



ACTION REQUIRED

Date: June 15, 2017

To: TTC Board

From: TTC Audit & Risk Management Committee

Subject: Auditor General's Report – Review of Toronto Transit Commission Procurement Policies and Practices: Improving Materials Management and Purchasing Policies Can Result in Significant Savings

The subject report, reviewed at the TTC Audit and Risk Management Committee on May 29, 2017, is forwarded to the TTC Board for review and consideration, and forwarding to the next City of Toronto Audit Committee meeting.

Original signed by V. Rodo

Vincent Rodo
Chief Financial &
Administration Officer

Attachments: Auditor General's Report – Review of Toronto Transit Commission Procurement Policies and Practices: Improving Materials Management and Purchasing Policies Can Result in Significant Savings

Review of Toronto Transit Commission Procurement Policies and Practices: Improving Materials Management and Purchasing Policies Can Potentially Result in Significant Savings

Date: May 15, 2017

To: Toronto Transit Commission Audit and Risk Management Committee

From: Auditor General

Wards: All

SUMMARY

The Toronto Transit Commission (TTC) procures over \$300 million worth of goods and services annually for its day-to-day operations through the Materials and Procurement (M&P) Department. The Department is comprised of three areas:

- Purchasing and Sales – purchases goods and services for TTC's day-to-day operations
- Materials Management– manages TTC's inventory assets
- Project Procurement – procures vehicles, construction, engineering, and consulting services, and provides contract administration services.

This audit included an in-depth review of Purchasing and Sales and extended into areas of Materials Management. We did not audit the Project Procurement Section.

The main customers of Purchasing and Sales and Materials Management are TTC's maintenance departments, including the Bus Maintenance & Shops, the Streetcar Maintenance and Infrastructure, and the Rail Cars & Shop Departments.

The objective of our audit was to assess whether TTC's procurement policies, procedures and practices are fair, transparent, cost effective, and achieving the best overall value.

Overall, we found that many aspects of TTC's procurement policies and practices need to be substantially improved or revamped for it to achieve efficient and effective operations and the best overall value. We also identified a few significant cost savings opportunities, and inventory management issues that negatively impact TTC's day-to-day customer service.

RECOMMENDATIONS

The Auditor General recommends that:

1. The Board request the Chief Executive Officer, Toronto Transit Commission, to undertake the necessary steps to maximize warranty claim rate and revenue for aftermarket parts. Such steps should include an assessment of the resource and technology requirements to enable staff to systematically retrieve, track, and process aftermarket parts warranty.
2. The Board request the Chief Executive Officer, Toronto Transit Commission, to undertake steps to improve the tracking and retrieving of cores in order to maximize the use of cores in vehicle rebuild programs and avoid paying for additional core charges when purchasing remanufactured parts.
3. The Board request the Chief Executive Officer, Toronto Transit Commission, to review and address the parts shortages issue and its impact on vehicles out of service, rebuild delays, vehicle spare ratios, and materials requests turnaround time. Steps should be taken but not be limited to:
 - a. Reducing delays in processing inventory requests
 - b. Minimizing repetitive purchases of the same parts in small quantities
 - c. Measuring and reporting materials requests turnaround time
 - d. Ensuring alignment of Materials Management's performance indicators with TTC priorities
 - e. Strengthening IFS system controls to monitor parts requests deletions
4. The Board request the Chief Executive Officer, Toronto Transit Commission, to review the current method of centrally procuring low dollar purchases through the Materials and Procurement Department, and explore ways to improve efficiency, and minimize delays and the backlog of outstanding purchase requisitions.
5. The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure procurement policies and procedures provide clear directions and guidelines for Buyer's Discretion purchases and its subsequent amendment, and applicability of the dollar threshold.
6. The Board request the Chief Executive Officer, Toronto Transit Commission, to implement measures to monitor compliance with Buyer's Discretion procurement policy requirements, and to ensure the requirements are effectively communicated to staff involved in the procurement process.
7. The Board request the Chief Executive Officer, Toronto Transit Commission, to identify strategies to improve response rate for competitive procurement and such strategies to include but not be limited to:
 - a. Providing free viewing of tender documents or detailed notices of tenders

- b. Extending bid response time for complex specifications
- c. Identifying alternate sources of supply and revise its current minimum quotes requirement to invite five or more suppliers where low bid response rates are evident.

8. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC) to formalize the process and requirements for seeking client department input in the bid evaluations for purchases involving subjective criteria or complex technical aspects. The formalized procedure should be posted on TTC intranet to be accessible by all staff.

9. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to review and strengthen the TTC's current non-competitive procurement policy and procedure requirements to ensure all sole and single source purchases are justified, and adequately reviewed and authorized.

10. The Board request the Chief Executive Officer, Toronto Transit Commission, to consider publishing a notice of sole source intent prior to engaging in non-competitive procurement for large dollar value sole source purchases where only one company is known to supply the goods or services but others may exist.

11. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to expand and actively pursue alternate sourcing to reduce purchase costs for replacement parts, and to ensure the alternate sourced products are adequately reviewed and tested for TTC operations.

12. The Board request the Chief Executive Officer, Toronto Transit Commission, to establish a comprehensive Blanket Contract policy and procedural requirements detailing minimum dollar threshold and ongoing review and renewal processes.

13. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to reduce annual purchase costs where feasible by establishing Blanket Contracts or expanding existing price agreements with vendors of concentrated spending and repetitive purchases. Periodic analysis of TTC's overall purchase activities to identify Blanket Contract opportunities should also be undertaken.

14. The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure that all procurement policies, procedures, and forms are up to date and that staff have a single-point electronic access to procurement policies, procedures and forms.

15. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to regularly report to the Board on TTC's procurement statistics and performance indicators.

16. The Board request the Chief Executive Officer, Toronto Transit Commission, to undertake steps to review and enhance the monitoring and controls of the Purchase Card program. Such steps should include a review of the level of staff resource, effectiveness of the current spot audits, and the transaction review and approval process.

17. The Board request the Chief Executive Officer, Toronto Transit Commission, to explore ways to expand the current Purchase Card (PCard) program with a view to utilizing PCard to improve the efficiency of the agency's purchasing functions.

18. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to ensure the Purchase Card process is considered when reviewing and revising TTC procurement policy dollar thresholds.

19. The Board request the Chief Executive Officer, Toronto Transit Commission, to report to the Board on an annual basis on savings achieved as a result of implementing the recommendations from this report, including information regarding:

- identifying alternate sourcing
- pursuing aftermarket parts warranty
- initiating further Blanket Contracts or expanding the product catalogue of existing Blanket Contracts
- retrieving and tracking cores.

20. The Board forward this report to City Council for information through the City's Audit Committee.

FINANCIAL IMPACT

The implementation of recommendations in this report will likely result in cost savings and improved operating efficiency. The precise extent of any resources required or potential cost savings resulting from implementing the recommendations in this report is not determinable at this time.

In this audit report, we identified several areas where TTC could generate significant savings through improving materials management and procurement practices. These initiatives include:

- expanding alternate sourcing
- pursuing aftermarket parts warranty
- expanding Blanket Contracts with vendors of concentrated purchases
- improving controls on core retrieval and tracking.

Based on our estimates, the combined savings from alternate sourcing, aftermarket parts warranty, and blanket contracts, when fully realized by the TTC, can potentially range from \$7.0 million to \$15.0 million per year. In addition, the annual savings from retrieving and using cores can be in the millions based on the savings identified from analyzing eight parts.

The table below summarizes the potential savings.

Initiatives	Potential Annual Savings (in millions)	
	Low	High
Expanding Alternate Sourcing for Parts	\$2.5	\$6.5
Pursuing Aftermarket Parts Warranty	\$4.0	\$6.0
Expanding Blanket Contracts	\$0.5	\$2.5
Subtotal	\$7.0	\$15.0
Improving Retrieval and Tracking of Cores	\$1 to \$1.5 based on an assessment of 8 types of cores; total savings from over 2,000 existing core codes could potentially be in the millions	

DECISION HISTORY

The Auditor General's updated 2016 Audit Work Plan included an audit of TTC's procurement processes. This review was selected based on the extent of TTC procurement expenditures and the general risks of procurement. It is the Auditor General's first review of TTC's procurement functions. The 2016 Audit Work Plan is available at:

[https://www.ttc.ca/About the TTC/Commission reports and information/Committee meetings/Audit Risk Management/2016/May25/Reports/7.AG Report - TTCV Updated Audit Work Plan for 2016 and 2017.pdf](https://www.ttc.ca/About%20the%20TTC/Commission%20reports%20and%20information/Committee%20meetings/Audit%20Risk%20Management/2016/May25/Reports/7.AG%20Report%20-%20TTCV%20Updated%20Audit%20Work%20Plan%20for%202016%20and%202017.pdf)

In May 2016, the Auditor General's Office provided a report entitled "Improving Controls to Safeguard Inventory" to the TTC Board. The report focused on the safeguarding of inventory at warehouses and stores, part of TTC's materials management functions. The report is available at:

<http://www.toronto.ca/legdocs/mmis/2016/au/bgrd/backgroundfile-94504.pdf>

COMMENTS

In order to deliver reliable and cost effective public transit services, the TTC needs to ensure an adequate and timely supply of vehicle parts and materials for its revenue fleets, and other operational units. The procurement functions, mostly invisible to the public, are the backbone of TTC's operations. Modernizing the TTC must include a thorough review and improvements of its procurement functions.

TTC's current procurement policies and practices are in need of a full review and in many areas, may not achieve the best overall value. Our audit provides 19 recommendations to help improve the management of inventory, the efficiency of the purchasing activities, and controls over non-competitive purchases.

While the focus of the audit was not on cost savings, we identified four areas relating to vehicle parts and blanket contracts where TIC should undertake immediate action to realize cost savings.

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SIGNATURE



Beverly Romeo-Beehler
Auditor General

ATTACHMENT

Attachment 1: Auditor General's Report, Review of Toronto Transit Commission Procurement Policies and Practices: Improving Materials Management and Purchasing Policies Can Potentially Result in Significant Savings

AUDIT AT A GLANCE

WHY THIS AUDIT MATTERS

Procurement functions are the backbone of the Toronto Transit Commission (TTC) operations, and a key component in modernizing the TTC. It procures over \$300 million worth of goods and services annually for day-to-day operations (excluding fuel bulk purchases). In order to deliver reliable and cost effective public transit services, the TTC needs to ensure an adequate and timely supply of vehicle parts and materials for its revenue fleets, and other maintenance departments.

BACKGROUND

The Materials and Procurement (M&P) Department is responsible for most of the TTC's procurement activities. This audit included an in-depth review of the Department's purchasing policies and practices, and extended into its materials management functions.

BY THE NUMBERS

- \$5.8 million in additional annual savings from implementing a new bus warranty administration process in response to 2014 audit recommendation
- Potentially between \$7 and \$15 million annual savings from improving materials management and expanding blanket contracts
- 41% of inventory items were short against current demand
- 34 vehicles or \$68 million worth of assets were out of service between July and December 2016 due to parts shortages
- 45% of the inventory requests took longer than 50 days to process
- 40% of purchase value was procured non-competitively
- Over 5,500 purchase requisitions centrally processed by Buyers were under \$250, costing the TTC more to process than the cost of the purchase
- Outstanding purchase requisitions peaked at approximately 1,900 during the last half of 2016

Review of Toronto Transit Commission Procurement Policies and Practices: Improving Materials Management and Purchasing Policies Can Potentially Result in Significant Savings

What we found

Opportunities for Significant Savings

Initiatives	Potential Annual Savings (in millions)	
	Low	High
Expanding Alternate Sourcing for Parts	\$2.5	\$6.5
Pursuing Aftermarket Parts Warranty	\$4.0	\$6.0
Expanding Blanket Contracts	\$0.5	\$2.5
Subtotal	\$7.0	\$15.0
Improving Retrieval and Tracking of Cores (Cores are defective vehicle parts that can be rebuilt or returned to suppliers to waive core charges)	\$1 to \$1.5 based on an assessment of 8 types of cores; total savings from over 2,000 existing core codes could potentially be in the millions	

Chronic Parts Shortages Led to Vehicles Out of Service

The TTC has been experiencing a chronic parts shortages issue. When we reviewed the inventory system data on March 10, 2017, approximately 10 per cent of stocks were completely depleted. Management's own analysis showed that 41 per cent of all inventory items were short against the demand.

Between July and December 2016, on average 34 revenue vehicles (approximately 8 streetcars, 0.7 subway trains or 4 subway cars, and 26 buses) were out of service due to parts shortages. According to the TTC management, the number of buses out of service due to parts shortages has since declined to 10 to 12 in March to April of 2017. Parts shortages also delayed a vehicle rebuild program 3 times over a 12-month period and kept 63 technicians from being fully productive for 15 working days. In addition, according to maintenance staff, parts shortages were one of the factors that contributed to the "hot cars" issue in the summer of 2016.

Procurement Policies and Processes are Ineffective and Inefficient

The current policy requiring nearly all purchases, regardless of the purchase value, to be centrally processed by the Department's Buyers result in inefficient use of staff resources, chronic purchasing delays, and a backlog of outstanding purchase requisitions. Buyers are inundated with a high volume of low value purchasing, leaving them little time to focus on more complex and significant dollar purchases. The TTC should increase purchasing efficiency by expanding Blanket Contracts and the use of Purchase Card for small dollar purchases.

The TTC does not have a policy or procedural requirements governing the justification and approval of sole source purchases. As a result, client departments are not required to justify their requests for sole source purchases.

How Recommendations Will Benefit the City

Implementation of the 19 recommendations in this report will potentially help the TTC realize significant savings, improve inventory management, and achieve purchasing efficiency and effectiveness.

AUDITOR GENERAL'S REPORT

Review of Toronto Transit Commission Procurement Policies and Practices:

Improving Materials Management and Purchasing Policies Can Potentially Result in Significant Savings

May 15, 2017

**Beverly Romeo-Beehler, CPA, CMA, B.B.A., JD, ICD.D, CFF
Auditor General**



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EXECUTIVE SUMMARY

TTC procures over \$300 million worth of goods and services annually for its day-to-day operations

The Toronto Transit Commission (TTC) procures over \$300 million worth of goods and services annually for its day-to-day operations through the Materials and Procurement (M&P) Department.

The Department is comprised of three areas:

- Purchasing and Sales – purchases goods and services for TTC’s day-to-day operations
- Materials Management– manages TTC’s inventory assets
- Project Procurement – procures vehicles, construction, engineering, and consulting services, and provides contract administration services.

Scope of the audit included a review of Purchasing and Sales and Materials Management

This audit included an in-depth review of Purchasing and Sales and extended into areas of Materials Management. We did not audit the Project Procurement Section.

The main customers of the Purchasing and Sales and the Materials Management are TTC’s maintenance departments, including the Bus Maintenance & Shops, the Streetcar Maintenance and Infrastructure, and the Rail Cars & Shop Departments.

The Bus Maintenance Department is the largest maintenance department in TTC. For ease of understanding, we used bus parts to illustrate issues and analyze potential savings throughout the report. The issues raised in this report may apply to other TTC maintenance departments as well.

The objective of our audit was to assess whether TTC's procurement policies, procedures and practices are fair, transparent, cost effective, and achieving the best overall value.

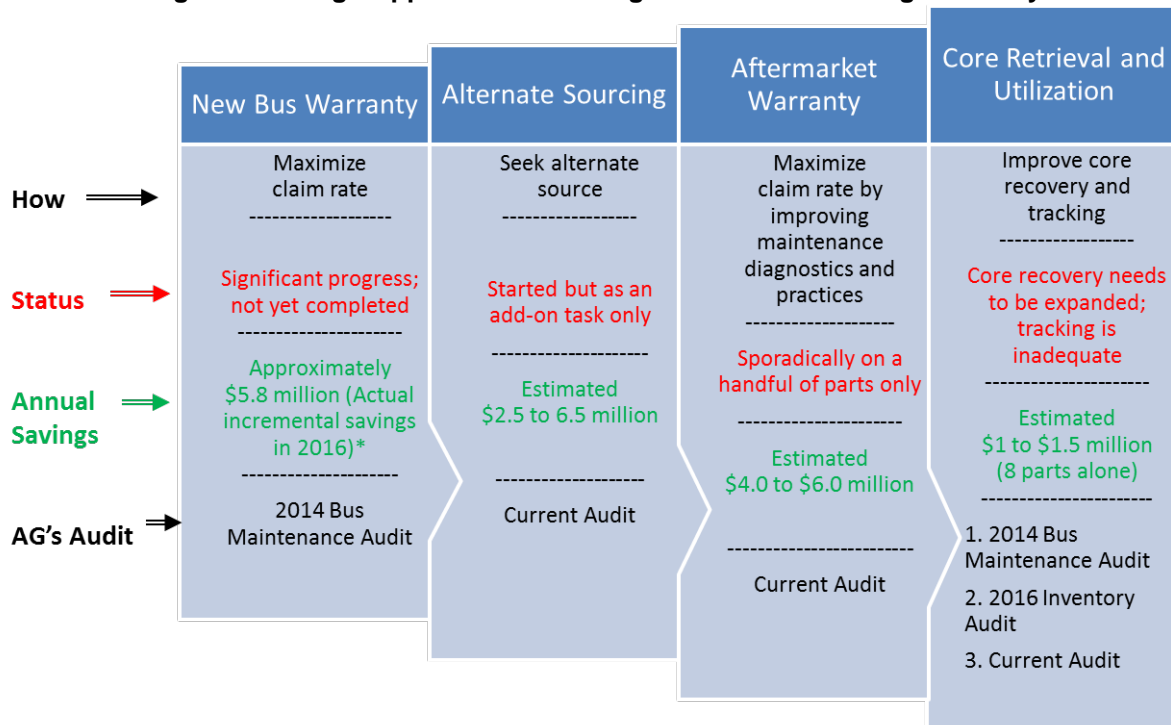
Many aspects of procurement policies and practices need to be improved or revamped

Overall, we found that many aspects of TTC's procurement policies and practices need to be substantially improved or revamped for it to achieve efficient and effective operations and the best overall value. We also identified a number of significant cost savings opportunities, and inventory management issues that negatively impact TTC's day-to-day customer service.

Opportunities for Significant Savings

Throughout the life cycle of parts management, there are four critical savings opportunities as illustrated below:

Figure 1 Savings Opportunities Throughout the Parts Management Cycle



*Note: We verified the incremental savings achieved for 2016. We expect the savings to continue as long as TTC continues to follow its steady state new bus procurement strategy.

\$5.8 million additional savings from implementing new bus warranty process in response to 2014 audit recommendation

In our 2014 audit report on bus maintenance and warranty administration¹, we identified that TTC had forgone significant savings opportunities by not claiming a large percentage of new bus warranty. Following our 2014 audit, the Bus Maintenance Department, along with a number of other departments, have made a concerted effort to develop and implement a new warranty claim process in bus garages. As of April 2017, the new process has been implemented to a large extent in bus garages. Based on our analysis, the additional revenues/cost savings in 2016 from improving the new bus warranty process totaled approximately \$5.8 million.

Current audit identified three opportunities for significant cost savings

Our current procurement audit identified three additional opportunities in parts management where TTC can realize significant savings. These opportunities are:

1. Expanding alternate sourcing
2. Pursuing aftermarket parts warranty
3. Retrieving and tracking cores

1. Expanding Alternate Sourcing

When a new vehicle series is still under warranty, TTC buys proprietary products (i.e. OEM parts) to maximize warranty claim coverage. After the warranty expires, TTC has an opportunity to seek comparable alternate sources to reduce purchase costs.

In our review of purchase files, we noticed quotes from various suppliers for alternate parts that offered lower prices than the proprietary products. These quotes were rejected by TTC Buyers because the alternate parts would require pre-approval by user departments involving technical review and/or testing.

Although we recognize that TTC should not procure any alternate parts without proper technical review and testing, it will be worthwhile for staff to invest time in reviewing the suitability of alternate parts for future purchases. This can be an important cost savings step. In many instances parts required for maintenance do not change and TTC procures the same parts many times over the life span of its vehicle fleets.

¹ Report available at <http://www.toronto.ca/legdocs/mmis/2014/au/bgrd/backgroundfile-67395.pdf>.

Expanding efforts to identify and purchase comparable parts from alternate sources can save \$2.5 to \$6.5 million a year

Based on data provided by TTC, our analysis showed that when alternate sources were identified by staff, tested and approved by end-users, on average 20 per cent savings were achieved. By expanding its efforts to identify and acquire adequate alternate parts, we estimate that TTC can potentially save \$2.5 to \$6.5 million annually.

2. Pursue Aftermarket Parts Warranty

After the new vehicle warranty expires, the TTC uses aftermarket parts to maintain and repair revenue vehicles (buses, subway trains, streetcars). While in general TTC's Tender Terms and Conditions specify a one-year warranty term for aftermarket parts, many aftermarket parts carry warranties longer than a year. Despite the warranty provisions, TTC does not systematically claim the warranty because no department has assumed the roles and responsibilities for claiming aftermarket parts warranty.

Pursuing warranty for aftermarket parts can potentially save \$4 to \$6 million a year

Based on our estimate, if TTC improves its claim rate for the aftermarket parts warranty, it can potentially save \$4 to \$6 million a year.

3. Improve the Retrieval and Tracking of Cores

A core is a vehicle part that can be rebuilt instead of buying a new part, or returned to a supplier for a waiver of core charges. The value of cores from TTC vehicles is worth millions over the life of its vehicles.

We discussed the issue of defective parts retrieval in general in our 2014 audit of the Bus Maintenance and Shops Department. In our 2016 audit of inventory controls², we identified deficiencies in the retrieval and tracking of cores. During our current audit, we noted that TTC has not fully implemented a process to ensure the recovery and tracking of cores.

² Report available at <http://www.toronto.ca/legdocs/mmis/2016/au/bgrd/backgroundfile-94504.pdf>

Making sure cores are retrieved and used can potentially generate significant savings

Due to the lack of data, we were unable to precisely project savings if TTC improves its core retrieval and tracking process. As part of the audit, we undertook extensive work to analyze eight parts and found that the potential savings from improved controls of cores from these eight parts alone will be approximately \$1 to \$1.5 million per year. Given that there are over 2,000 additional core stock codes set up by TTC staff for bus, streetcar and subway parts, we believe that the potential annual savings can be in the millions.

Furthermore, as TTC starts to capture the core related savings, it may be able to identify additional cores that are worth retrieving and utilizing.

The existing bus warranty process can be used for aftermarket parts warranty and cores recovery and tracking

It is important to note that the new bus warranty process, developed by staff in response to our 2014 audit recommendation, can be used for both aftermarket parts warranty and cores retrieval and tracking. To date it has not been fully utilized, and TTC continues to lose money by not systematically claiming aftermarket parts warranty and not fully retrieving and tracking cores.

Take Advantage of Volume Discount from Blanket Contracts

In addition to the above, in our review of purchasing patterns, we noted the opportunity for TTC to increase Blanket Contracts to take advantage of volume discount.

For the period from January 2015 to June 2016, TTC procured goods or services from 229 vendors, each supplied TTC with goods or services over \$50,000, through individual purchase orders rather than existing Blanket Contracts or price agreements, totalling \$174 million in spending.

Replacing repetitive purchases with Blanket Contracts may save \$0.5 to \$2.5 million a year

By establishing additional blanket contracts or expanding the existing product catalogue, TTC can take advantage of volume discount pricing, potentially reducing the purchase cost by one to five per cent, or \$0.5 to \$2.5 million per year.

The combined savings can range from \$7.0 to \$15.0 million a year, before accounting for savings from improving core retrieval and tracking

Based on our estimates, the combined savings from alternate sourcing, aftermarket parts warranty, and Blanket Contracts, when fully realized by the TTC, can potentially range from \$7.0 million to \$15.0 million per year. In addition, the annual savings from retrieving and using cores can be in the millions based on the savings identified from analyzing eight parts.

The table below summarizes the potential savings.

Table 1 A Summary of Potential Savings

Initiatives	Potential Annual Savings (in millions)	
	Low	High
Expanding Alternate Sourcing for Parts	\$2.5	\$6.5
Pursuing Aftermarket Parts Warranty	\$4.0	\$6.0
Expanding Blanket Contracts	\$0.5	\$2.5
Subtotal	\$7.0	\$15.0
Improving Retrieval and Tracking of Cores	\$1 to \$1.5 based on an assessment of 8 types of cores; total savings from over 2,000 existing core codes could potentially be in the millions	

It is important that the TTC takes immediate action to evaluate these initiatives and develop a plan to realize these savings opportunities.

Chronic Vehicle Parts Shortages Lead to Vehicles out of Service

Parts shortages resulted in \$68 million of non-performing vehicle assets or 1.5% of TTC's revenue fleets out of service

In our analysis of inventory management and vehicle records, we noted that every day a considerable number of revenue vehicles were out of service due to shortage of parts for repairs. During the last half of 2016, on average 25.7 buses, 4 subway cars, and 7.7 streetcars were out of service daily waiting for parts. This represents approximately 1.5 per cent of TTC's revenue fleets, or approximately \$68 million³ in vehicle assets, out of service due to unavailability of parts.

³ We used replacement value instead of depreciated asset value because replacement value represents the true cost of putting another vehicle into service.

Based on the latest information from TTC staff, the number of buses out of service daily due to parts shortages has significantly declined from over 50 buses in the last quarter of 2016 to 10 to 12 buses in March and April 2017. It is important to note that the declining trend appeared to coincide with the time audit staff started to enquire about this specific performance indicator.

In our view, the sharp decline in this indicator is an encouraging news for TTC and its customers. This also confirms the fact that it is attainable for TTC to minimize parts shortages and its impact on services. Based on our observations, the number of vehicles out of service due to parts shortages can fluctuate over time and it is important that staff continue to make efforts to monitor this indicator and reduce the shortages.

Parts shortages stalled vehicle rebuild program

Parts shortages also delayed TTC's vehicle rebuild activities. For instance, between 2015 and 2016, a vehicle rebuild program had to be stopped three times over a 12-month period due to parts shortages. Where possible, the maintenance department reassigned the rebuild technicians to perform other duties such as decommissioning vehicles and repairs. Despite the temporary assignments, 63 technicians could not be fully productive for approximately 15 work days because of rebuild parts shortages, resulting in approximately \$281,000 in re-assigned labour hours.

Need for Re-assessing the Efficiency of Current Procurement Policy

Buyers are inundated with high volume of low dollar purchases, leaving them minimal time to focus on more complex and significant dollar purchases

We identified a number of inefficiencies in TTC's procurement processes. Many of these issues, in our view, stem from its policy to require nearly all purchases⁴, regardless of the purchase value, to be processed by the M&P Department's Buyers. Buyers are inundated with high volume of low dollar purchases and could not focus on more complex and significant dollar purchases.

⁴ The only exceptions are Purchase Card and Petty Cash purchases which are managed by user departments

This resulted in inefficient use of staff resources, chronic purchase delays, and backlog of outstanding purchase requisitions:

- Over an 18-month period, TTC Buyers handled about 16,400 manual orders (excluding blanket release orders), of which 65 per cent or approximately 10,600 orders were less than \$5,000 in purchase value.
- During the second half of 2016, there was a backlog of about 1,900 purchase requisitions with some outstanding for longer than a year.
- Of the approximately 26,000 purchase requisitions processed by Buyers over an 18-month period, over 5,500 were for purchases under \$250. TTC staff estimated that it costs on average \$250 to manually process a purchase requisition. This means it cost the TTC more to process a small dollar requisition than the cost of the purchase itself. Many of these 5,500 purchase requisitions could have been procured more efficiently using Purchase Card.

For many small dollar purchases, it may cost TTC more to centrally process a requisition than the cost of the purchase itself

Tightening the Justification and Approval Process for Non-competitive Purchases

About \$211 million in goods or services or 40% of total procurement cost were purchased non-competitively

During the 18-month period from January 2015 to June 2016, TTC issued 10,271 Purchase Orders totalling \$211.0 million through non-competitive procurement methods:

- \$200 million were processed as sole or single source
- \$11 million were processed using Buyer's Discretion method which is essentially single source.

On average 3.5 out of every 10 purchases were procured non-competitively

These non-competitive Purchase Orders accounted for 35 per cent of the total order counts and 40 per cent of TTC's total order value of \$525.4 million (excluding fuel purchases).

No specific policy requirements for staff to justify sole or single source purchases

We recognize that many of TTC's non-competitive purchases are unavoidable as a fair amount of proprietary maintenance products are required for public transit operations. However, TTC needs to apply more robust review and approval process for non-competitive procurement. The M&P Department does not have a policy or procedural requirements governing the justification and approval of sole source purchases. As a result, client departments are not required to justify their requests for sole source purchases.

Conclusion

Procurement is the backbone of TTC's revenue vehicle operations

In order to deliver reliable and cost effective public transit services, the TTC needs to ensure an adequate and timely supply of vehicle parts and materials for its revenue fleets, plant equipment, and rail car tracks. The procurement functions, mostly invisible to the public, are the backbone of TTC's operations. Modernizing the TTC must include a thorough review and improvements of its procurement functions.

Audit provides 19 recommendations to help improve inventory management and efficiency of purchasing activities

The TTC's current procurement policies and practices are in need of a full review, and in many areas may not achieve the best overall value. Our audit provides 19 recommendations to help improve the management of inventory, the efficiency of the purchasing activities, and controls over non-competitive purchases.

While the focus of our audit was not on cost savings, we identified four areas relating to vehicle parts and Blanket Contracts where TTC should undertake immediate action to realize cost savings.

BACKGROUND

Most of TTC's procurement functions are carried out by its M&P Department

As part of the Corporate Services Group, the TTC's Materials and Procurement (M&P) Department is responsible for:

- the management of the TTC's inventory assets
- the purchase of materials for inventory as well as other goods and services required by the TTC
- the procurement of vehicles, construction, and consulting services
- contract administration services
- sale of surplus assets

The Department carries out its functions through the following three Sections:

- **Purchasing and Sales:** purchases of all inventory and non-inventory materials and services to support the TTC's day-to-day operations.
- **Materials Management:** manages TTC's inventory assets, including distribution of all inventory items, and the sale of surplus assets.
- **Project Procurement:** procures construction projects, consultant services, vehicles and equipment, and provides contract administrative services.

The M&P Department employs approximately 250 staff as of June 2016, of which 184 staff work in Materials Management and 29 in Purchasing and Sales.

The Department's 2016 operating budget was \$23.5 million, with salaries and benefits accounting for \$20.9 million, or 89 per cent of the total budget. Materials Management and Purchasing and Sales account for \$19.5 million of the total departmental budget.

The main customers of the Purchasing and Sales and the Materials Management are the:

- Bus Maintenance & Shops
- Streetcar Maintenance & Infrastructure
- Rail Cars & Shops
- Plant Maintenance.

This is the Auditor General's first comprehensive review of TTC procurement functions

In May 2016, the Auditor General's Office provided a report entitled "Improving Controls to Safeguard Inventory" to the TTC Board. The report focused on the safeguarding of inventory at warehouses and stores.

This audit focused on the procurement policies and activities to support TTC's day-to-day operations, and included an in-depth review of Purchasing and Sales and related functions that extend into Materials Management.

Scope of our audit did not include a full review of Materials Management

As the scope of this audit did not include a full review of Materials Management, there continues to be a need for a future audit focusing on Materials Management functions.

During this audit, Materials Management staff advised that they have begun piloting new order point policies and improving inventory planning data. In light of the changes being undertaken, and that a number of Materials Management related recommendations have already been made in our previous and current audits, we will postpone our full review of Materials Management to allow staff sufficient time to implement the changes.

Project Procurement was not within the scope of this audit

Project Procurement which operates relatively independently from the other two Sections, will be audited at a later date.

The following table shows the purchasing volume of Purchasing and Sales.

Table 2 Purchasing and Sales Six Year Purchase Trend

Year	Total Number of Purchase Orders Issued	Total Value (in millions)
2011	16,315	\$287.5*
2012	16,874	\$306.1
2013	17,634	\$333.0
2014	20,146	\$363.0
2015	19,873	\$381.5*
2016	18,821	\$306.2

*Note: The 2011 and 2015 amounts included large blanket orders of fuel - \$516.0 million in 2011 and \$182.5 million in 2015. Including the fuel orders, the 2011 and 2015 total purchase value were \$803.5 and \$564.0 million respectively.

Approximately \$525 million in day-to-day purchases over 18 months (excluding the bulk fuel purchase)

Our audit analyzed the purchasing activities over an 18-month period from January 2015 to June 2016. During this period, Purchasing and Sales processed a total of \$707.9 million for TTC's day-to-day procurement, including \$525.4 million for purchases of goods and services and a one-time bulk fuel purchase in the amount of \$182.5 million.

Of the \$525.4 million in day-to-day purchases, approximately \$270.0 million or 51 per cent originated from Materials Management.

AUDIT RESULTS

This section of the report contains the findings from our audit work followed by specific recommendations.

A. IMPROVING VEHICLE PARTS MANAGEMENT MAY RESULT IN SIGNIFICANT COST SAVINGS

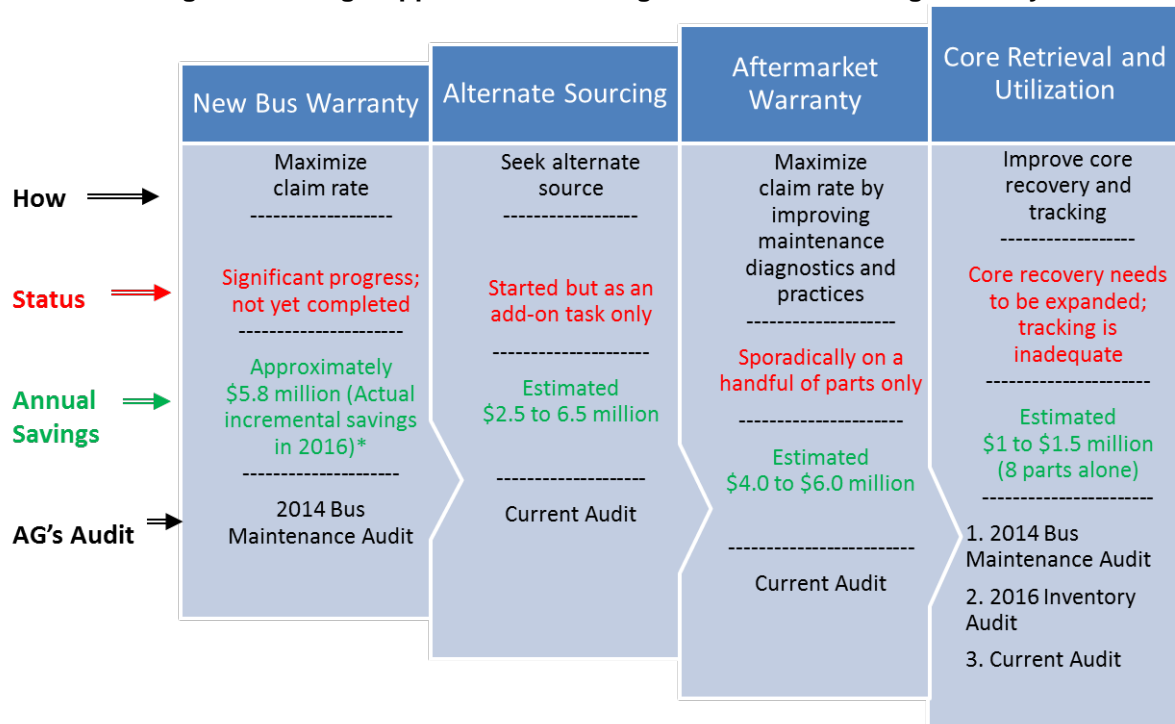
TTC should take advantage of four savings opportunities throughout the process of parts management

TTC should take advantage of four savings opportunities throughout the process of parts management.

1. maximize new vehicle warranty claims
2. identify alternate sourcing (Section C.4.2)
3. pursue aftermarket parts warranty (Section A.1)
4. retrieve and make use of cores from vehicle parts (Section A.2)

Figure 2 illustrates the four critical savings opportunities in parts management and TTC's current status.

Figure 2 Savings Opportunities Throughout the Parts Management Cycle



*Note: We verified the incremental savings achieved for 2016. We expect the savings to continue as long as TTC continues to follow its steady state new bus procurement strategy.

Maximize new vehicle warranty claims

In our 2014 audit report on bus maintenance and warranty administration, we identified that TTC had forgone significant savings opportunities by waiving a large percentage of new bus warranty claims.

Since our 2014 audit, the Bus Maintenance Department, along with other TTC departments, have substantially implemented process changes and new tools to help identify parts under new bus warranty and track their returns.

An annual \$5.8 million in additional savings from implementing the new bus warranty process

In order to assess the amount of savings from the new bus warranty claim process, audit staff had to manually analyze and record a large volume of warranty related data, and contacted the third parties to obtain their warranty costs. Based on our analysis, the additional revenues in 2016 from improving the new bus warranty process totaled approximately \$5.8 million.

Furthermore, as a result of the new process and TTC staff's diligence in pursuing new bus warranty claims, manufacturers provided proactive repairs for many buses in 2016. The value of this work totals approximately \$8 million in 2016.

A.1. Pursue Aftermarket Parts Warranty

After the expiry of new vehicle warranty, TTC relies on aftermarket parts for ongoing maintenance and repairs of its revenue vehicles.

The vehicle aftermarket is the secondary market of the vehicle industry, consisting of the manufacturing, remanufacturing, distribution, retailing, and installation of all vehicle parts, equipment, and accessories, after the sale of the vehicle by the Original Equipment Manufacturer (OEM) to the consumer. The parts and accessories for sale may or may not be manufactured by the OEM.

TTC's tenders for aftermarket parts include a standard one-year warranty clause

TTC's tenders for aftermarket parts include a standard one-year warranty clause:

"The Company shall promptly correct at its own expense any defect or deficiency in the workmanship or material which appears within a period of one year from the date of delivery of the work to the TTC ..."

Many aftermarket parts manufacturers offer warranty longer than one year

Although TTC specifies a standard one-year warranty requirement, many aftermarket parts manufacturers offer warranty longer than one year.

For instance, we observed the following warranty periods for different vehicle parts during our audit:

Table 3 Vehicle Aftermarket Parts and Warranty Period

Vehicle Aftermarket Parts	Warranty Period
Engines (Most)	Two-year warranty
Circulating Pumps	Four-year Warranty
Air Dryers (both New and Remanufactured)	Three-year Warranty
Led Lights	Life-time Warranty

Further, in our analysis of the usage history of eight vehicle parts (12 stock codes), we noted that these parts frequently failed prematurely. This, according to maintenance staff, could be attributable to TTC's maintenance practices which focused more on corrective than preventive maintenance, and the intensity of duty cycles.

According to the vehicle work order system data, there were approximately 1,600 work orders from April 2015 to April 2017 related to parts failure within warranty periods. Each of these parts costs \$50 or more.

Many high usage aftermarket parts come with warranties but TTC currently does not claim these warranties

Maintenance staff provided the following list of high usage parts with aftermarket warranty from the manufacturers, but TTC does not currently take advantage of the warranty.

- Luminator Destination Sign
- Bus start and accessories battery
- Air Dryers
- Shocks
- Multiplex Bus Power Control
- Turbocharger
- Steering Gear
- Alternator
- Radiator

TTC does not systematically claim aftermarket parts warranty

Despite the warranty provisions, TTC does not systematically claim the warranty because no department has assumed the roles and responsibilities for claiming aftermarket parts warranty.

In private auto dealerships, aftermarket parts warranty is tracked through assigning barcodes to individual parts purchased. Although certain TTC maintenance departments currently use a manual serialization system, TTC has not implemented a barcode system and has not automated the tracking and return of defective aftermarket parts to enable an efficient warranty claim process.

Potentially \$4 to \$6 million in annual savings by claiming aftermarket parts warranty

In forgoing warranty claims for its aftermarket parts, TTC misses an opportunity to realize significant annual cost savings. Based on our estimate (detailed in Exhibit 1), the value of claiming aftermarket parts warranty ranges from \$4.0 million to \$6.0 million per year.

In our savings analysis, we assumed that TTC achieves 80 per cent claim rate for aftermarket parts warranty.

Pursuing aftermarket warranties for a few parts in the past has resulted in considerable amount of savings

Over the years, TTC has pursued aftermarket warranties for a handful of parts, and has realized considerable amount of savings. For instance, aftermarket parts warranty activities undertaken by the Bus Maintenance Department realized the following savings:

- Circulating Pump – cost savings \$289,000 for 2015 and 2016.

Bus Maintenance staff discovered premature failure of circulating pump as a result of its Reliability Centre Maintenance program implemented in response to our 2014 Bus Maintenance and Shops audit.

- Bus Engine – \$633,000 cost savings in 2016 from repairs by one dealer alone; savings from other two vendors are not known as vendors are not obligated to provide TTC or us with their labour and parts costs for warranty repairs. The savings from all three vendors would likely be considerably higher.
- Bus LED lights – cost savings \$37,000 for 2016

In addition, the Materials Management staff were responsible for undertaking the aftermarket parts warranty activities for three BAE parts – PCS, Traction Motors and Traction Generators.

For BAE parts with one year of aftermarket warranty, we noted instances showing these parts failed within the first year. According to maintenance staff, 41 PCS parts failed within the one-year warranty period, representing approximately seven per cent of the 561 PCS parts purchased by TTC from 2014 to 2016.

Investing in a barcoding system may facilitate warranty claims

The new warranty claim system and processes implemented in response to our 2014 audit report can be used for aftermarket parts warranty. To fully realize these warranty claims, TTC may also want to consider investing in barcoding and serialization technology, and deploy additional staff resources to coordinate warranty returns. While these may require additional capital and operational expenditures, the potential savings are significant and will likely outweigh the expenditures.

The success of a warranty recovery program will depend on the coordination and collaboration between M&P and maintenance departments.

Recommendation:

- 1. The Board request the Chief Executive Officer, Toronto Transit Commission, to undertake the necessary steps to maximize warranty claim rate and revenue for aftermarket parts. Such steps should include an assessment of the resource and technology requirements to enable staff to systematically retrieve, track, and process aftermarket parts warranty.**

A.2. Improve the Retrieval and Tracking of Cores

Cores can be used for rebuild or returned to vendors for a lower purchase price for replacement parts

A core is a defective part that can be rebuilt to new standards. For TTC's cores, they can be used in internal and external rebuild program, or used for buy-exchange to waive the core charges. When TTC uses cores for buy-exchange, suppliers either require cores or will apply a core charge if the core is not returned.

TTC's cores are worth millions

Given the significant cost of TTC's revenue fleets, the value of cores from its vehicles is substantial and potentially worth millions over the life of the vehicles.

Cores are even more important for rail cars than for buses because rail cars are more specialized compared to buses.

It is important for TTC staff to retrieve cores from TTC garages and car houses and return them to suppliers to avoid paying additional core charges. Based on our review of a sample, cores can account for 25 to 74 per cent of the cost of a part.

Previous audits have highlighted the issue of inadequate or inconsistent controls on core retrieval and tracking

As discussed before, in our 2016 audit of inventory controls, we highlighted the issue of a lack of adequate cores retrieval and tracking process at TTC garages. We also pointed out the issue of defective parts retrieval in general in our 2014 audit of the Bus Maintenance and Shops Department.

TTC continues to lose money when it is not fully retrieving and tracking cores

Following our 2014 audit, TTC has implemented a new warranty claim process in bus garages. As of March 2017, the new process has been implemented to a large extent for warranty parts return in bus garages. While this new process can be used for the retrieval of cores, to date it has not been fully utilized for the recovery or tracking of cores. Consequently, TTC continues to lose money when it is not fully retrieving and tracking cores.

Materials Management should consult maintenance departments to identify more cores that may be worth recovering

Based on our review of the process, the main problem lies in the handoff of the cores to Materials Management and recording of cores in the inventory system after they have been retrieved by maintenance department staff. In addition, there is a need for Materials Management to consult maintenance departments to identify more cores that may be worth recovering.

While it is impossible for us to precisely gauge the amount of cost savings, based on our analysis of a small sample of parts, it is likely that the potential annual cost savings for improving core retrieval and tracking are in the millions. Details of cost savings estimates are provided in Exhibit 2.

We analyzed three BAE Hybrid bus parts and three types of air dryers where TTC currently utilizes cores for rebuild and buy-exchange, as well as four types of Luminator parts which TTC currently does not utilize the cores. This sample was selected to represent the existing core management processes in place for different vehicle parts.

BAE hybrid parts are expensive and difficult to obtain. Materials Management invested more effort in tracking these parts. On the other hand, for the four Luminator parts we analyzed, TTC discards the parts once they become defective and buys new parts. For Air dryers, TTC retrieves and utilizes the cores but does not track or record the cores in the inventory system.

A brief summary of potential cost impacts and other observations are provided below:

Savings from ensuring adequate tracking and retrieval of cores TTC currently uses for rebuild or buy-exchange

When there is no adequate controls on retrieval and tracking of cores, TTC risks losing cores. During the course of our audit, we observed that cores were haphazardly stored.

Based on our review of four types of parts, if TTC loses 10 to 20% of the cores, it risks paying \$4 to \$8 million extra over the remaining life span of its vehicles

When cores are not available for internal or external rebuild or buy-exchange, TTC staff purchase new or remanufactured parts at full cost. We analyzed four vehicle parts that TTC currently utilizes cores but does not systematically retrieve or track the cores when they are removed from vehicles.

The price difference between rebuild using existing cores and purchasing new or remanufactured parts is substantial. Based on our review of BAE PCS, Traction Motors, Traction Generators, and Air Dryers, if TTC loses 10 to 20 per cent of the cores, it risks paying \$4 to \$8 million extra costs over the remaining life span of the vehicles, just for these four parts alone.

Based on a review of four Luminator parts, the potential lost savings from not recovering cores can be \$3 to \$4 million for the remaining life of the bus fleet

Lost savings on parts that TTC currently does not recover the cores for rebuild or buy exchange

For cores that TTC does not normally recover them for rebuild or repairs, it pays a higher cost for a new part or buys a remanufactured part with the added core charge. Tracking and utilizing these cores can potentially save TTC millions.

For instance, we analyzed four bus Luminator parts where TTC currently does not recover the cores and only buys new parts. We found that TTC has already paid approximately \$0.8 million extra in purchasing these new parts since 2014. If TTC continues with the status quo, it will pay an extra \$3 to \$4 million for the remaining life span of the current bus fleet for these parts alone.

The combined savings from the eight parts analyzed above are approximately \$1 to \$1.5 million per year. These eight parts represents 12 core codes.

Total annual savings from improving controls on cores is expected to be significantly higher than the \$1 to \$1.5 million we estimated for the eight parts alone

There are currently over 2,000 unique active core codes set up in the IFS⁵ inventory system. We believe that staff set up these core codes because there is enough price difference between buying new and remanufactured parts to warrant the trouble of setting up these codes. Given that there are over 2,000 additional core stock codes, we believe that the potential annual savings from adequate recovery and tracking of cores can be significant and in the millions.

In addition, as TTC starts to measure the savings from improving the controls on core retrieval and tracking, we expect that it will likely be able to identify more cores that are worth retrieving to be used for rebuild or buy-exchange.

In our review of TTC's IFS inventory system records and on-site observations, we noted two issues related to the retrieval and tracking of cores:

- Many core codes are set up but have not been utilized at all. About three fourths of all core codes have no transaction data.
- Some cores have been retrieved by maintenance staff but the IFS system records have not been updated. The on-hand quantity for many cores in the system were recorded as zero, even though in some cases the cores had been returned to Materials Management. Without accurate system records, it would be difficult for staff to know the existence and locations of these cores.

Some of the Air Dryer cores are sitting outside exposed to harsh weather conditions for a year

For instance, while the IFS system recorded zero on-hand quantity for various air dryers (a critical component in the filtration of the bus air system), we noted hundreds of air dryers in a TTC warehouse, some of which were sitting outside and exposed to harsh weather conditions for almost a year instead of being utilized. A photo of air dryer cores is provided below.

⁵ IFS (Industrial and Financial Systems) is TTC's main enterprise software application.



Since the TTC Buyers were not aware of the on-hand quantities of these cores, they were more likely to buy new parts rather than returning the cores for the less costly remanufactured parts.

Recommendation:

- 2. The Board request the Chief Executive Officer, Toronto Transit Commission, to undertake steps to improve the tracking and retrieving of cores in order to maximize the use of cores in vehicle rebuild programs and avoid paying for additional core charges when purchasing remanufactured parts.**

B. ADDRESSING CHRONIC PARTS SHORTAGES ISSUE CAN IMPROVE SERVICE LEVEL AND REDUCE FUTURE COSTS

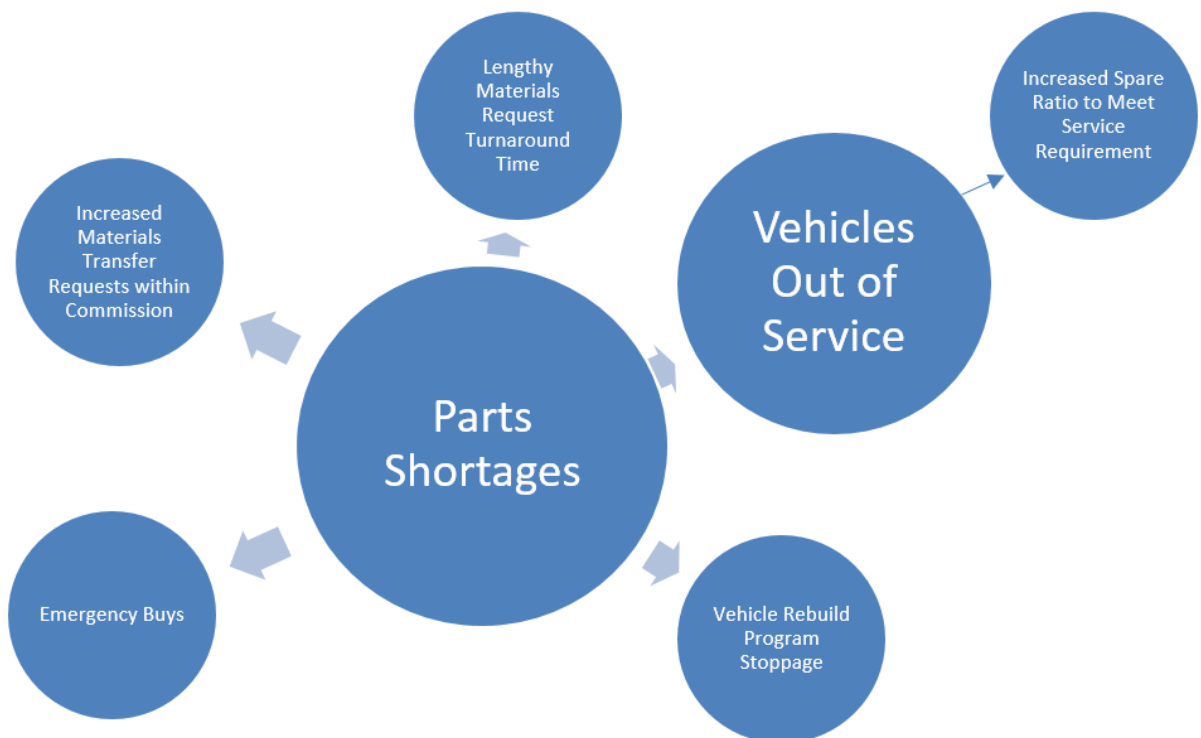
According to staff we interviewed and documents we reviewed, garages and car houses suffer from chronic parts shortages issue. To cope with the problem, technicians resort to unofficially stockpiling parts at the maintenance site. The frustration was best illustrated by a staff person who said: *“We are a maintenance department; we need parts on the shelves to service the vehicles.”*

Chronic parts shortages led to a number of consequences, including:

- vehicles out of service waiting for parts
- rebuild program stoppage and reassigned labour costs
- increased vehicle procurement cost to meet service requirement
- lengthy materials requests turnaround time
- emergency buys
- emergency materials transfer requests between stockrooms.

Figure 3 illustrates the relationship between part shortage and its consequences.

Figure 3 Relationship between Parts Shortages and Its Consequences



B.1. Address Vehicles Idle Waiting for Parts

TTC has been experiencing chronic parts shortages issue

TTC's parts shortages issue is chronic. When we examined the inventory IFS system data on March 10, 2017, approximately 10 per cent of stocks were completely depleted and a much higher percentage was short against historical usage and current demand. Management staff further reported that the demand outstripped supply for 41 per cent of all inventory items.

In our analysis of inventory management and vehicle records, we noted that a number of TTC revenue vehicles were out of service on a daily basis due directly or indirectly to parts shortages. Table 4 outlines the results of our analysis.

On average 34 vehicles or 1.5 per cent of total revenue vehicles were out of service on a daily basis due to M&P parts shortages between July and December 2016

Table 4 Daily Average Number of Vehicles Out of Service due to M&P Parts Shortages, July to December 2016

Type of Vehicle	Number of Vehicles
Streetcars	7.7 ¹
Subway	0.7 train (4 subway cars) ¹
Buses	25.7 ²
Total	34.1

- 1 Based on our analysis of the vehicle status daily report produced by SMS (the rail car work order system). We collected and analyzed these "swing sheets" with maintenance staff.
- 2 Based on data provided by Materials Management.

This represents \$68 million worth of vehicle assets sitting idle due to M&P parts shortages

Based on the vehicle replacement values, on average, there are about 34 vehicles or \$68 million in non-performing vehicle assets due to M&P parts shortages alone. This means that, 1.5 per cent of the TTC revenue vehicles (in both vehicle count and asset value), cannot be put into service because of parts shortages.

In addition, in the second half of 2016 there were on average 3.8 streetcars and 2.1 subway trains (12 cars) out of service due to internal rebuild parts issues (Table 5), including those resulting from raw materials or component parts shortages, or moving logistics issues for which M&P is responsible.

Table 5 Number of Vehicles Out of Service due to Rebuild Parts Shortages

Type of Vehicle	Number of vehicles/cars out of service due to rebuild parts shortages (2 nd half of 2016)
Streetcars	3.8
Subway	2.1 trains (12 subway cars)

An update regarding buses out of service due to parts shortages

The number of buses out of service daily due to parts shortages has declined, according to TTC staff

Based on the latest data from TTC staff, the number of buses out of service daily due to parts shortages has significantly declined from over 50 buses in the last quarter of 2016 to 10 to 12 buses in March and April 2017. It is important to note that the declining trend appeared to coincide with the time audit staff started to enquire about this specific performance indicator.

We also wish to point out that throughout the audit we have encountered difficulties obtaining data from Materials Management, particularly regarding the vehicles out of service data.

TTC staff have recently added this indicator to its daily dashboard, making the statistic visible to both maintenance staff and Materials Management staff and hence increasing the validity of the data.

The recent decline in the number of buses out of service due to parts shortages demonstrates that it is attainable for TTC to minimize parts shortages

In our view, the sharp decline in the number of buses out of service due to parts shortages is an encouraging news for TTC and its customers. This also confirms the fact that it is attainable for TTC to minimize parts shortages and its impact on services.

Aside from causing vehicles out of service, chronic parts shortages also result in a number of other negative impacts on service level and operations that are less visible. To name a few:

Parts shortages can also lead to other service level and operational issues

- In order to meet service requirements, TTC may need to put vehicles into service with incomplete repairs due to parts shortages. The missing parts are not safety critical items (such as a bike rack, stop and destination electronic sign) but may have affected the quality of service. In addition, according to maintenance staff, in order to meet the service requirement, during summer of 2016, TTC put into service subway cars with a higher risk of HVAC breakdown during peak service hours due to a shortage of HVAC parts which contributed to the “hot cars” complaints.
- In order to meet the service level, maintenance technicians noted that they frequently needed to “rob Peter to pay Paul” by removing a good part from one out of service vehicle to put into another, resulting in double labour hours as there are now two sets of activities: parts removal and parts reinstallation.

B.2. Prevent Rebuild Stoppage by Ensuring Timely Supply of Materials

Parts shortages not only result in vehicles out of service but it also impacts certain vehicle rebuild programs.

A vehicle rebuild program had to be stopped due to parts shortages

Maintenance staff advised that they had to stop certain vehicle rebuild program three times between October 2015 and 2016 due to parts shortages. According to the records we reviewed, maintenance staff submitted materials requests a year ahead of time to Materials Management.

Due to rebuild parts shortages, the maintenance department did its best to temporarily re-assign 63 technicians in the rebuild program to other activities such as repairing and decommissioning vehicles.

Rebuild materials shortage resulted in 63 technicians reassigned to other duties

Despite the temporary assignments, there was still 15 days when the 63 technicians could not be productively working on what they were hired to perform. As of October 2016, the department booked \$281,000 in reassigned labour.

B.3. Re-assess Vehicle Spare Ratios after Addressing Parts Shortages Issue

A spare ratio is the percentage of unused vehicles operated by a public transit operator during peak service periods. Vehicle spares are required for preventive maintenance purposes and to ensure continuation of service during vehicle breakdowns. Improving TTC's parts management may also help reduce the spare ratio, a key factor in determining the number of new revenue vehicles that needs to be procured by the TTC.

In 2016, all three TTC revenue fleets have a spare ratio above 20 per cent, including capital rebuild spares.

Bus – 23 per cent

Subway – 23 per cent including purchase of additional trains in preparation for TYSSE

Streetcar – about 25 per cent due to the age of the fleet

The U.S. Federal Transit Administration (FTA) provides grants to cover up to a maximum of 20 per cent spare ratio for bus fleet. As a result, many transit agencies in the U.S. target 20 per cent spare ratios in order to take advantage of Federal funding.

Parts shortages can also result in higher capital procurement costs for additional vehicles

There are many factors affecting a transit agency's spare ratio requirement, including the age of its existing fleet, intensity of duty cycles, and the effectiveness of preventive maintenance. Based on our analysis, we also believe adequate supply chain management, more specifically the ability to supply vehicle parts to maintenance departments when needed, is a key factor in determining spare ratio requirements.

Bus out of service due to parts shortages greater than 0.5% may impact the ability to meet service requirement

A higher spare ratio means higher capital procurement costs for purchasing additional vehicles for contingency purposes. TTC's Bus Maintenance and Shops Department factors 0.5 per cent (or 10 buses) of its spare ratio towards unavailability of parts. The remainder of the spare ratio (22.5 per cent) is needed for scheduling preventive maintenance, assisting in-service requirements, and completing bus rebuild programs. When there are consistently more than 10 buses (0.5 per cent) out of service due to parts shortages, it may impact the Department's ability to complete scheduled preventive maintenance activities, and in some circumstances may limit the Department's ability to meet service requirement.

Better managing part supplies means a more reliable fleet and possibility for TTC to reduce its future vehicle procurement cost

Better managing part supplies will help reduce the number of vehicles out of service due to parts shortages, as well as minimize delays in vehicle rebuild programs due to unavailability of parts. These will ultimately result in more timely completion of preventive maintenance activities and overhaul programs, improve service performance and reduce repair backlog. With a more reliable fleet, the TTC may be able to reduce the number of new vehicles that needs to be purchased.

As it will take time for TTC to improve its current parts supply issue, there will continue to be a need for TTC to maintain the current spare ratio to meet required service levels. As such, we are not suggesting any immediate adjustment to TTC spare ratio requirements. We highlighted this point as we believe that addressing parts shortages will, in the long term, facilitate the TTC's efforts to reduce its spare ratio and capital cost requirements.

B.4. Shorten Materials Requests Turnaround Time

We conducted an analysis of the average materials requests turnaround time at the Duncan Shop and the Greenwood Warehouse. Materials requests are made for inventory items, including parts, which should have already been stocked. Table 6 outlines our analysis results of all materials requests originating from the Duncan and Greenwood Shop in 2016.

Table 6 Average Materials Requests Turnaround Time, Duncan Shop and Greenwood Shop, 2016

Turnaround Time	Duncan Shop	Greenwood Shop
Same day or next day	54%	68%
3-5 days	22%	10%
6-10 days	4%	2%
Over 10 days or outstanding	19%	20%

Average 11.0 days and 11.4 days to fill a materials requests from Duncan Shop and Greenwood Shop respectively

At the Duncan Shop, it took on average 11.0 days to fill materials requests. For Greenwood, it took on average 11.4 days to fill materials requests. These do not appear to be efficient turnaround times and warrant further review by management staff.

In addition, Materials Management currently does not measure materials requests turnaround time. Instead, it measures materials fill rate – the time between a materials request is "picklisted" to the time of the delivery. "Picklisted" is a term used by warehouse staff when they start to gather the requested items from a warehouse.

Materials Management's current performance indicator is irrelevant to user departments

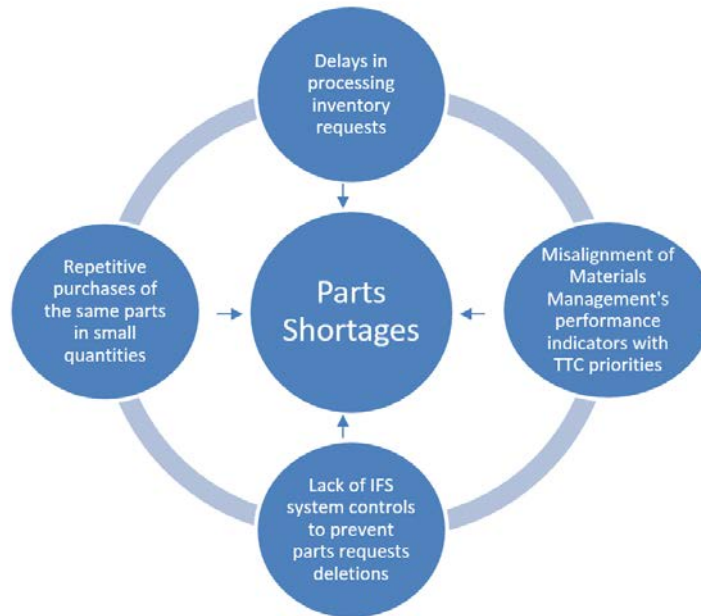
We found that materials sometimes did not get "picklisted" until days after the requests have been submitted by maintenance technicians. Materials Management reported fill rate of 80 to 90 per cent during the month of September to November 2016. In our view, a meaningful indicator should measure from the time the requests were made to the time of the delivery of materials.

B.5. Improve Current Materials Management Practices

Based on our analysis and review, we identified a number of current practices and factors that might have contributed to parts shortages. Figure 4 illustrates the following factors:

1. Delays in processing inventory requests
2. Repetitive purchases of the same parts in small quantities
3. Misalignment of Materials Management's performance indicators with TTC priorities
4. Lack of IFS system controls to monitor parts requests deletions

Figure 4 Current Practices and Factors that Might Have Contributed to Parts Shortages



A brief explanation of each of the factors is provided below:

1. Delays in processing inventory requests

Inventory requests are requests from maintenance departments to add new inventory items to warehouses and stockrooms. Processing inventory requests include approving the requests (including assigning stock codes), and physically stocking the requested items in stock rooms and warehouses.

According to Materials Management's internal standard, staff are to create the stock codes within two weeks after they receive the inventory requests from maintenance departments.

Only 15% of inventory requests were approved within a two-week period as prescribed by Materials Management internal policy

In our analysis of the work flow of 1,795 inventory requests submitted by TTC staff over 13 months (January 1, 2016 to Feb 17, 2017), we found considerable delays in processing the inventory requests by Materials Management staff. Only about 15 per cent of requests were approved within two weeks. Table 7 outlines the requests by outstanding period of time excluding the existing outstanding requests.

45% of inventory requests took staff longer than 50 days to approve

Table 7 Inventory Requests Approval Cycle Time (Excluding Outstanding Inventory Requests)

Outstanding period for inventory requests	Percentage of requests approved
Approved within 2 weeks	15%
10 to 30 days	22%
31 -50 days	19%
51 – 100 days	22%
101 to 200 days	20%
> 200 days	3%

Maintenance staff reported that even after the stock codes have finally been established, it would frequently take years to set up physical inventory in garages. For instance, TTC bought the 40 footer Nova buses two years ago and the 60 footer Nova articulated buses three years ago, to date many frequently required parts for these two models have not been stocked in garages.

Delays in processing inventory requests contribute to emergency transfers between garages and emergency buys

Technicians at garages complained that there was either no stock or very low level of stock which would be depleted quickly. To overcome this, technicians had to request emergency transfers between warehouses and garage stockrooms as well as emergency buys which are generally more costly, further undermining the efficiency and economy of Materials Management.

For instance, from January 1, 2016 to March 23, 2017, there were 16,600 emergency transfers among the seven garages, approximately 37 transfers a day.

In 2016, a total of 507 emergency buys were issued by garage staff for buses out of service being repaired. Although these emergency buys accounted for a small percentage of total purchase orders, based on our analysis, 50 per cent of them appear to be for commonly used parts and therefore should not have been bought on emergency basis.

Where possible TTC should avoid using emergency buys

TTC should minimize emergency orders wherever possible for the following reasons:

- Emergency orders can still take days to arrive and result in longer vehicle repair time.
- Emergency orders are not captured in maintenance work orders, rendering the total maintenance cost incomplete and reducing warranty claim rate.
- Emergency orders are not captured as part of the historical usage for the items ordered, rendering inventory part planning data inaccurate.
- Emergency orders add to the workload of Purchasing & Sales staff.

2. Repetitive purchases of the same parts in small quantities

All purchases of goods and services are processed by Purchasing and Sales of the M&P Department, including purchase orders from Materials Management.

\$270 million or 51% of the total day-to-day procurement originated from Materials Management for inventory items

Materials Management is the single largest client of Purchasing and Sales. From January 2015 to June 2016, TTC spent a total of \$525.4 million on day-to-day operations procurement, \$270.0 million or 51 per cent of which were for purchase requests from Materials Management. Decisions from Materials Management on when to order and how much to order impact the workload of Purchasing and Sales staff.

Repeated orders of the same vehicle parts within days or even on the same day by Materials Management

Our analysis showed that Purchasing & Sales staff placed repeated orders of the same vehicle parts within days or even on the same day. Orders from Materials Management of the same vehicle parts were often placed one day, two days or a few days apart, sometimes even multiple times a day.

**Inaccurate parts
planning data due to
IFS system
limitations**

This is primarily because of IFS system limitations. The parts data from different stockrooms and warehouses are not integrated in IFS, making it difficult for staff to determine when to order and how much to order. In addition, the parts planning data in IFS such as safety level, order point and order point quantity are inaccurate due to a lack of regular reviews and updates.

Materials Management staff advised that they have launched a pilot project to implement multiple order point policies at one garage as a first step to revamp the IFS planning data. This project will be expanded to other locations with the goal of reviewing all stock codes for all revenue vehicle maintenance departments by late 2018.

3. Misalignment of Materials Management's performance indicators with TTC priorities

According to its performance dashboard published on TTC intranet, Materials Management's current targets are to have no more than 2 subway cars, 2 streetcars and 5 buses out of service due to parts shortages. In addition, Materials Management also sets the parts shortages target at 750 parts or less.

Materials Management staff indicated that 750 parts represent only a small percentage of the total number of stock codes (about 25,000) set up in IFS.

Based on our discussion with maintenance departments' management staff, vehicles out of service due to parts shortages should be preventable by implementing better materials management and procurement planning. Materials Management's current performance targets should be reassessed to ensure they align with those of the maintenance departments and the TTC's customer service priorities.

Lack of system built-in controls for deletion of parts requests could pose a risk

4. Lack of IFS system controls to monitor parts requests deletions

We noted a lack of built-in controls in IFS to ensure parts requests are only deleted with proper authorization. When a garage technician requests a part through the IFS system, the stockroom staff is able to delete the requests unilaterally without the consent of the garage technician or supervisory approval.

While we did not find evidence of non-legitimate deletions of order requests by stockroom staff, the lack of system controls could pose a risk that stockroom staff may delete parts requests unilaterally thereby causing unnecessary delays in vehicle maintenance and vehicles out of service waiting for parts.

Since we have raised our concerns with TTC management staff, they have initiated implementation of system controls to help mitigate the risk.

Recommendation:

3. **The Board request the Chief Executive Officer, Toronto Transit Commission, to review and address the parts shortages issue and its impact on vehicles out of service, rebuild delays, vehicle spare ratios, and materials requests turnaround time. Steps should be taken but not be limited to:**
 - a. **Reducing delays in processing inventory requests**
 - b. **Minimizing repetitive purchases of the same parts in small quantities**
 - c. **Measuring and reporting materials requests turnaround time**
 - d. **Ensuring alignment of Materials Management's performance indicators with TTC priorities**
 - e. **Strengthening IFS system controls to monitor parts requests deletions.**

C. CURRENT PROCUREMENT POLICIES AND PROCESSES NEED A FULL REVIEW

P&S centrally procures all goods and services

The Purchasing & Sales (P&S) Section centrally procures all goods and services required for TTC's day-to-day operations, with the exception of Purchase Card (PCard) and Petty Cash purchases. The Section consists of 29 staff members including 10 Buyers and 19 other staff.

Buyers procure goods and services through one of the following six purchasing methods:

- Buyer's Discretion – used when the estimated value of a purchase requisition or purchase authorization is under \$10,000 in 2015; this threshold was lowered to \$4,000 in January 2016 and raised back to \$10,000 in November 2016
- Informal competitive purchases – used when the estimated purchase value is above Buyer's Discretion threshold but not greater than \$100,000
- Formal competitive purchases / public tenders – used when the estimated purchase value is above \$100,000
- PCards – up to \$5,000 per transaction
- Sole source requests – used when only one known source exists or when only one source is approved; no requirement for pre-approval and no dollar threshold
- Single source requests – used when more than one potential Bidder/ Proponent exist but it is in the best interest of the TTC to deal with only one Bidder or Proponent; requires pre-approval based on thresholds.

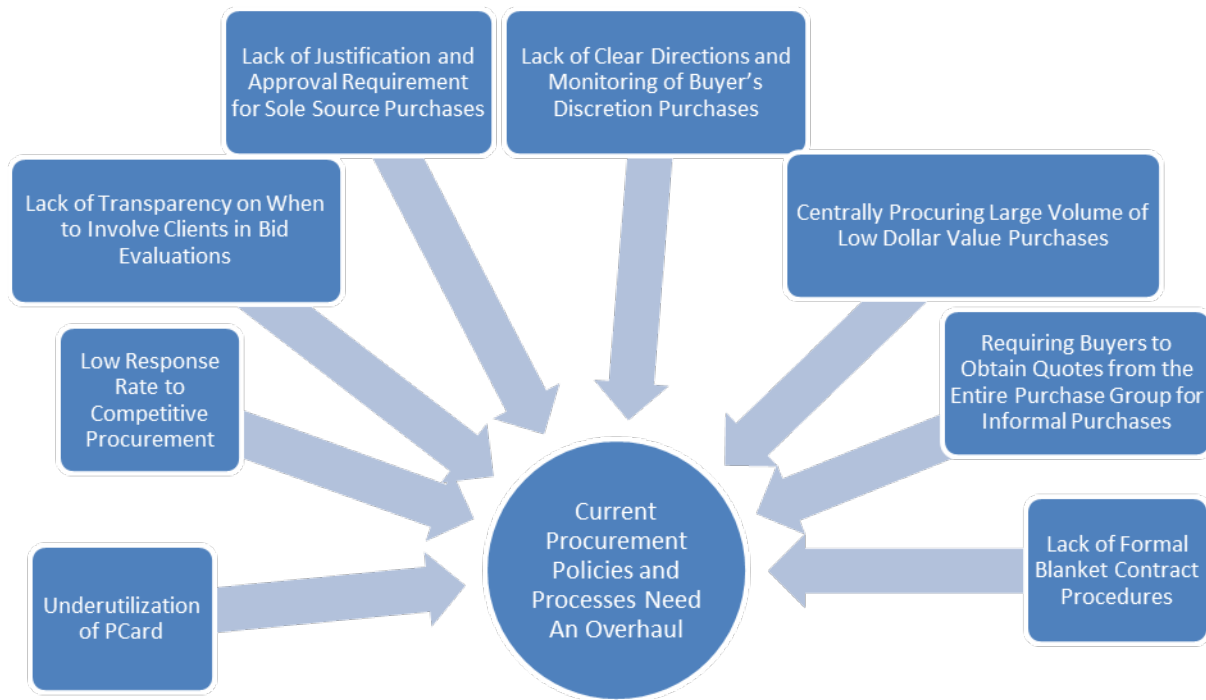
Table 8 outlines the dollar threshold and the administrative controls for each type of procurement method.

Table 8 Thresholds and Administrative Controls for Each Type of Procurement Method

Dollar Value Thresholds For	Procurement Method	Competitive Process (Yes or No)	Roles and Responsibilities
Up to \$5,000; CEO approval required for purchase limit above \$5,000	Purchase Card (PCard) - Cardholders directly purchase and receive non-stock, non-repetitive goods within the PCard transaction limit. The use of the PCard is restricted by a number of controls, including expenditure limits by transaction and month, and the type of purchase.	No	M&P administers the PCard contract, conducts spot audits, trains PCard users, and maintains a procedure manual. User Departments ensure cardholders use PCard appropriately.
Currently up to \$10,000 (Lowered to \$4,000 in January 2016; Raised back to \$10,000 in November 2016)	Buyer's Discretion Quotes may be verbal, email, or fax.	Up to the Buyer	User Departments provide specifications; P&S procures goods and services on behalf of the User Departments.
Above Buyer's Discretion threshold and up to \$100,000	Informal Requests - Bidders who register with TTC are invited to submit an informal Bid directly to P&S, either electronically or by written response. In November 2016, P&S revised this rule. Buyers are required to invite a minimum of three vendors to provide quotes.	Yes	User Department specifies goods / services requested; P&S solicits quotes from Bidders / Proponents, evaluates Bids received, and awards the contract to the lowest compliant Bidder / Proponent.
Greater than \$100,000	Formal Requests – Bidders / Proponents are solicited through public advertisement, including the TTC Website and the MERX Website. Bids / Proposals are submitted to the Commission Services Department.	Yes	User Department specifies goods and services requested; P&S solicits Bids / Proposals through public advertisement; evaluates Bids received; and awards the contract to the lowest compliant Bidder.
No threshold	Sole Source Requests are used when only one known source exists for the procurement of a requirement or when only one source is approved.	No	Only one company is requested to submit a proposal to P&S. No pre-approval is required.
Pre-approval required; approval requirement based on thresholds	Single Source Requests are used when more than one potential Bidder exist but due to unique circumstances, TTC chooses to deal with only one Bidder.	No	All Single Source purchases need pre-approval based on purchase dollar value threshold.

Overall, our audit found that TTC's current procurement policies and processes are inefficient and ineffective, requiring a full review and re-design. Figure 5 illustrates the issues in TTC's current procurement policies and processes.

Figure 5 Issues in TTC's Current Procurement Policies and Processes



C.1. Explore Ways to Improve Procurement Efficiency

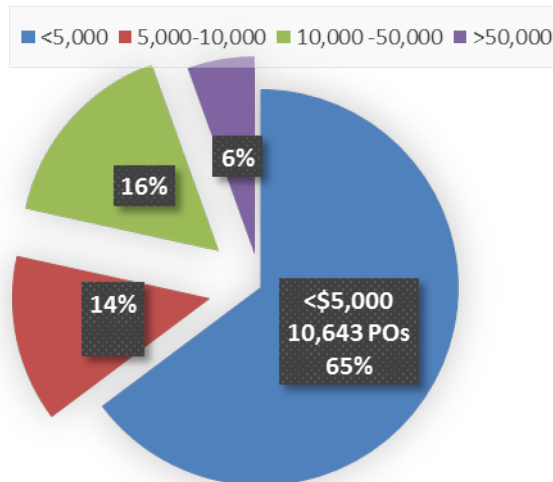
65 per cent of manual orders centrally processed by Buyers were below \$5,000

Centrally Procuring High Volume of Low Dollar Purchases

A key issue in the current procurement policies is the requirement for Buyers to centrally procure nearly all goods and services including extremely low dollar purchases.

For instance, for the 18-month period from January 2015 to June 2016, P&S Buyers handled about 16,400 manual orders (excluding Blanket release orders), 65 per cent or about 10,600 of which were less than \$5,000 in purchase value. Figure 6 provides a breakdown of the orders by purchase value.

**Figure 6 Manual Orders by Purchase Value,
January 2015 to June 2016**



Staff estimated that the cost to centrally process a Purchase Order (PO) is approximately \$250. Centrally procuring low dollar value goods and services is costly.

Buyers provided little value in processing small dollar purchases

Our file review of 55 Buyer's Discretion purchases (dollar value less than \$10,000) found that Buyers added little value in processing small dollar value items. The 55 files we reviewed included 30 inventory items and 25 non-inventory items. For all purchases of inventory items, Buyers relied on vendor information listed in IFS. For all non-inventory items, Buyers relied on client department input on vendor information. Furthermore, in six out of the 25 cases, Buyer used quotes already obtained by client departments.

Previous Policy to Require Buyers to Invite the Entire Purchase Group

Until November 2016, TTC's policy required Buyers to invite the entire purchase group for informal purchases (above Buyer's Discretion and up to \$100,000).

P&S structures its procurement by commodity groups such as "Electronics" or "Orion Bus Parts." Each commodity group has a purchase group – a list of vendors that have registered with TTC to provide products/services. Some of these purchase groups contain hundreds of vendors that have not been vetted by P&S staff.

Requiring Buyers to obtain quotes from the entire purchase group contributed to purchase delays

Requiring Buyers to obtain quotes from the entire purchase group was not an efficient use of Buyers' time. Many vendors responded that they did not supply the product. For those who provided quotes, Buyers then spent hours analyzing bids, often for purchases of insignificant value.

In one instance, Buyers requested quotes from about 400 vendors for an estimated purchase value of \$7,200

In one instance, Buyer requested quotes from about 400 vendors for an estimated purchase value of \$7,200, and received about 70 responses. The Buyer then spent hours analyzing the 70 responses.

If the purchase group is tied to a current procurement policy, then staff should have reviewed purchase groups to ensure that they only contain relevant vendors.

In November 2016, during our audit, P&S scrapped this procedure and the current procurement procedure requires Buyers to obtain a minimum of three quotes from the relevant purchase group.

Overall Impacts

Centrally procuring high volume of low dollar value purchases and requiring Buyers to obtain quotes from the entire purchase group contributed to chronic purchase delays and backlog of outstanding purchase requisitions. The backlog peaked at approximately 1,900 in the last half of 2016 with some purchase requisitions outstanding for more than a year.

P&S Buyers operate in a fast-paced and challenging environment, which might have contributed to a higher than normal turnover rate. Over the three years from 2014 to 2016, the turnover rate for Buyers was as high as 55 per cent.

Buyers were inundated with high volume of low dollar purchases, leaving them minimal time to handle the more complex and significant dollar purchases

High staff turnover led to more inexperienced staff, which might have exacerbated processing delays and purchasing issues. We also observed some purchasing mistakes that resulted from inexperience.

Inundated with high volume of low value transactions, Buyers were not able to devote their time to more significant dollar purchases.

Unlike the TTC, many government agencies use a decentralized method to process low dollar value purchases.

For instance, the City of Toronto and the majority of Ontario Municipalities use a Departmental Purchase Order (DPO) or field order process for low dollar purchases. Under the DPO process, goods and services under a certain threshold would be handled directly by client departments and the corporate purchasing unit is only responsible for issuing a Purchase Order at the end of the process.

Recommendation:

- 4. The Board request the Chief Executive Officer, Toronto Transit Commission, to review the current method of centrally procuring low dollar purchases through the Materials and Procurement Department, and explore ways to improve efficiency, and minimize delays and the backlog of outstanding purchase requisitions.**

C.2. Provide Clear Directions for Buyer's Discretion and Monitor Compliance

Under the Buyer's Discretion method, when an estimated purchase value is below a certain dollar threshold, Buyers can choose whether to competitively procure an item or directly award it to an vendor without competition. Purchases above Buyer's Discretion threshold should be procured competitively.

In January 2016, the Department lowered the Buyer's Discretion threshold from \$10,000 to \$4,000, and then in November 2016 during the course of our audit, the Department raised the threshold back to \$10,000.

\$11.4 million purchase orders did not go through a competitive process over a 18-month period

From January 2015 to June 2016, the Department issued a total of 4,727 Buyer's Discretion Purchase Orders (POs) without undergoing a competitive process. The aggregated value of these purchase orders is \$11.4 million over 18 months, or approximately \$7.6 million a year.

Our audit noted the following issues with the Buyer's Discretion purchases:

- lack of clarity and guidelines in the procurement policy
- individual non-compliance at the initial PO lines level
- lack of rigorous monitoring and approval of subsequent amendments to Buyer's Discretion purchases.

Buyers have different understanding of the dollar threshold application

Lack of policy clarity in the application of the dollar threshold

The Department's guidelines for Buyer's Discretion do not specify whether the dollar threshold applies at PO level or individual lines within a PO. Buyers have different understanding on how the threshold should be applied.

Each PO may contain multiple line items because Buyers can choose to combine several purchase requisitions into one PO. TTC procurement policy or procedures do not limit the number of line items in a PO.

As a result, Buyers could issue a Buyer's Discretion PO with multiple PO lines to the same company at a total value significantly above the dollar threshold.

Because of the lack of policy clarity in the application of the Buyer's Discretion threshold, many Buyer's Discretion purchases exceeded the threshold in effect at the time without undergoing a competitive process:

Many Buyer's Discretion purchases were above the effective dollar threshold

- In 2015, 57 POs issued using the Buyer's Discretion method were above the \$10,000 threshold, with the highest PO value being \$58,760.
- In 2016, 116 POs issued using the Buyer's Discretion method were above \$4,000 (threshold effective in 2016), with the highest PO value being \$28,375.

Staff advised that Buyer's Discretion purchases above \$50,000 are subject to management approval.

Buyer's Discretion threshold should be set at PO level and not individual PO lines or purchase requisition level

At the City, thresholds are set at the total commitment level to a vendor, including future optional renewal. In our view, to ensure proper procurement controls, TTC's Buyer's Discretion threshold should be set at the PO level and not at individual PO lines or purchase requisition level.

We also noted that the M&P Department often communicates policy and threshold changes to Buyers through emails. As a good practice, it should specify purchase thresholds in the TTC procurement policy.

Lack of policy guideline when actual purchase values exceed the dollar threshold

In addition, in reviewing a sample of 55 Buyer's Discretion purchase files, we noted that in three files, the initial estimated purchase value was within Buyer's Discretion limit but due to quantity increase or price increase, the actual purchase value exceeded the threshold limits at PO line level. The actual purchase values for these three files doubled or tripled the original estimates.

Actual purchase value may exceed estimated purchase value when a vendor quotes higher than expected, or when client departments increase purchase quantities during the procurement process.

Current TTC policy/procedures do not clarify what course of actions Buyer should take when the actual purchase value exceeds estimated value and purchase thresholds

Current TTC policy/procedures do not clarify what course of actions Buyer should take when the actual purchase value exceeds estimated purchase value and purchase thresholds.

The City's DPO policy, for instance, specifies that if the lowest compliant bid exceeds the \$50,000 DPO threshold by more than 20% or \$60,000, divisional staff must cancel the Call and forward the purchase requisition to the City's Purchasing and Materials Management Division (PMMD) to be centrally procured. PMMD will reissue a competitive Call.

Five files exceeded Buyer's Discretion threshold even at the individual PO line level

Non-compliance with the dollar threshold even at PO line level

Given that some Buyers may interpret that the dollar threshold is applicable for each PO line item, we undertook a closer review of the PO lines and purchase values. We found that five files exceeded Buyer's Discretion threshold even at the individual PO line level. These PO lines each exceeded the threshold by a significant amount, up to 60 per cent or \$6,000. Buyers should have engaged in a competitive process for these five files.

Lack of rigorous monitoring and approval of amendments to Buyer's Discretion purchases

The amended PO values for eight files more than doubled, sometimes quadrupled the original order values

Some of the Buyer's Discretion purchases exceeded their threshold because of amendments. We noted that 18 out of the 55 Buyer's Discretion purchases had a purchase order amendment. Twelve of the 18 purchases were issued at or just under the Buyer's Discretion threshold of \$10,000. The amendments resulted in significant increases in PO values. For instance, the amended values for eight out of 18 POs more than doubled, sometimes quadrupled, the original order values without undergoing any competitive process.

Buyers crossed out the original amounts and wrote exactly \$10,000 on the forms without documented justification

In three out of the 12 files, client departments indicated a purchase value higher than \$10,000 on the Purchase Authorization form, and the Buyers crossed out the original amounts and wrote exactly \$10,000 on the forms without documented justification.

According to staff, the amendments for these 18 files were legitimate. In our view, this practice has the appearance of circumventing the dollar threshold.

The City's purchasing policy does not allow amendments to DPOs. TTC staff should develop a rigorous review and approval process for amendments to purchases using Buyer's Discretion to prevent potential order splitting.

Recommendations:

5. The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure procurement policies and procedures provide clear directions and guidelines for Buyer's Discretion purchases and its subsequent amendment, and applicability of the dollar threshold.
6. The Board request the Chief Executive Officer, Toronto Transit Commission, to implement measures to monitor compliance with Buyer's Discretion procurement policy requirements, and to ensure the requirements are effectively communicated to staff involved in the procurement process.

C.3. Competitive Procurement

C.3.1 Address Low Vendor Response Rate

Under TTC's current procurement policy, for purchases valued above \$10,000 (i.e. current Buyer's Discretion threshold) but under \$100,000, Buyers should process these purchases as **Informal Requests** and are required to invite a minimum of three vendors to provide quotes.

For Purchases above \$100,000, they are processed as **Formal Requests** and TTC publishes the tender calls in MERX website.

A considerable number of purchase requests received only one compliant bid

We reviewed 50 informal competitive purchases that are valued under \$100,000, and noted 20 of them received only one compliant bid. Staff explained that in some cases, there were only two or three existing approved vendors for the required product.

To ensure TTC is obtaining the best value, in our view, in processing Informal Requests, Buyers should invite five or more vendors in categories of commodities where they historically experience a low bid response rate. In certain cases, staff may need to identify alternate sourcing to address long term requirements when only a few vendors can supply the required products.

For instance, the City's DPO policy states:

"If only one (1) or two (2) quotations are consistently received, the Division should increase the number of vendors invited to bid to ensure that an adequate number of quotations are received, i.e. a minimum of five (5) vendors should be invited to bid."

Average 2.7 bids compared to benchmarked 4.7 bids

For the Formal Requests (over \$100,000), P&S received on average 2.7 bids for each formal competitive tender for 2015 and 2016. This is lower than the 4.7 bids per tender average response rate published by the Municipal Benchmarking Network Canada (MBNCanada) for the years 2014 and 2015. We could not find benchmarking statistics specific for public transit agencies regarding average number of bids received.

TTC should seek the best overall value for its day-to-day procurement needs. Low response rate limits the price competitiveness of the bids received.

In reviewing the tender files, we noted that vendors who did not bid cited a combination of short-response time and/or complexity of specification as reasons.

Complex specifications, short response time and lack of free viewing of tender documents might have discouraged some bidders

We also conducted a vendor survey. Of 108 vendors contacted, 33 responded. Eleven vendors indicated that they found TTC's specifications to be complex and/or the response time being too short. Five vendors stated that they would like more information to be posted on the MERX website without having to spend money to download the entire tender document.

With respect to free access to call documents, the Canada-European Union Comprehensive Economic and Trade Agreement (CETA) requires the procuring entities to provide free access to a notice of intended procurement.

CETA prescribes that a notice of intended procurement should include:

- A description of the procurement, including the nature and the quantity of the goods or services to be procured
- The time-frame for delivery of goods or services or the duration of the contract.

The City is going above and beyond that requirement by making most of its call documents free for viewing. The TTC should consider providing a more detailed notice free of charge to help increase its bid response rate.

Recommendation:

- 7. The Board request the Chief Executive Officer, Toronto Transit Commission, to identify strategies to improve response rate for competitive procurement and such strategies to include but not be limited to:**
 - a. Providing free viewing of tender documents or detailed notices of tenders**
 - b. Extending bid response time for complex specifications**
 - c. Identifying alternate sources of supply and revise its current minimum quotes requirement to invite five or more suppliers where low bid response rates are evident.**

C.3.2 Formalize the Requirement for Seeking Client Departments Input

No guideline on when to seek client department input

The P&S Section currently has no formal operating procedures to guide Buyers on when to involve client departments in its bid evaluation process.

95% of purchase requests with clear specifications are awarded to the lowest compliant bids

P&S staff handle most of TTC's day-to-day operational procurement, including all parts inventories at TTC's stores. According to P&S staff, approximately 95 per cent of purchase requests are for items with clear specifications and P&S awards the contracts to the lowest compliant bids. Buyers do not seek client departments' input when making these price-based award decisions. However, Buyers are required to obtain the client department input when a price-based bid shows deviations from TTC's approved specifications.

According to management staff, P&S requires the client department to evaluate and score the bid submissions for purchases that are more specialized and involve technical specifications, or rating bidder capabilities and experience. Management further advised us that P&S Buyers have received training on this process.

Some lowest priced bids can be problematic

Many client department staff we interviewed, however, indicated that products procured through the lowest priced bids were frequently of inferior quality and required extensive rework by TTC staff.

User department input can help identify potential issues in abnormally low bids

Given P&S current responsibility for processing a large volume of day-to-day purchase requests, we recognize that it would be challenging for Buyers to involve client departments in more bid evaluations. There are, however, advantages in seeking client input for purchases with complex or technical requirements. For instance, client input may help identify potential issues in abnormally low bids, and provide insights on vendors' past performance history and qualification.

To ensure client input is sought when needed, P&S should formalize its internal processes to provide guidance on when and how to involve client departments in bid evaluations. These should be stated in a standard operating procedure, which should be posted on the P&S website for transparency and accessibility by client departments.

Recommendation:

- 8. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC) to formalize the process and requirements for seeking client department input in the bid evaluations for purchases involving subjective criteria or complex technical aspects. The formalized procedure should be posted on TTC intranet to be accessible by all staff.**

C.4. Non-Competitive Procurement

For efficiency and other established criteria, many organizations have provisions for non-competitive purchases in their procurement policies. Similar to other organizations, TTC allows for non-competitive procurement in some circumstances. Our review noted that TTC has a relatively large proportion of purchases procured non-competitively.

TTC issued a total of 10,271 POs or \$211 million through non-competitive procurement methods

During the 18-month period from January 2015 to June 2016, TTC issued a total of 10,271 POs or \$211 million through non-competitive procurement methods. These POs accounted for 35 per cent of the total number of POs and 40 per cent of TTC's total order value (\$525.4 million excluding the one bulk fuel purchase order).

Currently, TTC allows for two main types of non-competitive procurement. Table 9 provides a breakdown of these methods and their aggregated purchase values.

The issues pertaining to Buyer's Discretion purchases have been discussed in Section C.2.

Table 9 TTC's Two Main Non-Competitive Procurement Methods and Their Corresponding Aggregated PO Values, January 2015 to June 2016

Purchase method	Number of PO issued	Purchase Value
Buyer's Discretion	4,727	\$11 million
Sole and Single Source	5,544	\$200 million
Total	10,271	\$211 million

Many of TTC's non-competitive purchases are unavoidable

A basic principle in procurement is to minimize purchases through non-competitive procurement to reduce costs. However, many of TTC's non-competitive purchases are unavoidable as it requires a fair amount of proprietary maintenance products for public transit operations.

Our review identified a number of areas where TTC can tighten its controls over non-competitive procurement while meeting operational needs.

C.4.1 Develop Sole Source Justification and Approval Process

No specific policy pertaining to sole source or single source purchases

Our audit noted that TTC lacks a rigorous review and approval process for all non-competitive procurement in general. The M&P Department does not have a policy or procedural requirements governing the justification and approval of sole source purchases. As a result, client departments are not required to justify their requests for sole source purchases.

Many files contained no justification for sole and single source purchases

We reviewed a sample of 40 sole and single source files as part of the audit. Among these 40 files, 25 contained no justification for sole/single source on the Purchase Authorization or Purchase Requisition forms. Among these 25 files:

- Two showed that Buyers appropriately followed up with departmental staff to confirm the justification for sole/single source.

- One file was a Buyer's Discretion purchase which did not require sole source justification.
- For the remaining 22 files, Buyers awarded the work to the vendors suggested by client departments without confirming the need or justification for non-competitive procurement.

Some single source purchases were processed as sole source bypassing the need for justification and pre-approval

Our further review of the 22 files noted that nine were single sourced and should have been pre-approved with specific justification. In TTC, single source purchases require justification and pre-approval; sole source do not. Some single source purchases may be processed as sole source thereby bypassing the need for justification and approval requirement.

We realize that our sample of 40 files may not be representative of the total 5,544 single and sole source purchases for the 18-month period we reviewed. However, we were not able to expand the sample size because of the labour-intensive audit process. This is largely due to poor documentation of the purchase files. In order to ascertain whether the 40 files are single source or sole source, we had to resort to calling individual vendors and the originating departmental staff to obtain the missing justification.

Until March 2016, TTC has defined sole and single source opposite of most other procurement entities

To complicate matters further, until March 2016, TTC has defined sole and single source in the opposite way of most other procurement entities. In March 2016, TTC reversed its single and sole source definition to align with the common definitions in use by other public entities (sole is the only available source and single is the preferred while more than one source is available).

When the change of definition became effective, it was reflected only in the *Authorization for Expenditures and Other Commitments* policy, while the main TTC procurement policy document still kept the old definition. This might have created confusion among Buyers and client departments in providing and approving justification for single source purchases.

This reversal of definition took place in the middle of our purchase file sampling period – January 2015 to June 2016, and therefore some purchases files used the old definition and others used the new definition.

The City's PMMD has developed a comprehensive non-competitive procurement policy and process. This should be reviewed and considered by the TTC as a starting point to enhance its current processes and controls regarding sole and single source purchases.

Many government agencies frequently publish a notice of sole source intent prior to engaging in non-competitive procurement. The notice gives vendors an opportunity to propose their products that may meet the specifications, and this may reduce the need for sole sourcing.

Recommendations:

- 9. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to review and strengthen the TTC's current non-competitive procurement policy and procedure requirements to ensure all sole and single source purchases are justified, and adequately reviewed and authorized.**
- 10. The Board request the Chief Executive Officer, Toronto Transit Commission, to consider publishing a notice of sole source intent prior to engaging in non-competitive procurement for large dollar value sole source purchases where only one company is known to supply the goods or services but others may exist.**

C.4.2 Expand Alternate Sourcing

As indicated previously, due to its operational needs, TTC spends a substantial amount of money in non-competitive procurement for specialized vehicle parts and technology.

In particular, bus parts purchases account for a substantial portion of TTC's procurement activities. Based on our analysis of current TTC bus fleet, about 70 to 80 per cent of bus parts are common truck parts while 20 to 30 per cent are proprietary products.

Alternate sourcing of comparable parts can reduce costs

When a new bus series is still under warranty, TTC buys proprietary products to maximize warranty claim coverage. After the warranty expires, TTC has an opportunity to seek alternate sources to reduce purchase costs and maximize savings.

In our review of purchase files, we noted quotes from various suppliers for alternate parts offering a lower price. These parts from alternate sources may not meet the precise specifications from TTC but may perform the same function. The quotes for alternate parts were rejected by P&S Buyers because these must be pre-approved by user departments after technical review and testing.

Investing time to explore alternate sources may lead to cost savings without impacting quality of parts

It is important that TTC does not procure any parts from alternate sources without proper technical review and testing. However, in some circumstances, it will be worthwhile for staff to invest time in reviewing the suitability of alternate suppliers for future purchases. This can be an important cost savings step as in many instances parts required for maintenance do not change and TTC procures the same parts many times over the life span of its vehicle fleets.

Where alternate sourcing was pursued, savings were realized

Seeking alternate sourcing is not a new concept. P&S has undertaken a few initiatives since 2002 to identify alternate suppliers. According to staff, these initiatives generated savings of \$0.7 million in 2014, \$0.6 million in 2015, and \$1.7 million in 2016. These savings are insignificant in comparison to TTC's yearly total procurement value (over \$300 million per year).

Based on the data provided, our analysis showed that on average, for each alternate source identified by P&S staff and approved by end users, TTC realized just over 20 per cent in procurement savings.

TTC can potentially save \$2.5 to \$6.5 million per year by increasing alternate sourcing

By expanding its efforts to identify and acquire adequate alternate products, TTC can reduce its reliance on sole and single source procurement. Based on our estimate, a 10 to 25 per cent reduction in sole and single source procurement may potentially result in \$2.5 to \$6.5 million annual savings. Table 10 outlines the savings estimates from increasing alternate sourcing.

Table 10 Estimated Savings from Expanding the Alternate Sourcing Effort (in millions)

Assumed Reduction Rate	Current Sole and Single Source Volume (1.5 years)	Reduction Value (1.5 Years)	Average Saving Rate	Savings (1.5 Years)	Annualized savings (rounded to the nearest \$500,000)
Low (10%)	\$200	\$20	20%	\$4	\$2.5
High (25%)	\$200	\$50	20%	\$10	\$6.5

Identifying alternate product sources and getting these products approved by end users is not a simple task. M&P needs the assistance of technical staff from user departments to carry out these initiatives. As well, there may be a need for additional resources to assist P&S staff in this process, but the savings potential will likely offset the cost to provide additional resources.

Recommendation:

- 11. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to expand and actively pursue alternate sourcing to reduce purchase costs for replacement parts, and to ensure the alternate sourced products are adequately reviewed and tested for TTC operations.**

C.5. Blanket Contracts

Blanket Contracts provide means for acquiring goods and services that are required frequently or repetitively. A Blanket Contract is an agreement between an organization and a vendor to provide goods and/or services at a pre-determined unit price, within an estimated maximum total value, and for a stated period of time.

Wherever feasible, TTC should set up Blanket Contracts to further consolidate individual purchase orders and to take advantage of volume discounts.

C.5.1 Develop a Comprehensive Blanket Contract Policy

TTC currently does not have specific policy or procedure regarding the criteria for establishing Blanket Contracts or renewal process.

We analyzed existing 378 active Blanket Contracts as of November 18, 2016 and noted the following issues:

(1) A considerable number of existing contracts have extremely low dollar value or low spending

Creating low-value blanket contracts is not an effective use of staff resources

Among the 378 Blanket Contracts reviewed, 40 or 10 per cent have maximum contract value less than \$10,000, with the lowest being \$800.

In addition, 42 Blanket Contracts have low spending, ranging from 0 to 20 per cent of total contract value. In one blanket contract of \$472,000 contract value, there has been no spending since 2014.

At TTC, Blanket Contracts for multiple line items are awarded to the lowest bidder for individual line items, thus creating multiple Blanket Contracts with low dollar values. At the City, Blanket Contract for multiple line items are awarded to the lowest overall bidder.

As creation of a Blanket Contract usually requires a lengthy and extensive competitive bidding process, setting up Blanket Contracts for low purchase value or contracts that are barely used is not an effective use of staff resources. In addition, for Blanket Contracts with small purchase value or quantity, vendors do not normally provide a price break and therefore these contracts will not provide TTC with volume discount. This was confirmed through our vendor survey.

To ensure effective use of resources for Blanket Contracts, TTC should establish a dollar threshold for minimum Blanket Contract value in its procurement policy.

Some Blanket Contract prices were found to be more expensive than market prices

(2) Some purchases under Blanket Contracts are more expensive than purchasing the same product under non-Blanket Contracts

We noted instances in which the prices under a Blanket Contract are more expensive:

- A bus passenger side front door mirror costs \$12 under an existing blanket contract. The same mirror bought outside the blanket costs \$8 a piece.
- A bus rim costs \$206 under an existing blanket contract. The same rim costs \$140 under a non-blanket contract.

TTC staff indicated that sometimes market develops after staff has set up a Blanket Contract, rendering the initial contracted prices no longer competitive.

It may be beneficial for TTC staff to review and consider the City's Blanket Contract policy

The City has a comprehensive Blanket Contract policy and procedure that guide staff in the following areas:

- Identifying requirement
- Preparing specification
- Reviewing and evaluation of bids
- Awarding of contracts
- Contract administration
- Renewing existing Blanket Contracts

It may be beneficial for TTC staff to review and consider the City's policy.

Recommendation:

12. The Board request the Chief Executive Officer, Toronto Transit Commission, to establish a comprehensive Blanket Contract policy and procedural requirements detailing minimum dollar threshold and ongoing review and renewal processes.

C.5.2 Expand Current Blanket Contracts

For the period from January 2015 to June 2016, TTC procured goods or services from 229 vendors, each supplied TTC with goods or services over \$50,000, through individual POs rather than existing Blanket Contracts or price agreements, totalling \$174 million in spending.

Establishing more Blanket Contracts may reduce purchase costs by volume discount and save \$0.5 to \$2.5 million per year

Assuming that TTC is able to establish Blanket Contracts for half of the \$174 million purchases, we estimate that by establishing Blanket Contracts or expanding existing price agreements, TTC can potentially save one per cent to five per cent of purchase costs, equivalent to \$0.5 to \$2.5 million annual savings.

TTC should set up further price agreements where warranted or expand the product catalogue of existing price agreements to take advantage of volume discount. This will also help consolidate the number of purchase orders for processing, reduce workload for P&S staff, and ultimately improve work efficiency.

M&P should analyze its overall purchase activities periodically to explore savings opportunities

In addition, M&P should analyze its overall purchase activities periodically to identify vendors of concentrated spending and explore savings opportunities. This should take into consideration all procurement activities, including those performed by the Project Procurement Section and PCard activities.

Recommendation:

- 13. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to reduce annual purchase costs where feasible by establishing Blanket Contracts or expanding existing price agreements with vendors of concentrated spending and repetitive purchases. Periodic analysis of TTC's overall purchase activities to identify Blanket Contract opportunities should also be undertaken.**

C.6. Other Improvement Suggestions

Listed below are minor issues and suggestions for changes:

M&P should keep its procurement policy and procedures up-to-date

- The M&P's main procurement policy document and intranet publications of procedures are out-dated and contain references to old terminologies or purchase thresholds. The Department should regularly review and update its policy, procedures and Intranet Publications to provide staff with updated information.

M&P should provide staff with a single-point electronic access to up-to-date policies, procedures and forms

- Procurement policies and procedures are placed in various M&P intranet pages, making it challenging for TTC staff to access and for M&P staff to update. The Department should provide TTC staff with a single-point electronic access to its procurement policies, procedures and forms.
- M&P currently does not regularly report its procurement activities and performance indicators to the Board. We recommend that M&P regularly provides its procurement statistics and performance indicators to the Board for information and transparency.

Recommendations:

- 14. The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure that all procurement policies, procedures, and forms are up to date and that staff have a single-point electronic access to procurement policies, procedures and forms.**
- 15. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to regularly report to the Board on TTC's procurement statistics and performance indicators.**

D. EXPANDING PURCHASE CARD USAGE CAN IMPROVE PROCUREMENT EFFICIENCY

From January 1, 2015 to June 30, 2016, there were 5,607 Purchase Card (PCard) transactions totalling \$3 million, or approximately \$2 million a year. As of August, 2016, there were a total of 189 active cardholders.

D.1. Expand the Use of Purchase Card

TTC PCard Program is currently underutilized

The TTC PCard Program is currently underutilized. Table 11 compares the utilization of PCard between the City and the TTC.

Table 11 Comparison of Workforce and PCard Program between the City and the TTC, 2016

	City	TTC
Number of staff	24,000 (excluding those with City agencies and corporations)	14,500
Active PCard holders	1,400	189
PCard transactions	51,000	3,000
Total PCard transaction costs	\$13 million	\$2 million*

*Note: TTC's PCard transaction cost is based on annualized transaction cost from January 2015 to June 2016.

A PCard program, when implemented with adequate controls, is an efficient tool for purchasing small dollar items

A PCard program, when implemented with adequate monitoring and controls, provides an efficient means of procuring small dollar purchases. In our view, there are a number of advantages for TTC to expand its PCard program. To name a few, PCard can help reduce the cost of issuing checks for small dollar purchases, and alleviates the need for P&S Buyers to process small dollar items, allowing them to direct their efforts to more complex and significant purchasing activities.

For many small dollar purchases, it costs TTC more to centrally process the requisition than the cost of the purchase itself

TTC staff estimated the average cost of manually processing a purchase requisition to be approximately \$250 (including the cost of obtaining quotes, receiving goods, and issuing payment). When we analyzed approximately 26,000 purchase requisitions processed by Buyers over an 18-month period, we noted that over 5,500 of them were for purchases under \$250. In other words, it cost the TTC more to process the requisition than the cost of the purchase itself. Many of these 5,500 purchase requisitions could have been procured more efficiently using PCard.

Before TTC expands its PCard program, it is imperative that it has put in place adequate monitoring and controls to ensure proper use of PCard in accordance with TTC policy.

D.2. Improve Monitoring of Purchase Card Transactions

Insufficient monitoring of PCard usage/activities

As PCard transactions currently represent only a small percentage of TTC's total spent, the level of staff resource assigned to monitor the transactions is low. Overall we found insufficient monitoring of PCard transactions at TTC.

Currently, a System Contract Administrator is responsible for monitoring PCard transactions at the corporate level. The Administrator is responsible for drafting PCard policies, training users, approving payments, liaising with the PCard provider, performing spot audits of transactions, identifying and communicating questionable expenditures to user department heads, and a number of other tasks. The System Contract Administrator is also responsible for five other system contracts.

In reviewing PCard transactions between January 2015 and June 2016, we identified about 500 transactions that appeared to be questionable, including transactions for restricted purchases, controlled purchases that would require advance approval, and transactions that appeared to be personal in nature.

In our sample of 35 purchases, we noted that the System Contract Administrator followed up and requested receipts for only three of them.

Our review on these transactions is ongoing and we will provide our review results in a future audit report.

Scope of spot audits performed by staff should be expanded

We also noted that the focus of the PCard Administrator's spot audit was on identifying repetitive purchases or purchases from vendors that TTC has existing price agreements. As a result, the spot audit did not identify a large number of restricted, controlled, split purchases, transactions that exceeded limits, and purchases of questionable nature.

Immediate supervisory review and approval of PCard transactions is a key control

More importantly, in our view, a key weakness in TTC's current PCard program is a lack of review and approval of purchases by the cardholder's immediate supervisor. Currently compliance review of PCard usage at the user department level is assigned to a department clerk, and the transaction logs are then approved by the department head, potentially bypassing the cardholder's immediate supervisor.

Effective monitoring of PCard transactions requires an adequate review and authorization from the cardholders' immediate supervisors who have knowledge of the operational purchase needs. At the City, PCard users are required to submit transaction logs to their immediate supervisors for approval on a monthly basis.

Although TTC uses the same PCard provider as the City, TTC currently does not have IT system capability to use the City's PCard system (SAP XiBuy). TTC is in the process of migrating to the SAP system and it should add IT capability to monitor PCard transactions when SAP is fully implemented.

TTC should consider further control measures prior to expanding the PCard program as suggested in our previous section.

The City publishes its PCard purchases on the internet for public scrutiny and transparency. A similar approach by the TTC may also help deter inappropriate PCard usage and should be considered.

Recommendations:

- 16. The Board request the Chief Executive Officer, Toronto Transit Commission, to undertake steps to review and enhance the monitoring and controls of the Purchase Card program. Such steps should include a review of the level of staff resource, effectiveness of the current spot audits, and the transaction review and approval process.**
- 17. The Board request the Chief Executive Officer, Toronto Transit Commission, to explore ways to expand the current Purchase Card (PCard) program with a view to utilizing PCard to improve the efficiency of the agency's purchasing functions.**
- 18. The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to ensure the Purchase Card process is considered when reviewing and revising TTC procurement policy dollar thresholds.**

E. A SUMMARY OF POTENTIAL COST SAVINGS

In this audit report, we identified a number of areas where TTC could generate significant savings through improving its current materials management and procurement practices. These initiatives include:

- expanding alternate sourcing
- pursuing aftermarket parts warranty
- improving controls on core retrieval and tracking
- initiating further Blanket Contracts with vendors of concentrated purchases.

The combined savings, when fully realized by TTC, can be in the range of \$7 to \$15.0 million a year, excluding savings from improving core retrieval and tracking

The combined annual savings from alternate sourcing, aftermarket parts warranty, and Blanket Contract, when fully realized by the TTC, can potentially range from \$7 million to \$15.0 million (Table 12).

Table 12 A Summary of Potential Savings Identified in This Report

Initiatives	Potential Annual Savings (in million)	
	Low	High
Alternate Sourcing	\$2.5	\$6.5
Aftermarket Parts Warranty	\$4.0	\$6.0
Expand Blanket Contracts	\$0.5	\$2.5
Subtotal (excluding Core Initiative)	\$7.0	\$15.0

Potential savings from improving controls on cores for 8 vehicle parts alone could be \$1 to \$1.5 million per year

In addition, our analysis shows that the annual savings from improving core retrieval and tracking for eight vehicle parts alone is substantial (Table 13).

Table 13 Estimated Savings from Improving Controls on Cores - Eight Parts Alone (in millions)

Initiative	Low	High
Core Retrieval and Tracking	\$1.0	\$1.5

The overall financial impact from improving core controls is expected to be significantly higher

There are currently over 2,000 additional core stock codes identified by TTC staff. We believe that as staff begin to measure savings from improving controls on core retrieval and tracking, they are likely to identify more cores that worth retrieving and utilizing. The total savings from improving controls of cores is thus expected to be significantly higher than the \$1 to \$1.5 million based on our analysis of the eight parts alone.

Recommendation:

- 19. The Board request the Chief Executive Officer, Toronto Transit Commission, to report to the Board on an annual basis on savings achieved as a result of implementing the recommendations from this report, including information regarding:**
- identifying alternate sourcing**
 - pursuing aftermarket parts warranty**
 - initiating further Blanket Contracts or expanding the product catalogue of existing Blanket Contracts**
 - retrieving and tracking cores.**

CONCLUSION

Procurement is the backbone of TTC revenue vehicle operations

This is the Auditor General's first review of the TTC's procurement functions. In order to deliver reliable and cost effective public transit services, the TTC needs to ensure an adequate and timely supply of vehicle parts and materials for its revenue fleets, and other operational units. The procurement functions, mostly invisible to the public, are the backbone of TTC's operations. Modernizing the TTC must include a thorough review and improvements of its procurement functions.

Audit provides 19 recommendations to help improve inventory management and efficiency of purchasing activities

The TTC's current procurement policies and practices are in need of a full review and in many areas may not achieve the best overall value. Our audit provides 19 recommendations to help improve the management of inventory, the efficiency of the purchasing activities, and controls over non-competitive purchases.

While the focus of the audit was not on cost savings, we identified four areas relating to vehicle parts and Blanket Contracts where TTC should undertake immediate action to realize cost savings.

AUDIT OBJECTIVES, SCOPE AND METHODOLOGY

This review was selected based on the extent of TTC procurement expenditures and the general risks of procurement.

The Auditor General's updated 2016 Audit Work Plan included an audit of TTC's procurement processes. This review was selected based on the extent of TTC procurement expenditures and the general risks of procurement.

The objective of this audit was to assess whether TTC's procurement policies, procedures and practices are fair, transparent, and achieving the best overall value.

The audit covered the period from January 1, 2015 to March 31, 2017

This audit covered the period from January 1, 2015 to March 31, 2017.

Our audit methodology included the following:

- conducting extensive data analysis, including purchase data, inventory planning data, inventory requests workflow data, PCard activities, transfer requests data, purchase orders, purchase requisitions, vehicle status snapshots from the SMS (rail cars work order system) and the IFS system, and various performance reporting data
- interviewing TTC staff, including both M&P staff and maintenance staff
- reviewing TTC internal documents, including procurement policies and procedures, and various performance indicators
- benchmarking policies, procurement statistics, and spare ratios with the City, other municipalities, MBNCanada, and other transit research programs and reports

- reviewing previous Auditor General's reports on procurement activities of City operations and of other agencies
- manually reviewing individual purchase files
- performing extensive financial and savings analysis
- consulting technical personnel from maintenance departments on TTC's maintenance practices and our savings analysis
- conducting a vendor survey.

Compliance with generally accepted government auditing standards

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Exhibit 1: Aftermarket Parts Warranty Savings Analysis

Based on our estimate, pursuing aftermarket parts warranties will generate significant savings. According to the *Warranty Week*, an online website that studies warranty, U.S. heavy truck Warranty Expense Rates (warranty expense as a percentage of sales) ranged from 2 to 3 per cent for four of the top U.S. based truck manufacturers for the 2003 to 2016 period.

Approximately \$270.0 million out of the \$525.4 million purchases between January 1, 2015 to June 30, 2016 were for stock-coded parts. We estimated that a further \$220.0 million were for non-inventory purchases delivered to the garages, car houses and Duncan Warehouse. A large percentage of these purchases are likely for parts as well. Assuming 80 per cent of all these purchases, totaling \$490 million (including \$270.0 million in inventory and \$220.0 million for non-inventory items), are eligible for aftermarket parts warranty. The total purchases that are eligible for aftermarket parts warranty is therefore \$392.0 million over the 18 month period, or \$260.0 million annually.

Using the truck manufacturers warranty expense rates (2 to 3 per cent) as a guidance, we estimate that TTC foregoes \$5.0 to \$7.5 million per year in aftermarket parts warranty recovery. Assuming TTC achieves 80 per cent claim rate for aftermarket parts warranty, the adjusted annual savings is therefore \$4.0 to \$6.0 million (rounded to the nearest \$500,000).

Aftermarket parts warranty = Average Value of Parts Purchased x Warranty Expense Rates x TTC Warranty Claim Rate.

As TTC starts to pursue aftermarket parts warranty, it will help drive down TTC's parts purchase volume, which in turn will reduce the number of parts that are eligible for aftermarket parts warranty claims. The aftermarket parts warranty savings calculation should include two components: the reduction in parts purchases and the aftermarket parts warranty recovery.

Exhibit 2: Savings Analysis on Cores

We analyzed three BAE Hybrid bus parts and three types of air dryers where TTC currently utilizes cores for rebuild or buy-exchange, as well as four types of Luminator parts where TTC currently does not utilize the cores. This sample was selected to represent existing core processes in place for different vehicle parts.

There are currently 2,038 unique active core codes set up in IFS. We believe that TTC set up these core codes because there is enough price difference between buying new and remanufactured parts to warrant the trouble of retrieving and returning cores. We found that only 403 of these codes had activity in the last 12 months. For the remaining 1,635, there is no activity because staff have not utilized these core codes for either rebuild or buy-exchange.

Further, 189 of these 403 core codes showed zero on-hand quantity despite the fact that TTC actively utilized these cores. The on-hand quantity for cores that are being utilized are likely not zero but staff did not record the quantities in IFS. For instance, while the IFS system recorded zero on-hand quantity for various air dryers (a critical component in the filtration of the bus air system), we noted hundreds of air dryers in a TTC warehouse, some of which were sitting outside and exposed to harsh weather conditions for almost a year instead of being utilized. If staff do not update IFS with accurate on hand quantity of cores, Buyers are more likely to buy the more costly new parts rather than remanufactured parts. Therefore, it is important that TTC improve its controls on core retrieval and tracking.

Core codes can be for internal or external rebuild program or buy exchange. In discussion with TTC staff, we found that most of the core codes for external rebuild or buy exchange showed "0" quantity on hand in IFS. For core codes used for internal rebuild, some are tracked but TTC did not have a closed loop from the time the cores were taken off at garages or rail car houses to the time they were shipped back to warehouses or rebuild shops. Others are not tracked at all.

Our analysis showed that TTC paid \$2.0 million extra for core charges for air dryer and BAE PCS, traction motors and traction generators since 2014. For the remaining life span of the current bus fleet, TTC may pay \$4.0 to \$8.0 million extra if it loses 10 to 20 per cent the cores for BAE parts and air dryers. Table 1 provides details of the analysis.

For the four Luminator parts which TTC only bought new parts instead of utilizing cores, it paid \$0.8 million for lost cores since 2014. If TTC continues with the status quo, it may lose \$3.0 to 4.0 million for the remaining life span of the current bus fleet for these four parts alone. Table 2 provides some details of the analysis.

Table 1 Savings Analysis for Four Parts That TTC Currently Utilizes Cores

Parts	Value of Lost Cores since 2014 to March 21, 2017	Additional Cost to TTC Based on Projected Core Loss for the remaining lifespan of the Bus Fleet	
		Losing 10%	Losing 20%
PCS	\$1,324,800	\$1,539,534	\$3,079,069
Traction Motor	\$343,200	\$1,160,229	\$2,320,458
Traction Generator	\$90,000	\$743,736	\$1,487,473
Air Dryer	\$187,200	\$708,122	\$1,416,245
Total Lost Savings Since 2014	\$1,945,200		
Total Potential Lost Savings		\$4,151,624	\$8,303,247

Table 2 Savings Analysis of Parts that TTC Currently Does Not Utilize Cores

Luminator Parts	Value of Lost Cores Since 2014 to March 21, 2017	Total Potential Savings if TTC keeps good control of Cores for the remaining lifespan of the Bus Fleet
Rear Display Module	\$350,242	\$1,388,068
Rear/Side Sign	\$312,816	\$1,234,633
Front Sign Generation 4	\$26,770	\$135,734
Power Control ASM Front Generation 4	\$183,387.05	\$879,569
Total Savings	\$873,215	\$3,633,003

Table 3 Annualized Potential Savings If TTC Improve Controls on Cores for a Sample of Eight Parts

Parts that TTC Currently Utilizes Cores	Annualized Potential Future Savings Based on Projected Core Loss	
	Low - Losing 10%	High - Losing 20%
PCS	239,430	478,860
Traction Motor	180,440	360,880
Traction Generator	115,667	231,333
Air Dryers	77,560	155,120
Sub-total	<u>613,097</u>	<u>1,226,193</u>
Parts that TTC Currently Does Not Utilize Cores		
Rear Display Module	151,486	151,486
Rear/Side sign PWA Unicard	135,228	135,228
Front Sign Gen 4 16X40 Generation Board	12,793	12,793
Power Control ASM Front G4	85,895	85,895
Sub-total	<u>385,403</u>	<u>385,403</u>
Total	<u>998,499</u>	<u>1,611,596</u>
Total Losses rounded to the nearest \$500,000	1,000,000	1,500,000

Table 4 Savings Analysis for Four Parts that TTC Currently Utilizes Cores

	Value of lost cores since 2014 to March 20, 2017	New Buy unit price	EXRB unit price	Difference between New and EXRB unit price	Number of Bus Fleet	Average remaining lifespan of the Bus Fleet	Parts expectancy life	Projected lost savings if TTC lose 10% of the cores for the remaining lifespan of the Bus fleet due to not tracking cores systematically	Projected lost savings if TTC lose 20% of the cores for the remaining lifespan of the Bus Fleet due to not tracking cores systematically
		A	B	C = A - B	D	E	F	G= E/F*D*C*10%	H= E/F*D*C*20%
								10%	20%
Hybrid - PCS	\$ 1,324,800.00	\$ 36,800.00	\$ 16,100.00	\$ 20,700.00	694	6.43	6	\$ 1,539,534.90	\$ 3,079,069.80
Hybrid -Traction Motor	\$ 343,200.00	\$ 62,100.00	\$ 46,500.00	\$ 15,600.00	694	6.43	6	\$ 1,160,229.20	\$ 2,320,458.40
Hybrid -Traction Generator	\$ 90,000.00	\$ 32,800.00	\$ 22,800.00	\$ 10,000.00	694	6.43	6	\$ 743,736.67	\$ 1,487,473.33
Total hybrid Parts	\$ 1,758,000.00							\$ 3,443,500.77	\$ 6,887,001.53
Air Dryer	\$ 187,200.00	\$ 1,500.00	\$ 700.00	\$ 800.00	1939	9.13	2	\$ 708,122.80	\$ 1,416,245.60
Total hybrid Parts and Air Dryer	\$ 1,945,200.00							\$ 4,151,623.57	\$ 8,303,247.13

Table 5. Savings Analysis of Parts that TTC Currently Does Not Utilize Cores

	Value of lost cores since 2014 to March 20, 2017	New Buy unit price	EXRB unit price	Difference between New and EXRB unit price	Number of buses using these parts currently	Number of buses going to use these parts in the future	Remaining Lifespan of the Bus fleet	TTCs historical usage of these parts per year	Total savings going forward if TTC kept cores
		A	B	C = A - B	D	E	F	G	H = C * G * F * E / D
Rear Display Module	\$ 350,242.20	\$ 2,475.13	\$ 631.75	\$ 1,843.38	1,573	1939	9.13	67	\$ 1,383,067.82
Rear/Side sign PWA Unicard	\$ 312,816.00	\$ 2,371.39	\$ 742.14	\$ 1,629.25	1,573	1939	9.13	67	\$ 1,234,632.51
Front Sign Gen 4 16X40 Generation E	\$ 26,770.24	\$ 1,452.36	\$ 665.00	\$ 787.36	844	1210	10.61	11	\$ 135,734.21
Power Control ASM Front G4	\$ 183,387.05	\$ 2,612.12	\$ 1,017.45	\$ 1,594.67	1,091	1457	10.24	40	\$ 879,568.56
Total	\$ 873,215.49								\$ 3,633,003.10

Appendix 1: Management’s Response to the Auditor General’s Review of Toronto Transit Commission Procurement Policies and Practices: Improving Materials Management and Purchasing Policies Can Potentially Result in Significant Savings

Recommendation 1: The Board request the Chief Executive Officer, Toronto Transit Commission, to undertake the necessary steps to maximize warranty claim rate and revenue for aftermarket parts. Such steps should include an assessment of the resource and technology requirements to enable staff to systematically retrieve, track, and process aftermarket parts warranty.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

Materials and Procurement cannot validate that there is between \$4.0 and \$6.0 Million in potential savings by maximizing our aftermarket parts warranty claims. M&P will conduct a detailed investigation into the percentage of aftermarket parts that fail within the warranty period.

Materials and Procurement will also complete an assessment of the estimated savings associated with pursuing an aftermarket warranty program in conjunction with our field personnel. At this time we agree with pursuing “potential” savings associate with using aftermarket market parts versus Original Manufactured (OEM) parts.

At the same time, once we have completed an evaluation of the potential savings, Materials and Procurement is committed to work with our field staff to roll out a strategy to identify and evaluate Aftermarket Parts that may be suitable replacements for Original Equipment Manufacturer (OEM) parts wherever feasible. We will immediately start to produce a report identifying with targeted savings, and then start to pilot replacement parts, post evaluation of the parts by the field based on the acceptance that the Aftermarket parts meets the same performance expectations as the OEM part.

Please note that this recommendation is similar to the recommendation in the 2014 Phase 1 Audit of Bus Maintenance & Shops warranty process.

As a result of this audit, processes were developed and tools have been implemented in the Bus Maintenance & Shops Department to identify, track and process warranty claims for new bus purchases and high expense items. This process will be extended to streetcar and subway operations; and will include warranty for aftermarket parts.

Recommendation 2: The Board request the Chief Executive Officer, Toronto Transit Commission, to undertake steps to improve the tracking and retrieving of cores in order to maximize the use of cores in vehicle rebuild programs and avoid paying for additional core charges when purchasing remanufactured parts.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

We agree more can be done to track and better manage cores. We cannot verify that Millions of dollars can be saved by better tracking and management of cores without further analysis. A sample set of eight cores may not sufficient to conclude that millions of dollars can be saved. We do not know whether the eight cores analyzed are representative of all cores that can be refurbished instead of buying new parts.

We are committed to start to develop and implement a full operational tracking process for cores for the majority of highest value cores, immediately, and have the overall tracking system fully operational by the end of 2017 for all cores.

This recommendation is similar to the recommendation regarding the tracking of parts for warranty. This recommendation was also presented in the 2014 Phase 1 Audit of Bus Maintenance & Shops warranty process.

Please note that we will need to dedicate staff resources to properly track cores; the total cost of staff needs to be deducted from any potential savings. In order to better track cores, staff will need to receive, package and enter core data into the system.

The same process for warranty retrieval will be used for the retrieval of cores.

Recommendation 3: The Board request the Chief Executive Officer, Toronto Transit Commission, to review and address the parts shortages issue and its impact on vehicles out of service, rebuild delays, vehicle spare ratios, and materials requests turnaround time. Steps should be taken but not be limited to:

- a. Reducing delays in processing inventory requests
- b. Minimizing repetitive purchases of the same parts in small quantities
- c. Measuring and reporting materials requests turnaround time
- d. Ensuring alignment of Materials Management's performance indicators with TTC priorities
- e. Strengthening IFS system controls to monitor parts requests deletions.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

Materials and Procurement has already started the process of reducing parts shortages. We are currently measuring the relevant statistics to improve overall cycle times for our customers to obtain their material orders in a timely way. For example, we are measuring the time between a requisition request and the delivery of material to the customer as a baseline for further improvement. We are also creating more blanket orders for those parts that are repetitively ordered. We have completed the IFS system controls to monitor and prevent parts requests deletions as well. The initiatives implemented by Materials and Procurement since the time of the audit has resulted in a significant number of buses out of service due to shortage of parts. Trending in this area remains positive. The current (March & April) number of buses out of service due to parts shortage averages 10 – 12 buses per day.

Recommendation 4: The Board request the Chief Executive Officer, Toronto Transit Commission, to review the current method of centrally procuring low dollar purchases through the Materials and Procurement Department, and explore ways to improve efficiency, and minimize delays and the backlog of outstanding purchase requisitions.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

A solution for this problem has begun. We are taking the following steps to correct this issue:

- 1) Eliminating a back-log of outstanding requisitions with a "One quote required; additional quotes "encouraged" policy, similar to New York City transit.
- 2) Working on a communication to the field to have their teams directly order products and services

less than \$250 from the suppliers. Currently we are centralizing the solicitation of quotations for low dollar value purchases, especially in the case where the processing cost of the purchase is higher than the value of the product or service.

- 3) Adding as many requisitions to blankets as possible to leverage TTC spend to drive the deepest discounts, and increase the speed at which products and services are ordered.

Recommendation 5: The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure procurement policies and procedures provide clear directions and guidelines for Buyer's Discretion purchases and its subsequent amendment, and applicability of the dollar threshold.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

Within the remainder of 2017 Materials and Procurement will undertake a complete review of all of our Procurement Policies and Procedures with the intent of revising them, as necessary. We will ensure that we provide our Buyers are provided clear guidelines governing their limits on ordering expenditures, including setting clear direction and guidelines for buyer discretion.

Recommendation 6: The Board request the Chief Executive Officer, Toronto Transit Commission, to implement measures to monitor compliance with Buyer's Discretion procurement policy requirements, and to ensure the requirements are effectively communicated to staff involved in the procurement process.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

We will change our procurement policies and procedures, as necessary in 2017, including the policy on Buyer Discretion and then ensure staff compliance with the policy. We will ensure employees are made aware of the changes in policies, and also reporting will be developed to monitor and ensure compliance.

Recommendation 7: The Board request the Chief Executive Officer, Toronto Transit Commission, to identify strategies to improve response rate for competitive procurement and such strategies to include but not be limited to:

- a. providing free viewing of tender documents or detailed notices of tenders
- b. extending bid response time for complex specifications
- c. Identifying alternate sources of supply and revise its current minimum quotes requirement to invite five or more suppliers where low bid response rates are evident.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

We will begin an evaluation of this process immediately. Materials and Procurement will evaluate opportunities to solicit as many suppliers where and when possible

Recommendation 8: The Board request the Chief Executive Officer, Toronto Transit Commission (TTC) to formalize the process and requirements for seeking client department input in the bid evaluations for purchases involving subjective criteria or complex technical aspects. The formalized procedure should be posted on TTC intranet to be accessible by all staff.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

We will ensure we revise our policy to ensure there is a defined process to solicit more client input in bid evaluations for more complex procurement. We will start this process immediately.

Recommendation 9: The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to review and strengthen the TTC's current non-competitive procurement policy and procedure requirements to ensure all sole and single source purchases are justified, and adequately reviewed and authorized.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

We will ensure that the process for non-competitive purchases are clearly outlined in a revised policy, and we will challenge those purchases where we believe that further pricing could be obtained from additional suppliers. For sole source needs we will regularly post Notice of Intents to validate there are no other vendors that can supply the product of service.

Recommendation 10: The Board request the Chief Executive Officer, Toronto Transit Commission, to consider publishing a notice of sole source intent prior to engaging in non-competitive procurement for large dollar value sole source purchases where only one company is known to supply the goods or services but others may exist.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

Agreed, we will immediately begin the process of posting more Notice of Intents (NOIs) where we believe that there is only one vendor that can meet our requirements.

Recommendation 11: The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to expand and actively pursue alternate sourcing to reduce purchase costs for replacement parts, and to ensure the alternate sourced products are adequately reviewed and tested for TTC operations.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

As part of Materials & Procurement's response to address Recommendation #1, M&P will work with end users to identify and evaluate Aftermarket Parts that may be suitable to replace OEM Parts. This will include the identification and evaluation of alternate suppliers.

We plan to start with the following next steps:

- 1) Generate a report showing our highest value items that have *potential* for an Aftermarket solution.
- 2) Explore alternative sourcing or substitutes for these higher dollar OEM parts in phase 1.
- 3) Implement an aftermarket parts solution where the cost of the replacement is more competitive than the OEM parts, and the performance of the Aftermarket parts meets our technical requirements for any parts determined to have a technically acceptable equivalent.

Recommendation 12: The Board request the Chief Executive Officer, Toronto Transit Commission, to establish a comprehensive Blanket Contract policy and procedural requirements detailing minimum dollar threshold and ongoing review and renewal processes.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

This process has begun. We are currently adding as many required forecasted inventory items to blankets as possible to leverage our spend to increase discount rates, and also increase buyer processing times.

Recommendation 13: The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to reduce annual purchase costs where feasible by establishing Blanket Contracts or expanding existing price agreements with vendors of concentrated spending and repetitive purchases. Periodic analysis of TTC's overall purchase activities to identify Blanket Contract opportunities should also be undertaken.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

Agreed. We have developed reporting to identify parts that are repetitively purchased that can be added to blanket orders. We are currently adding as many parts to blanket orders as possible.

Recommendation 14: The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure that all procurement policies, procedures, and forms are up to date and that staff have a single-point electronic access to procurement policies, procedures and forms.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

We plan on revising our current policies and procedures during 2017.

Recommendation 15: The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to regularly report to the Board on TTC's procurement statistics and performance indicators.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

We need to setup a reporting schedule, and provide relevant reports to the Board.

Recommendation 16: The Board request the Chief Executive Officer, Toronto Transit Commission, to undertake steps to review and enhance the monitoring and controls of the Purchase Card program. Such steps should include a review of the level of staff resource, effectiveness of the current spot audits, and the transaction review and approval process.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

We will undertake this effort asap.

Recommendation 17: The Board request the Chief Executive Officer, Toronto Transit Commission, to explore ways to expand the current Purchase Card (PCard) program with a view to utilizing PCard to improve the efficiency of the agency's purchasing functions.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

We are currently revising our P-card process to have our end-users use the cards for purchases less than \$250 as a first step. We will then consider rolling out the p-card policy to higher levels of spend based on analysis of the benefits and risks of a \$250 and under, "Field" P-card policy.

Recommendation 18: The Board request the Chief Executive Officer, Toronto Transit Commission (TTC), to ensure the Purchase Card process is considered when reviewing and revising TTC procurement policy dollar thresholds.

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

As stated, we plan to start with the promotion of Purchasing Cards for purchases of under \$250 by field personnel. This will alleviate the need to centrally process small dollar value transactions. We do believe that keeping the processing of all transactions net of those valued at \$250 or centrally is a first step. Based on the ability to reduce Outstanding Requisition counts in our Purchasing and Sales department, we may consider decentralizing more of our procurement, and associated use of Purchasing Cards in a phase 2 rollout after reviewing the use of P-cards for purchases under \$250 in value.

Recommendation 19: The Board request the Chief Executive Officer, Toronto Transit Commission, to report to the Board on an annual basis on savings achieved as a result of implementing the recommendations from this report, including information regarding:

- identifying alternate sourcing
- pursuing aftermarket parts warranty
- initiating further Blanket Contracts or expanding the product catalogue of existing Blanket Contracts
- retrieving and tracking cores

Management Response: Agree Disagree

Comments/Action Plan/Time Frame:

We are in the process of developing appropriate reporting to address this issue. Our first step will be to identify parts that potentially have a substitute. We plan to start with an identification of those parts with the highest savings potential.

We will implement a system to better track cores and estimate potential savings. A sample of 8 cores is not significant enough to conclude large savings through the initiation of a program.