staff resources have to be managed to cover various stakeholders including the larger customer base serviced by the utilities counter.

Staff expectations are in some instances loosely defined with lack of clarity on the handoffs between parts stores and Fleet Mechanical. The priority system for determining how urgently a particular item is needed is not being consistently used. Parts that might be ordered but needed for the following season change are not identified as such. On other occasions after a rush is placed on a part, the user finds an alternative and what was a priority is no longer deemed as such. However, there are communication gaps around the change of status. The process for determining the correct part needed for a particular job has been a time-consuming process involving both Fleet and stockroom staff. The boundary for the respective roles and responsibilities has yet to be clearly defined.

Lack of system documentation on the parts leaves subjectivity in determining which is the correct part. The same part can be entered multiple times in the system with differing descriptions based on who entered it. The situation is compounded when vendors make changes to their part numbers without any notification. The stockroom attendant has to make calls to suppliers in search of the right part. On occasion the wrong part is ordered which then adds to the delay in the repairs being done. This occurs approximately 4% - 8% of the time. The difficulty in determining which is the correct part needed is the most significant challenge facing the stockroom team. For each item this task can take anywhere from 5 to 45 minutes. This task involves dialogue with the technician, looking up vehicle repair histories in Flint. It takes a long time to get a new hire up to speed in the stockroom as a lot of information transfer relies on memory.

Although special order parts represent only 11% of the value of parts on hand, they generate 51% of the purchasing activity.

Purchasing Activity by Stocking Category

Order Type	Number of Order Lines
Special order	2,750
Stocked Items	2,618
TOTAL	**5,367**

Table 3: Fleet purchase orders created year to date October 2019

Inventory Value by Stocking Category

Inventory Class	Inventory Value
Non-stock (special order)	$ 47,268.59
Stocked Items	$ 383,234.65
TOTAL	**$ 430,503.24**

Table 4: Inventory on hand as of October 2019

The process for finding the correct part is quite time consuming. It involves looking up repair histories in Flint, checking their parts' books as well as doing research online. This is then followed up with phone calls to suppliers. The 70% to 80% of regularly stocked items are relatively easy to identify the remaining items which are special order consume the bulk of their time. The situation with parts is compounded by the fact that despite the time and effort required to obtain non-stock parts, upon receipt many are not consumed in a timely fashion. Two thirds of the special-order inventory has been in stock for more than 3 months.

Fleet "Special Order" Inventory – Aging Report

MONTHS SINCE ARRIVAL	# OF PARTS	VALUE OF PARTS
0.5	18	$ 1,938.64
1	15	$ 8,106.53
1-3	22	$ 5,277.26
3-6	30	$ 10,705.60
6-9	16	$ 6,918.30
9-12	9	$ 2,892.73
OVER 1 YEAR	28	$ 11,429.53
	138	**$ 47,268.59**

Table 5: Aging of special-order inventory on hand as of October 2019

Having a licensed technician now on the team has to some extent alleviated the situation. Internal handoffs between stockroom attendants on various shifts is also a challenge. This knowledge transfer occurs primarily via email. The timelines get extended as night shift, usually staffed by one individual, has to hand over to one of two colleagues on the day shift as suppliers are unavailable overnight.

Sometimes the appropriate technician is not informed that the ordered part has arrived, leading to further delays. Stockroom attendants will call multiple sources in order to get the best price for a part. The procurement policy requires at least three quotes for purchases over $15,000. However, the stores attendants do struggle with finding the right balance between the value of their time, the value of the part and the amount of effort expended to find a lower price.

Monthly meetings between parts and Fleet do not lead to issue resolution as there is no alignment on relevant KPIs. While there is reporting on stock turns and inventory dollars, fill rates are currently unavailable.

Value stream mapping (VSM) workshops

Two value stream mapping (VSM) workshops were convened in order to validate the input from key process experts and to share learnings across the wider group as to the challenges currently faced by fleet management.

A value stream is a list of activities in a process that outlines the flow from the beginning to the end, from the initiation of the service delivery to the final delivery to the customer (internal or external). A value stream map follows a service or item from beginning to end, identifies and quantifies value-adding and non-value-adding activities within the value stream and links all associated material and information flows.

The VSM process is based on the following:

1. Developing a current state (‘as is’) value stream map of a pre-identified/pre-selected processes/services to fully understand how things currently operate.
2. Conducting a Lean analysis of the current state to identify opportunities for improvement.
3. Establishing a desired future state (‘to be’) value stream map through stakeholder consensus for a more streamlined process or service where value-adding activities are increased and non-value-adding or wasteful activities are minimized, while process steps and procedures are standardized as is practical.

4. Developing priorities that will allow for a transition from current to future state and realize and sustain improvement opportunities.

A VSM workshop should involve the people who understand the process best (those who work with it every day). The team uses paper and pen (flip chart, sticky notes, markers, brown craft paper, etc.) to map out the process, develop their own current and future state maps and agree on a plan to realize improvement opportunities.

As well as providing the platform for identifying improvement opportunities, VSM workshops enable a common language and standard for process improvement, while participants gain new perspectives and a deeper appreciation of flow issues across functions and functional areas.

On October 29, 2019 a VSM workshop was conducted involving fleet mechanical and user groups. A second session was held on November 5, 2019 including the fleet mechanical and parts team.

In preparation for these sessions, a project orientation and an initial training session was conducted on October 22, 2019. This was done to provide the participants with a fuller context for the initiative. They were also provided with an introduction to some of the fundamental principles of Lean in order to equip them to better participate in their respective VSM sessions. Following the training, an initial working session with the parts team only was also conducted. This was done to capitalize on their availability as well as focus in depth on their specific processes and challenges.

The teams together identified numerous challenges and bottlenecks within the existing processes as well as opportunities for improvement. Below is a list of identified issues and solutions proposed by the team that could serve as inspiration for continuous improvement activities.

VSM 1 Output- Fleet & User Working Group

#	ISSUES/ PAIN POINTS	POTENTIAL SOLUTIONS
1	Staff does not get notified of status changes or service completion.	✓ Update existing database with supervisor/users assigned to vehicles. ✓ Create automatic notification emails. ✓ Develop a user phone app. ✓ Add ETA to Flint
2	Lack of awareness of online status checks.	✓ Communication and training on KHUB in Flint.
3	Preventative maintenance (PM) schedule gives due dates but not actual dates for service.	✓ Select designated supervisors who will follow up on maintenance for their group.

4	Some users have difficulty scheduling ahead for PM.	✓ Have point person above contact Fleet to schedule.
5	Replacement vehicles often unavailable.	✓ Create a fleet pool of vehicles as spares for "some classes" of vehicles maintenance/repairs with check in and out policy like car rentals.
6	Unreported defects are accumulated and discovered during maintenance resulting in longer downtimes.	✓ Reinforce duty to report.
7	Unrealistic user expectations for when all of a particular group can have maintenance done.	✓ Notify users of number of days required for each class of vehicle or equipment setting expectations.
8	Maintenance notifications are delayed in delivery resulting in short lead times for the work to be done e.g. < 24 hrs.	✓ Send notification to supervisors or users not admins. ✓ Select designated supervisors who will follow up on maintenance for their group.
9	Vehicles are taken by Fleet for maintenance and users are unaware.	✓ Give third party providers better guidance on which vehicles in the yard are to be taken for maintenance. ✓ Online look up screen near board with keys – in case fleet has the vehicle. ✓ Flag vehicles in system as to which area owns it.
10	Supervisors are unaware of issues known to the users.	✓ Provide refresher to users on their reporting responsibilities.
11	Lack of clarity around when to repair vs replace small ticket items.	✓ Provide refresher to techs on policy.
12	Repairs reported in bulk at the start of day and not at end of day.	✓ Instruct operators to drop off DVIR or call in to supervisor real time.
13	Delay between when a defect is noticed and when it is reported.	✓ Instruct operators to drop off DVIR or call in to supervisor real time.
14	Difficult for users to deliver vehicle to offsite shop for repairs.	✓ Borrow other operations staff for vehicle shuttling.

15	Lack of understanding of budget / operational cost recovery.	✓ Book training session.
16	Users unable to access the fluid distribution system for washer fluids (air in tires).	✓ Review process for tire pressure and fluids/user access to system.
17	Lack of weekend coverage for snow events and fleet unaware of special needs ahead of time.	✓ Develop process for snow loading. ✓ Notification for snow events for fleet and parts staff ✓ Review of Fleet winter shifts when operators working 24/7.
18	Complexity of special vehicles.	✓ Standardization of fleet equipment where possible.
19	Unnecessary repairs due to misuse of vehicles and damage.	✓ Have supervisors/managers revisit policies with users.
20	Lack of cleanliness of vehicles – no set expectations.	✓ Have supervisors/mangers revisit policies with users.
21	Fleet is burdened with vehicle preparation that users did historically.	✓ Have users put on and take off accessories themselves instead of Fleet.
22	Vehicles/ equipment have been repaired but not collected.	✓ Create a report of jobs done and not collected or no longer need to be done.
23	Difficulty in finding status on specific vehicles.	✓ Greater search functionality in KHUB.

Table 6: Issue and solutions developed in by the User – Fleet Working Group.

VSM 2 Output- Fleet & Parts Groups

#	ISSUES/ PAIN POINTS	POTENTIAL SOLUTIONS
1	Inconsistent part names – Vendor/Fleet/Stores.	✓ Institute PDI (Pre-Delivery Inspection); IR (Inventory Request) Form update to parts division. ✓ Create a new vehicle IR Form. ✓ Create forms to be used to notify stockroom when vehicle no longer in use. ✓ Use parts numbers where possible.

2	Vehicle info missing/incorrect in system.	✓ Clean up of system info. ✓ Tech provide part number where possible.
3	PDI info not updated for new vehicles.	✓ Assign a specific responsibility for ongoing updates of PDI information. ✓ Clean up exiting Flint data.
4	Techs spend too much time at parts counter.	✓ Tech brings actual part, pictures. ✓ Regular maintenance - Tech places request, then go to start the job, bring a list. ✓ User training on Flint parts request function for both parts and fleet staff. ✓ Add online chat App. ✓ Pre-pick special order parts; fleet brings over tickets in advance. ✓ Phone headsets for parts team. ✓ Techs pick up their own non-stock parts based on their tickets – leave paperwork with parts team.
5	Techs not receptive to suggestions for complementary parts.	✓ Updating meetings with fleet/parts frontline staff.
6	Min/Max not updated based on usage.	✓ Updating meetings with fleet/parts frontline staff.
7	Manual paper-based ETA updates.	✓ Investigate systems solution e.g., a data pull from SAP, Flint. ✓ Implement a dedicated inventory management system. ✓ Parts would update from default 1-day.
8	Manual checks for status of ordered parts – done inconsistently.	✓ White board or TV Screens to update ETA's. ✓ Long term, investigate integrated system functionality.
9	Manual parts receiving process.	✓ Automated parts receiving. (IT Systems)
10	Physical number of parts on the shelf doesn't match the system.	✓ Techs pick up their own non-stock parts based on their

		tickets – leave paperwork with parts team.
11	Items not scanned out.	✓ Training to reinforce use of gun when picking. ✓ More regular cycle counts. ✓ Correct inventory at time when last item is taken.
12	Difficult to pull systems data - SAP, Flint, KPI, fill rates.	✓ Inventory management/ Reporting System.
13	Chasing Users because PM not scheduled.	✓ Planning/Communication with users to provide visibility to parts team.
14	Lack of user accountability for PM.	✓ Planning/Communication with users.
15	Gaps in proactive communication on critical vehicles.	✓ Status updates to user with ETA's. ✓ Add Tech time to parts ETA. ✓ Prioritize 5-10% critical items. ✓ Add to Flint/K HUB.
16	Contracts create quality issue from cheapest suppliers.	✓ Include Fleet & stock with contracting process. ✓ Formalize component warranty process.

Table 7: Issue and solutions developed in by the Fleet – Parts Working Group.

7. Challenges Encountered

Any engagement such as this will encounter challenges along the way. Some of the specific challenges encountered included the following:

- Difficulty in quantifying the relative impact of various root causes within the parts management cycle due to lack of system reporting capability.
- Systems limitations included lack of information on fill rates and order fulfilment cycle times.

8. Analysis and Recommendations

While the Fleet team does provide a valued service to the various user groups, there are opportunities to enhance both the actual level of service delivered as well as overall customer satisfaction. The key areas of focus to achieve these improvements centre around improving parts delivery, scheduling maintenance and stakeholder communication and engagement.

With vehicles being out of service for preventative maintenance being the leading driver of downtime, there are opportunities for greater communication and dialogue between Fleet and users to bridge this gap. Improved data quality in the system will also be an enabler in this respect. Assigning appropriate responsibility for the vehicles as well as emailing the appropriate individuals will reduce the delays in notifications getting to the correct individual.

While fleet users may have operational constraints that may hinder their ability to comply with preventative maintenance scheduling at times, the lack of a formal system of communication and notifications on status changes creates difficulty for all concerned. In addition, the paper-based system and over-processing results in poor communication and frustration for both fleet users and fleet management. Automated updates and proactive status change notifications would be very helpful in improving compliance and improving cross-functional collaboration.

While email is often the default mode of communication, there are opportunities to leverage broader communication strategies to enhance user engagement. These could involve developing shared metrics with user groups' input to ensure that information presented at Fleet-User meetings is mutually beneficial for both broad stakeholder groups at the table. This could also extend to collaboration on the actual agendas to ensure that relevant issues from both sides are tabled. The Fleet team has a solid track record of delivering service from a technical perspective, however providing soft skills training could complement their expertise and lead to broader stakeholder satisfaction across the user groups.

The stockroom team, while quite conscientious and caring about the value they bring to the organization, needs to be refocused on the priority of improving parts delivery times. This involves providing them with a robust IT system with well documented parts information in order to reduce reliance on memory. This system will also need to incorporate the tools and reporting required to drive good inventory management including monitoring vendor performance.

The ability to monitor fill rates and PO turnaround times will be vital for good inventory management. In addition to systems enhancements, there needs to be added collaboration with Fleet Mechanical to more quickly identify the correct parts, including providing pictures or the actual part as well as part numbers where available. This will enhance efficiency as well as reduce instances of incorrectly ordered parts.

Fleet's input will also be vital in an ongoing manner to aid stocking decisions and updating items no longer needed.

Also, clearer guidelines on purchasing decisions need to be provided to the stockroom to minimize the time spent calling around to place orders. Time freed up from placing special orders can then be reinvested in updating system parameters such as min-max including seasonality. This will make the system's recommendations for order quantities more reliable and further reduce the time taken for placing orders.

In addition to the broader themes for improvement identified, a number of specific areas of process wastes are outlined below:

Waste Type	Process
Defects	✓ Incorrect part being ordered. ✓ Insufficient information given to accurately diagnose a repair issue.
Over-production	✓ Multiple pieces of paper being handed off throughout the repair cycle.
Waiting	✓ Waiting for DVIR reports to be turned in. ✓ Waiting for ordered parts to arrive.
Non-utilized skills	✓ Technicians spending time away from service tasks in order to help identify parts.
Transportation	✓ Fleet tracking down vehicles for PM as they have not been turned in on time.
Inventory	✓ Items ordered into stock and then sitting unused for extended periods of time.
Movement	✓ Technicians and stockroom attendants walking between each other's work areas in the process of identifying parts.
Excessive processing	✓ Time spent shopping around for multiple vendors before placing parts order. ✓ Multiple handoffs between staff when PM schedule published.

Table 8: Fleet repair/maintenance process waste examples

Summary of Recommendations

Parts Stockroom

- ✓ Fully described parts with associated part numbers in Flint would enable the technician to place orders ahead of time and arrive at the parts counter to retrieve them with minimal wait time.

- ✓ There are opportunities to better leverage the system functionality to place orders. This would involve validating the min-max settings so that SAP recommended orders could be placed with minimal manual intervention. This process would also involve checks and balances for seasonality as parts consumption in many instances varies widely based on winter and summer activities.

- ✓ Fully completed documentation for parts requested by Fleet in the short term would also help speed the process of obtaining parts.

- ✓ Formal training for onboarding new parts stores attendants would be beneficial in enhancing the overall process efficiency.

- ✓ Pre-ordering items for preventative maintenance would also speed up the process as these are items that are more routinely used and would be stocked items rather than special orders. This would allow the technician to retrieve their parts with minimal waiting.

- ✓ Implementing vendor scoring with requirements for vendors to proactively provide status updates on ordered parts would benefit the entire process.

- ✓ It could be beneficial to institute a formal apprenticeship and certification program for stockroom attendants, such as the Ontario College of Trades program or the Red Seal Program offered by the Canadian Council of Directors of Apprenticeship.

- ✓ Providing Stores with downtime data by reason code could be very helpful in order to perform analysis as to which specific parts are leading to additional downtime.

Fleet - Users

- ✓ Review weekly maintenance communication (PM & PMCVI Report) that is emailed to users to ensure accuracy in scheduling and investigate options for improving content to assist users in planning/scheduling maintenance of vehicles/equipment with Fleet for required maintenance activities.

- ✓ Creating an agenda on the standing Fleet-User Group meetings for addressing concerns from each team's perspective will go a long way to improve dialogue and enhance communication and issue resolution.

- ✓ Piloting of changes to vehicles in consultation with user groups will not only improve the successful outcomes but also engage key stakeholders and enhance dialogue and communication.

- ✓ The large volume of data being captured by the Fleet Planning team could be distilled into a specific set of key metrics mutually agreed upon with users. This could become a tool for enhancing engagement and participation in the monthly update meetings.

- ✓ Formalize the intake process including an assessment of the need for a replacement vehicle at the time of initial assessment as well as timelines for periodic status updates.

- ✓ Standardizing process for users to schedule maintenance ahead of time.

- ✓ Conducting a review of the current Fleet staff complement, including winter shift coverage, as well as pay structures would be helpful in addressing staffing issues.

Policies & Practices

In addition to the specific activities listed above, it would be beneficial to review the current policies and processes in a number of areas. These include:

- ✓ A review of vehicles taken home should be undertaken to ensure on-call requirements and operational efficiencies are being realized and downtime minimized.

- ✓ Conducting an assessment of route planning and general utilization would be beneficial to minimizing excess travel and thereby reduce repair and maintenance requirements.

- ✓ Continued efforts in driver training and other measures to improve driver behaviours would help to reduce preventable collision and damage repairs which negatively impact downtime.

Long-term Recommendations

The current IT systems are fragmented and rely heavily on manual intervention with information being passed along by paper. Updating databases with supervisor/users assigned to vehicles would also be a key enabler for improved notifications. In the longer term, it will be important to invest in systems enhancement and integration to eliminate most, if not all of the need for paper-based activities. This includes the ability to initiate repairs and maintenance as well as provide proactive status reports. This automation would extend to parts ordering, receiving and inventory reporting and management. A robust integrated system would also be designed to address the

current unmet data needs as well deliver value-added reporting including relevant KPIs.

While vehicle acquisition was out of scope for this initiative, there is also an opportunity to evaluate incorporating stockroom, Fleet Mechanical and user feedback in the procurement decisions. While the immediate cost of vehicle acquisition is a key parameter, there may be opportunities to contrast this with the cost of complexity associated with managing a wide range of suppliers and vehicle makes and models. Managing seasonal changeovers is another out of scope area that could be the subject of a future initiative.

Short-term Recommendations

- ✓ Institute PDI (Pre-Delivery Inspection) and IR (Inventory Request) Form update to parts division.
- ✓ Assign a specific responsibility for ongoing updates of PDI information.
- ✓ Implement user training on Flint parts request function for both stockroom and Fleet staff.
- ✓ Institute ongoing updating meetings with Fleet/Parts frontline staff.
- ✓ Initiate KPIs that can be supported by current manual processes with the aid of spreadsheets.
- ✓ Deliver communication and training on KHUB in Flint.
- ✓ Select designated supervisors who will follow up on maintenance for their group.
- ✓ Reinstate the priority system for parts orders, including whether the vehicle is operable or not as well as user needs and priority.

Additional Opportunities for Stockroom Consideration
✓ **Alignment on metrics for Fleet and stockroom** ✓ **Standard descriptions for parts** ✓ **Eliminate obsolete items** ✓ **Increased cycle counts** ✓ **Reinforce process to scan items taken from the shelf** ✓ **Periodic reviews of stocked parts with Fleet input** ✓ **Create alerts in Flint from technician to begin parts search** ✓ **Fleet picks parts themselves from a designated area for non stock parts**

- ✓ **Set flags for off season ordering, so that items do not sit for extended periods**
- ✓ **Set expectations around dealer or aftermarket parts.**

Table 9: Opportunities to enhance the Stockroom operations

BENEFIT CALCULATIONS

I. Reducing Time at Parts Counter - Technician Productivity Savings

Category	Amount
Time spent daily by Technicians at parts counter	60 min /day
Productivity savings at 25%	15 min/day
Billable Technician days per year	181 days
Annual productivity savings per Technician	45.25 hrs
Number of Technician, Body Repair, and Welders	28
Annual Efficiency Gains	1,267 hrs
Fully Burdened Hourly Labour Rate	$136.00
Annual Productivity Savings	$172,312

II. Downtime Reduction - Operator Productivity

No. of Vehicles with service delays Jan. to Sep. 2019	1, 580
Annualized no. of vehicles with delays	2,107
Average no. of days out of service	2.28 days
Reduction in downtime by 10%	0.228days
Increased vehicle availability per 8-hour day	1.8 hours
Annual productivity savings	3,792 hours
Fully Burdened Hourly Labour Rate	$50.00[2]
Annual Productivity Savings	$189,600

([2] Actual pay rates may be higher or lower than this estimated rate based on different pay rates in various operating areas as well as overhead cost recovery practices.)

III. Downtime Reduction – Asset Utilization

Fleet Uptime	96.46%
Fleet Downtime	3.54%
Purchase Value of Fleet Assets	$53,727,610
Fleet assets out of service at any given time	$1,901,950
Reduction in downtime by	10%
Increase in daily Fleet asset availability	$190,195

9. Future Challenges and Opportunities

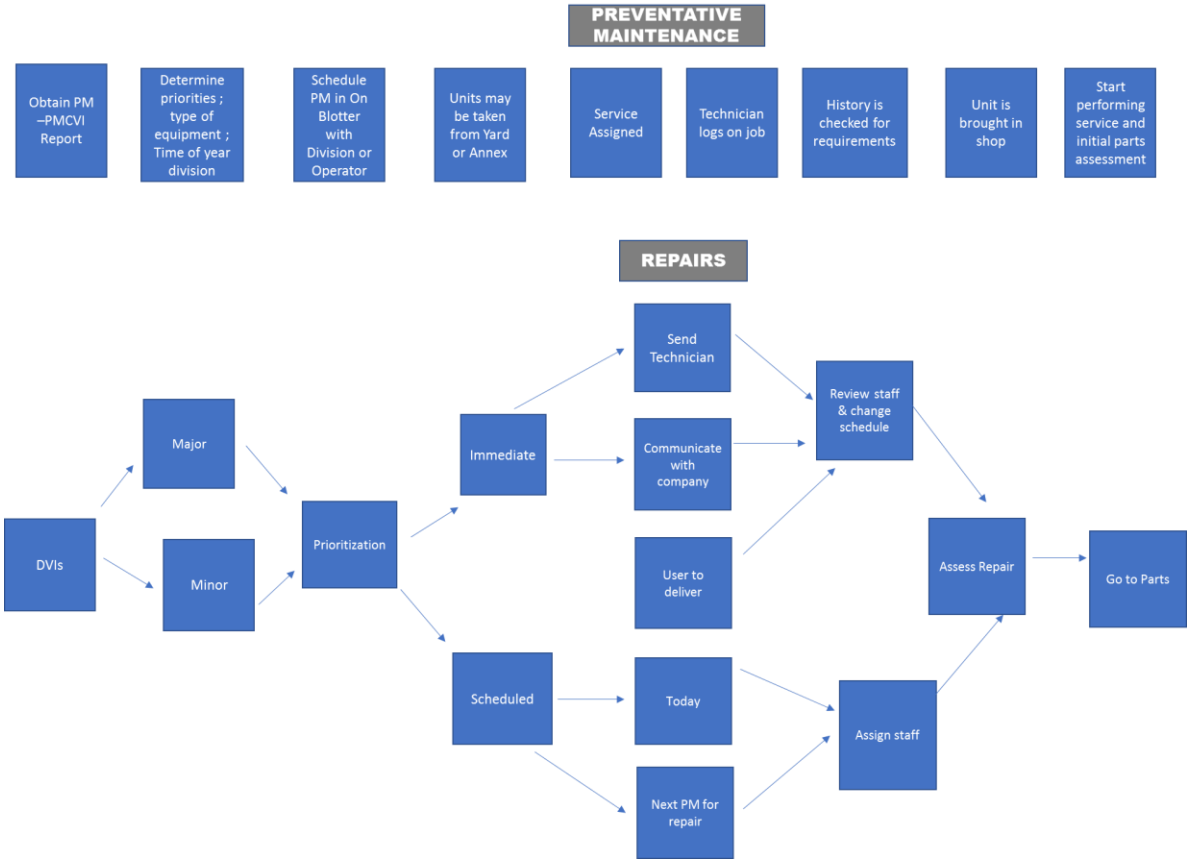
Specific process issues and challenges were identified through interviews and from Value Stream Mapping participants. Many of these have been associated with specific countermeasures to mitigate or eliminate the associated challenges. In order to implement positive changes and maintain the gains, disciplined project management best practices will have to be adopted, supported by ongoing monitoring and oversight from designated process owners.

In addition, there has been a recurring theme centred on the softer issues of culture, communication and engagement. It has been said that “the hard stuff is easy and the soft stuff is hard”. That said, changes to culture can be quite challenging at best and require commitment and cooperation from all involved. However, the investment of time and effort required to create a more collaborative and cooperative culture, will not only reduce the barriers created by functional silos but will also enhance tangible operational metrics such as downtime.

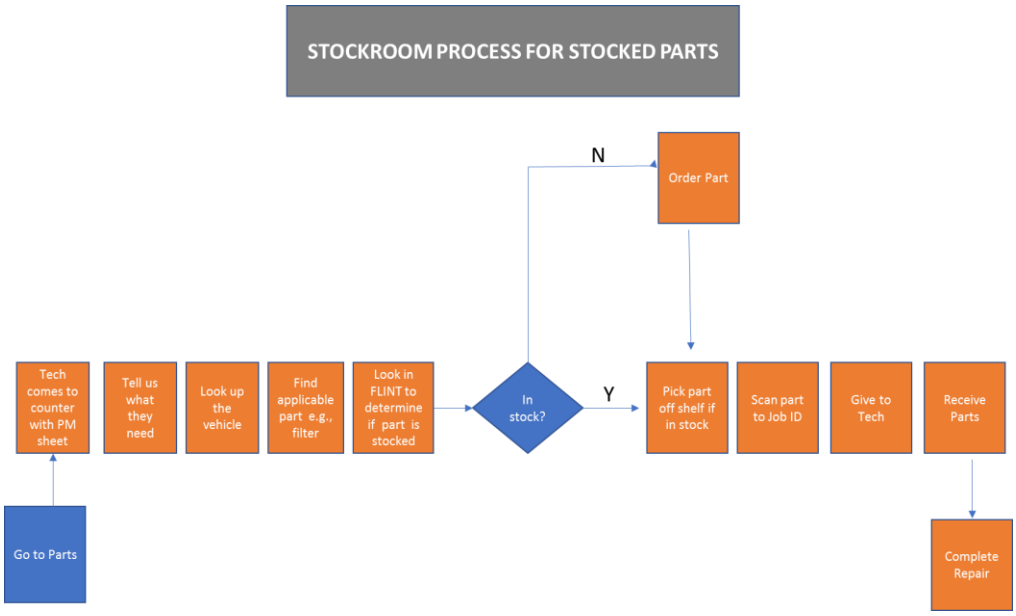
There is good reason for optimism that the improvement efforts will pay off as there is a renewed sense of cooperation between the various stakeholder groups. This is exemplified by a recognition by users that they can do more to help Fleet in order to help themselves and their willingness to become more actively engaged in the process.

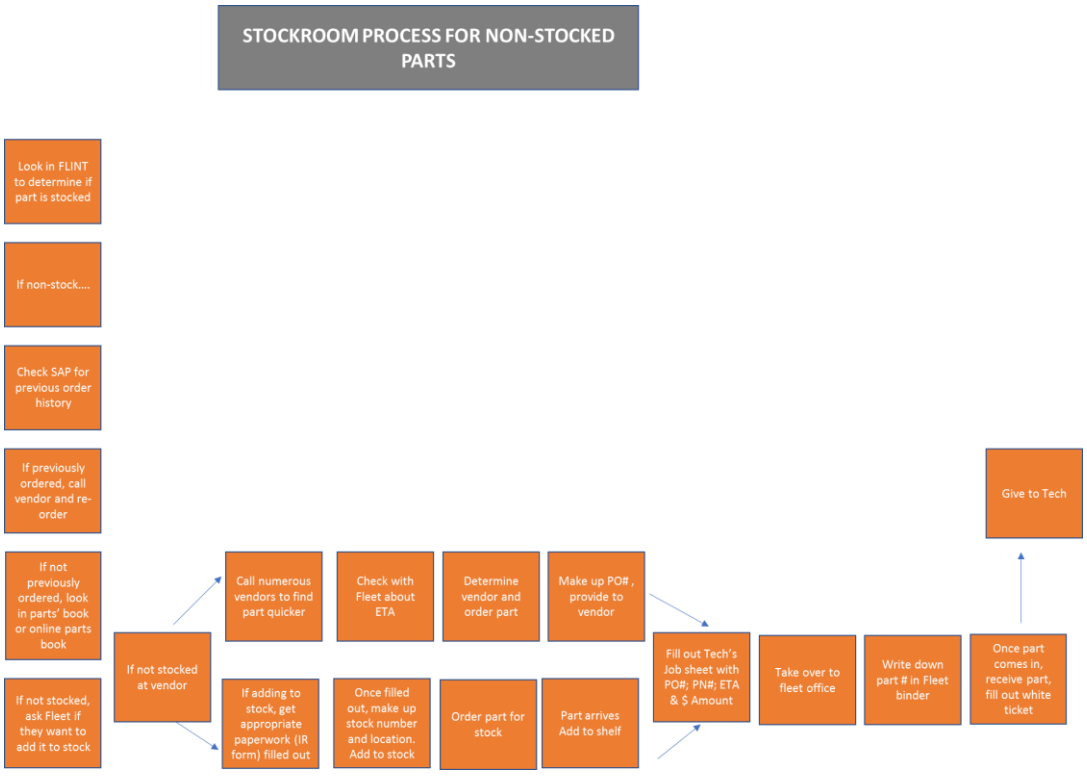
10. Appendices

Appendix 1: Fleet Repairs & Maintenance Intake Current State Maps



Appendix 2: Stockroom Stock & Non-stock Parts Current State Maps

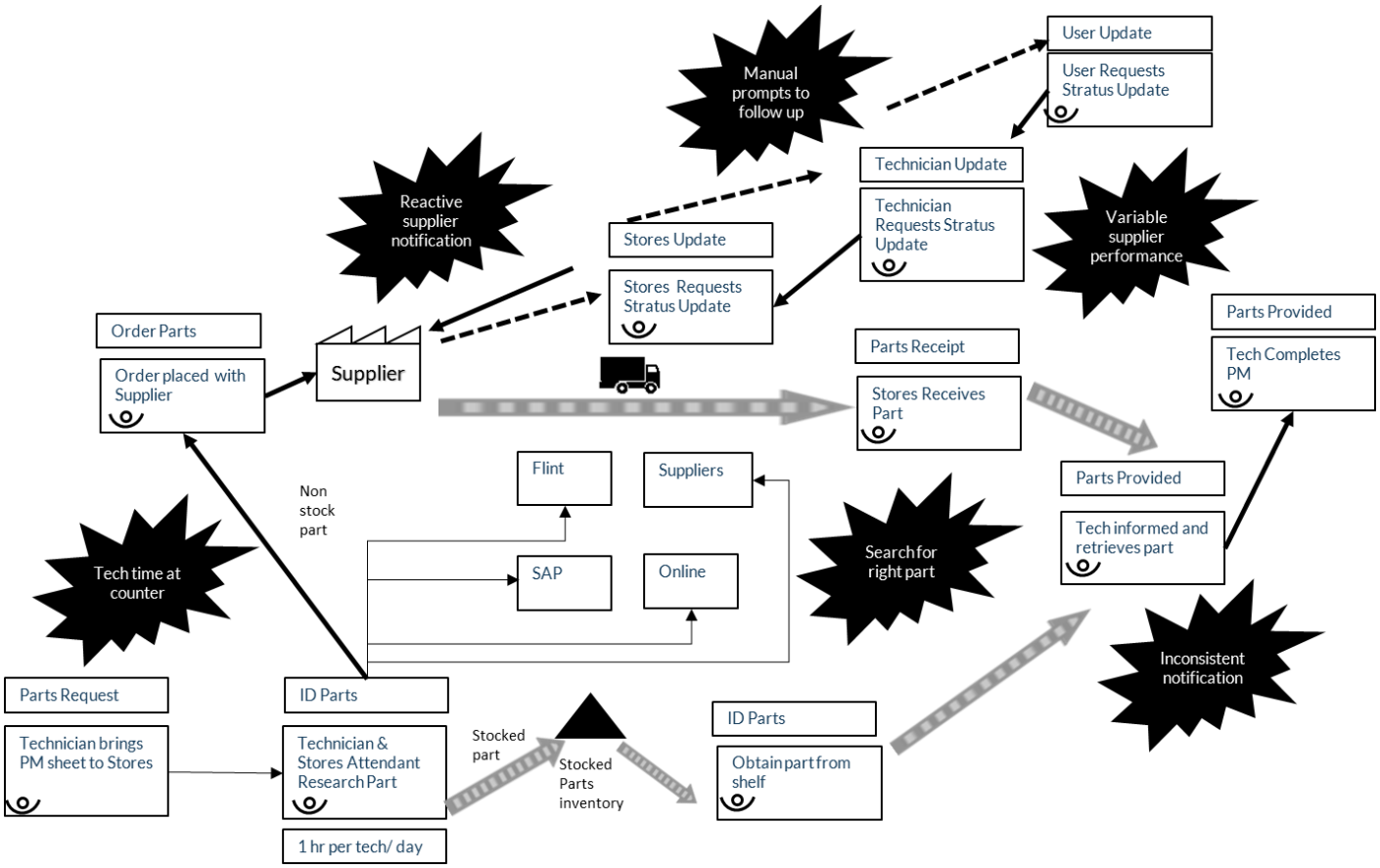




Appendix 3: Activities undertaken after the Working Group meetings:

1. A methodology for measuring accurate parts lead-times is currently under development. Some additional steps to be taken include:
    a. Creating a report to make this data easily extractable
    b. Breaking down the data by supplier, setting targets, measuring against them and providing feedback and/or need for corrective actions to our suppliers.
    c. Setting expectations across the supplier base.
2. A new non-stock ("special order") inventory tool is in the late stages of development based on ideas that were raised during this project.
    a. The programming has been completed
    b. Testing and procedure creation have started with a goal to go live the week of December 18th.
    c. This new tool will move the manual paper-based process for special order parts into an electronic tracking tool that provides several benefits:
        i. Allows fleet staff (any fleet member with a computer) to see a live listing showing the ETA / delivery date of each non-inventory part they have ordered
        ii. "Macro buttons" are at the top of the page to allow quick filtering to only show desired information
        iii. Removes the need for stores staff to provide / maintain inventory tickets with fleet counter
        iv. Allows stores staff to easily identify when identical special-order parts are being ordered multiple times (potentially leading to stocking decisions)
        v. Allows stores staff to update listing from any computer
        vi. Allows notes to be added that are specific to supplier part numbers and easily searchable
        vii. Allows automatic flag to identify if an ETA has passed without part receipt
        viii. Provides opportunities for metrics based on special order activities
3. Full PDI information has been provided for two new vehicles since meetings took place and these provided the information that Stores was looking for. Additional work is needed to ensure that this process is repeatable for all new vehicles as gaps still exist.
4. Headsets for stores attendants to allow more efficient multi-tasking are in testing with positive initial feedback. (Additional equipment can be ordered quickly for installation prior to year-end.)

Appendix 4: Stockroom Stock & Non-stock Parts Current State Value Stream Map



Appendix 5: Stockroom Stock & Non-stock Parts Future State Value Stream Map