November 28, 2001

The Honorable Bill Purcell, Mayor
Metropolitan Government of Nashville and
Davidson County
Metropolitan Courthouse
Nashville, TN 37201

Report of Internal Audit Section

Dear Mayor Purcell:

We have recently completed a performance audit of the Metropolitan Government of Nashville and Davidson County's Fleet Operations. According to the *Government Auditing Standards* issued by the Comptroller General of the United States, "a performance audit is an objective and systematic examination of evidence for the purpose of providing an independent assessment of the performance of a government organization, program, activity, or function in order to provide information to improve public accountability and facilitate decision-making by parties with responsibility to oversee or initiate corrective action." A performance audit is different than a financial statement audit, which is limited to auditing financial statements and controls, without reviewing operations and performance. In performing this audit, we retained Transportation Consultants, Inc. (TCI) to work under our direction. Their final report dated November 2001,

Internal Audit typically addresses audit reports to and obtains responses from the department head and the board or commission overseeing the department audited or, for departments without a board or commission, the department head and the Mayor. As more fully explained in the accompanying report from TCI, Metro's vehicle fleets and fleet operations have been fragmented among several Metro departments, namely General Services, the Fire Department, Water and Sewer, the Parks Department, and Public Works, all of which fall under the direct responsibility of the Mayor. Additionally, the Metropolitan Board of Education (MBOE) maintains fleets of school buses and other vehicles, and the Nashville Electric Service (NES), Metropolitan Transit Authority (MTA) and Metropolitan Development and Housing Agency (MDHA) maintain fleets of vehicles. The TCI report concludes that the fleets and fleet operations of the five Metro departments that report directly to the Mayor should be consolidated but that the fleets of MBOE, NES, MTA and MDHA are more distinct operations that would not benefit from significant coordination or integration with other Metro departments at this time. As a result, this report is being addressed to the Mayor, who has the ultimate overall managerial responsibility for the five Metro departments with fleet operations.

Objectives, Scope, and Methodology

This audit represents the first comprehensive performance audit of Metro's fleet operations. The five Metro departments that were the primary focus of this audit have over 3,500 vehicles at a recorded cost of $83.6 million. Those vehicles include police cars, fire trucks, ambulances, medium and heavy duty trucks, off road and grounds vehicles, cars, vans and light trucks. Metro's fleet is maintained in ten different garages by 75 mechanics and 33 other personnel at an approximate cost of $8.7 million for the 2000-2001 fiscal year. The size and cost associated with Metro's other fleets are detailed in the accompanying TCI report.

The primary objectives of this performance audit were as follows:

- Review all major aspects of fleet operations for the five Metro departments, including assessing the efficiency and effectiveness of vehicle maintenance operations, capital replacement, vehicle utilization and parts inventory management.
- Compare Metro's cost of operations, key performance measures and overall operations to industry norms, benchmarks and best practices.

- Assess the overall management of Metro's fleets, including organizational structure, staffing patterns, policies and procedures, and information technology.
- Review other practices associated with fleet management, including fuel management, take-home vehicle policies, cost recovery practices, and insurance policies.
- Develop findings and recommendations for any areas where performance could be improved.

Secondary objectives were to conduct a more in-depth review of the mechanical aspects of the MBOE and MTA fleets, to address any other significant aspects of the MBOE and MTA fleets not covered in their respective performance audits, to reassess the number of mechanics needed at MBOE, and to conduct high level reviews of the NES and MDHA fleets and fleet operations. The underlying rationale behind this work was to provide TCI's expertise for a high level assessment of departments that have more distinctive and less interdependent fleet operations.

The scope of the work included all aspects of operations related to the five Metro department fleet operations, and the audit focused on fiscal year 2001 performance and cost. Certain analyses required the consideration of financial results, performance and operations outside of that time period. The scope of work surrounding MBOE, NES, MTA and MDHA was similar but not as in-depth, given the more limited nature of the objectives of that work.

The methodology employed throughout this audit was one of objectively reviewing various forms of documentation, including written policies and procedures, financial information and various other forms of data, reports and information maintained by the five Metro departments and MBOE, NES, MTA and MDHA. Management and administrative personnel and mechanics at all major garage locations, as well as personnel from other Metro departments and other stakeholders, were interviewed, and various aspects of all fleet operations were directly observed. Data obtained from the various fleet maintenance systems in place was analyzed, and various aspects of fleet performance, cost and practices were compared to those of industry norms and to best practices.

We performed the audit procedures in accordance with generally accepted government auditing standards.

Findings and Recommendations

TCI's report addresses the current fleet operations and the resulting findings and recommendations in detail. Following is an overview of some of the more significant findings and recommendations included in their report.

TCI found an overall lack of sound management over Metro's vehicle fleets and fleet maintenance operations. The current systems are fragmented, inefficient, and – in many areas – ineffective, sometimes resulting in unsafe conditions. It is important to note that mechanics and other fleet staff throughout Metro are hard-working and dedicated employees who genuinely appear to be trying to do their jobs in a professional and effective manner. The audit findings result from systemic problems due to the absence of a comprehensive, Metro-wide fleet management program with adequate systems and processes in place to support the staff responsible for the fleets and maintenance operations.

Overall findings with regard to Metro's collective fleet operations managed through General Services, the Fire Department, Water and Sewer, the Parks Department and Public Works are as follows.

- With the exception of the Motor Pool, auditor mechanical inspections uncovered unsafe vehicle conditions, particularly with regard to heavy equipment vehicles. Weekend safety inspections of 127 heavy equipment vehicles in operation at Water and Sewer and Public Works revealed safety problems on every vehicle inspected, resulting in those vehicles being taken out of service until they were repaired.
- Adequate capital replacement plans have not been in place, resulting in the fleets at Parks, Pubic Works, and Water and Sewer being excessively old and in poor condition. Additionally, the Motor Pool fund balance is being depleted because of the absence of a capital recovery plan for Police vehicles.
- There are not adequate information and fleet management systems in place, and each location has a different method of tracking fleet information, some of which are manual.
- For the locations where fleet management information is available, mechanic utilization is lower than industry norms, the level of preventative maintenance is lower than industry norms and the number of inactive vehicles is excessive.
- The cost of maintaining Metro's fleets is excessive when compared to industry norms.

- Mechanic training and certification were not always a priority, and most garage locations had safety and/or cleanliness issues, inadequate parts inventory accounting and controls, and poor tire management.
- Fuel management is not centralized, and adequate fuel information systems are not in place at all locations. Information on environmental compliance surrounding underground storage tanks was not easily obtainable.
- Central fleet policies are outdated, and management and maintenance procedures are not adequately documented in most garage locations.

TCI recommends consolidating Metro's fleets and fleet maintenance operations currently operating under General Services, the Fire Department, Water and Sewer, the Parks Department and Public Works. Organizationally, an Office of Fleet Management (OFM) should be established within General Services to be run by a professional fleet manager and other administrative staff who could manage a consolidated Metro-wide fleet operation. TCI recommends that the OFM include three main garage locations - one for light vehicles, one for heavy equipment vehicles, and one for grounds and other off-road equipment and vehicles, with a fourth heavy equipment garage that would provide limited inspections and preventative maintenance. Other aspects of this consolidation would include:

- OFM ownership of all vehicles, with departments leasing vehicles from OFM at rates that would fund a reasonable capital replacement plan.
- Full cost recovery for all maintenance and repair work.
- Consolidating existing garages into three main garages, plus a heavy equipment inspection/preventative maintenance location. Because Metro does not currently own an adequate alternative light vehicle garage facility, TCI is recommending further study surrounding a new location for a light vehicle garage, should the location of the existing Motor Pool be developed for other uses.
- Staffing the garages at levels that reflect industry norms, taking Metro's mechanic utilization experience into account.
- Centralizing all aspects of fuel management and conducting an additional study of the benefits of a fuel card program.
- A new fleet management information system that would support all aspects of fleet management and integrate into existing accounting and other systems.
- Updating all aspects of fleet policies and procedures.

It is estimated that implementing these recommendations would save $2.9 million in fleet operating expenses over the next 5 years, while providing Metro with a well managed, safely maintained and appropriately utilized fleet. In addition to these savings, additional savings would be realized by a reduction in the fleet size through improved sharing and scheduling of heavy and other equipment. TCI has also recommended changing the fuel grade purchased, which would save Metro an estimated $200,000 annually.

Other key recommendations include:

- Outsourcing tire management,
- Exploring the use of alternative fuel vehicles, and
- Considering self-insuring vehicle collision damage.

In order to implement the above, it is recommended that the Mayor appoint a task force with appropriate representatives from the five Metro departments that are consolidating their fleet operations, plus representatives from Finance, Human Resources, and Legal. Additionally, the existing executive order should be replaced by an executive order establishing an Office of Fleet Management and empowering that office to implement the recommendations made in this audit.

Given that the Office of Fleet Management will not be fully staffed until the 2002-2003 fiscal year, I am recommending that Metro obtain contract services to establish appropriate charge back rates and vehicle replacement rates for the 2002-2003 budget and to assist the task force and General Services in implementing the steps in Phase 1 of TCI's audit implementation plan, as needed.

With regard to the other departments and agencies reviewed, TCI found that NES was the best run fleet operation within Metro. NES's fleet and maintenance operations are well managed, and NES's fuel system and tire management program are models for the rest of Metro. TCI made a few recommendations for improvement to NES that were well received. Similarly, MDHA's fleet and maintenance operations are well run, and most of TCI's recommendations were implemented before this report was issued.

With regard to MTA, TCI recommended additional performance measurement and identified potential savings in parts management. Similar to the MTA performance audit, TCI recommended that MTA further analyze the number of mechanics and other maintenance workers needed to support the fleet. In the absence of reliable performance measures and other data, and given the more limited objectives and scope of their work at MTA, TCI was not able to recommend a specific target with regard to maintenance staffing. However, the overall cost of the fleet maintenance operation and other performance measurements suggest that staffing in that area may be higher than needed.

TCI's work at MBOE uncovered a number of problems in the bus maintenance operation, including identifying buses with potential safety problems that were pulled from service until they could be repaired. As a result, I previously recommended bringing in outside management on an interim basis in an attempt to provide the training and procedural changes necessary to improve the quality of the inspections and routine maintenance performed by the bus maintenance garage, and MBOE has established a separate contract for those services. Once the quality and efficiency of the work is up to a reasonable level and assuming the fleet size stays the same, TCI estimates that MBOE could reduce the number of mechanics on staff by 6 over the next three years, which is similar to the reduction recommended in the previous MBOE performance audit conducted by MGT of America. TCI also recommended that MBOE hire a fleet manager and that MBOE consider utilizing Metro's Office of Fleet Management for non-bus maintenance and repair needs.

*****

The Mayor's response to the audit recommendations surrounding the five Metro Departments is attached to this report. The portions of the TCI report related to MBOE, NES, MTA and MDHA have been provided to and reviewed with appropriate officials responsible for those departments and agencies. Those officials generally agree with TCI's findings and have committed to consider the related recommendations and respond to them in writing within two weeks of the issuance of this report.

We greatly appreciate the cooperation and help provided by General Services, he Fire Department, Water and Sewer, the Parks Department, Public Works, MBOE, NES, MTA, and MDHA.

This report is intended for the information of the management of the Metropolitan Government of Nashville and Davidson County. This restriction is not intended to limit the distribution of this report, which is a matter of public record.

Internal Audit Section

Kim McDoniel
Internal Audit Manager

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Karl F. Dean, Department of Law
Randall Dunn, Public Works
Jim Fyke, Parks Department
Pedro Garcia, Metropolitan Board of Education
Stephen Halford, Fire Department
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John W. Lynch, Human Resources Department
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Gerald Nicely, Metropolitan Housing and Development Agency
Marian Ott, Metropolitan Transit Authority
Scott Potter, Water and Sewer

Metropolitan Council Audit Committee
Richard V. Norment, Director of County Audit
KPMG, Independent Public Accountant

November 28, 2001

Ms. Kim McDoniel
Internal Audit Manger
Metropolitan Government of Nashville and
Davidson County
222 3rd Avenue North, Suite 401
Nashville, TN 37201

Dear Ms. McDoniel:

I have reviewed Internal Audit's report on Metro's fleet operations and TCI's Fleet Performance Audit, and I am in basic agreement with the related recommendations. Sound management of the government's fleet operations is essential for public and employee safety and for the protection of the significant investment in capital resources allocated to the thousands of vehicles deployed throughout Metro.

I will call together a task force that will include representatives from the appropriate Metro departments and instruct that task force to work toward implementing the plan proposed by TCI. It is my intention to call this task force together during the month of December.

Sincerely,

Bill Purcell

Copy: Mike Bradley, General Services
Karl F. Dean, Department of Law
Randall Dunn, Public Works
Jim Fyke, Parks Department
Stephen Halford, Fire Department
John W. Lynch, Human Resources
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EXECUTIVE SUMMARY

Introduction

Transportation Consultants, Inc. is pleased to submit our report, summarizing the results of our performance audit of Metropolitan Government of Nashville and Davidson County (Metro) Fleet Operations. This report is part of a Metro Internal Audit report dated November 2001. This audit, conducted under the Internal Audit Section of the Department of Finance, was performed over a six-month period from late March 2001 to September 2001. Our scope of services centered on a comprehensive performance audit of the various Fleet Operations within Metro to assess the efficiency and effectiveness of fleet operations and report on the results of that work. Our review was broadly governed by the precepts of Government Auditing Standards that directed us to focus on:

- Economic and efficient use of resources
- Underlying causes of inefficiencies or uneconomic practices
- Compliance with laws and regulations
- Whether results achieved match the expectations of the authorizing body
- Effectiveness of the various operations

Our review concentrated on all those entities within Metro that maintained a fleet of vehicles or similar equipment. Based on the results of our work, we have categorized the results of our work for Metro Departments, Schools, and Component Units and have organized our report as follows.

Metro Departments that report directly to the Mayor include the following departments:

Water Services
Fire Department
Parks
Public Works
General Services Motor Pool

This **Executive Summary** includes an overview of the findings related to those departments, followed by our overall recommendations for Metro's fleet operations. The recommendations are followed by an implementation strategy and a summary of benefits and financial impacts.

Chapter One provides the detail behind the findings related to the Metro Departments and a discussion of the findings surrounding the practices and operations impacting those departments, including:

Vehicle Assignments
Radio Operations
Parking/Traffic Violations
Central Motor Pool Vehicle Replenishment
Motor Vehicle Fuel
Vehicle Insurance

Chapter Two includes other recommendations related to the Metro Departments, some of which should be considered for immediate implementation.

School fleet operations fall under the governance of the Metropolitan Board of Education (MBOE) and are addressed in **Chapter Three**. Funding of the MBOE is ultimately the responsibility of the Mayor and Metropolitan Council, and there are several operational aspects of MBOE that are administered or coordinated by other central Metro departments. The school fleet operations, however, have a number of unique aspects that must be addressed separately from other Metro departments.

Component Units include Nashville Electric Service, the Metropolitan Transit Authority, and the Metropolitan Development and Housing Authority. After conducting fieldwork at each of these locations, we concluded that that each of these entities' operations are such that there would not be near term benefits in considering general integration or significant coordination with other Metro departments at this time. As a result, our findings and recommendations for the component units, including a few recommendations for specific areas of coordination that could produce benefits, are addressed in **Chapters Four, Five and Six**.

Work Performed

Transportation Consultants, Inc. executed the following work plan over our May – August field work. The months of September, October and November were devoted to data analysis, report preparation, out briefings and the like. Our work plan consisted of the following general steps for all nine maintenance units:

- Operational Reviews/Observations
- Documentation of Users Viewpoints
- Data Collection (Performance and Cost)
- Assessment of Management Processes
- Resource Assessment

- Review of Facilities and Equipment
- Assessment of Fleet Financing, Fleet Information/Fleet Replacement
- Review of Inventory Systems
- Assessment of Maintenance Management (Area of Emphasis)
- Review of Fuel Management
- Compilation of Strategic Issues
- Formulation of Findings and Recommendations, Implementation Plans and Anticipated Benefits

A few of the key performance outcomes set forth by Metro in the Request for Proposal include:

- Comparison of Metro's fleet and fuel processes to best practices.
- Evaluation of operating efficiency and effectiveness.
- Major strengths and weaknesses for all operational areas.
- Specific deliverables, including replacement plans, cost recovery, consolidation of facilities and similar analyses.

Unless otherwise specified, industry standards cited are based on TCI's direct research and experience gained while performing over 180 fleet studies nationwide. The consultants were also tasked with reviewing other related operations and practices such as a review of the Radio Shop, disposition of parking tickets, and vehicle assignment policies.

Findings

The following comments are regarding the operations of the Metro departments. We might note that these operations are large and complex, e.g.:

- 108 employees are directly involved in the maintenance process.
- Approximately $6,000,000 is expended on fuel annually.
- Excluding fuel, approximately $8,734,000 is expended for labor, parts and outside services for the Metro vehicles.
- Maintenance operations occupy 140,000 square feet of garage space with 97 bays spread over ten buildings in six locations.
- Automotive parts value, where enumerated, approximates $725,000.
- The vehicle cost per FASTnet exceeds $83,000,000.

Following is a summary of the collective condition of Metro's departmental fleet operations.

AREA	FINDING	INDICATORS
Professional Fleet Management	• With the exception of the General Services Motor Pool, Metro has made little effort to consolidate or manage fleet operations. • Department level managers are not trained in fleet management, and often appear ambivalent in fleet operations. • Fleet operations are often combined with other functions at a low level within a department. • User groups are not impressed with the service, and have little interest in playing their role to ensure a safe and well-maintained fleet.	• No common practices or procedures. • Inconsistent policies and methods of operation. • A wide range of fleet replacement practices and fleet conditions. • Lost opportunities in areas of better utilization of equipment and labor. • A wide range of operating management and supervision in terms of skills and attitudes. • Operators are not well trained, checklists are ignored and vehicles are mistreated. • Capital necessary for fleet replacement is often spent on other needs. • No pooling of vehicles and equipment.
Fleet Replacement and Utilization	• With the exception of the Police fleet, the fleet is quite old. • Vehicles are often repaired well after they have exceeded their useful life. • Over 300 vehicles are seldom or never used. • In some departments capital funds are not sufficient for vehicle replacement.	• The median age of heavy vehicles is 1990 (11 years). • The median age of light vehicles, excluding the police fleet (which is very current) is 1994 (7 years). • The number of vehicles in the Fire, Public Works, Parks and Water fleets that are judged to be inactive exceeds 300. • Vehicle replacement funds compete with all other capital needs. • Replacement practices are supply driven.

AREA	FINDING	INDICATORS
Operational Efficiency and Effectiveness	• TCI found all five garages to be inefficient in terms of either cost or safety. • Administrative processes and procedures varied widely between locations and were not documented. • Most business practices are poor. • Many functions are duplicated. • The existing locations are sometimes too small to justify appropriate systems and support. • Fleet effectiveness was deemed questionable.	• In all cases, efficiency measures were below TCI's expectations and industry norms. An example is mechanic utilization ranging from 39% to 55%, when the norm is 75%. • Training was sporadic or inconsistent. • Appropriate mechanic certification was not found in all locations. • Administrative support was either behind, overstaffed, or non-existent. • Procedures were either non-existent or incomplete. • In some cases, cost accounting for the fleet was incomplete or non-existent.
Maintenance and Preventative Maintenance (PM)	• Maintenance quality ranged from fair to poor. • PM programs were generally undisciplined, not timely and/or poorly performed. • Training and certification opportunities were not consistent for mechanics. • There is very little control over PMs' due, in part, to asset ownership issues. • Operators are not cooperating in the PM scheduling process.	• Each operation has multiple road service calls daily. • Poor fleet utilization. • A low ratio (well under 50%) of preventative to corrective maintenance when the norm should exceed 50%. • There was very little emphasis on mechanic certification. • In performing indepth inspections on 127 heavy trucks, TCI encountered over 1,100 safety and operating defects.

AREA	FINDING	INDICATORS
Garage and Vehicle Safety	• Safety is not a priority. • Unsafe vehicles were in operation at most locations. • Multiple safety violations were found in all garages and many locations where vehicles were in use. • Tire programs are erratically applied. • Metro has significant exposure in the area of safety.	• TCI did not identify one effective safety program. • TCI's inspections found multiple vehicles with unsafe operating conditions. These conditions included slick tires, improperly inspected air brakes, frayed belts and hoses and severely corroded batteries. • Each location visited had stacks of used tires collecting rainwater, attracting mosquitoes. • Each location had multiple service calls daily on tire and battery problems.
Fleet Management Information Systems and Reporting	• There is no consistency in methods or systems. • Goals and expectations vary from none at all to those that are just evolving. • All of the locations have some type of significant information system problem. • Financial reporting relative to fleet management is inconsistent between departments, as is reporting accuracy. • Budgets are sometimes over-stated.	• Two garages have strictly manual systems. Each of the other facilities uses a different computer system. Only one location has a system that is reliable from an operational standpoint. • Three of the garages have very little management reporting. The remaining two garages are in the early stages of developing reports and targets. • The two manual systems have little report information of any type. • Motor Pool has problems with billing information and multiple databases. Public Works has recurring down time on their system. • There is no consistency of management reporting, and the wrong items are often measured. • Some system controls were bypassed with manual forms usage. • Two garages consistently under run budget by over $500,000 annually. • Vehicle maintenance costs are sometimes combined with those of other functions.

AREA	FINDING	INDICATORS
Repair Parts and Inventory	• Parts procedures varied from location to location. • Inventory effectiveness was poor. • Parts availability was poor. • Procurement was often governed by "low bids" rather than by performance reliability or user input on requirements.	• Mechanics complained that parts were not available as needed. • Parts availability (fill rates) was not calculated or targeted by fleet staff. • Parts inventories contained obsolete items. • Parts turned slowly (sometimes less than twice per year). • No reliable service history is kept on parts. Warranty claims on parts are not always made. • There are inadequate internal controls over parts inventories.
Fleet Appearance	• The fleet appearance does not meet expectations.	• Many vehicles are operating with dings and dents. • There is little provision for vehicle cleaning (inside or out). • Operators often turn in vehicles for maintenance in dirty condition. It is difficult for mechanics to be proud of repairing these vehicles.
Organizational Climate	• Users have been conditioned to accept mediocrity in maintenance, information and communication. • A wide range of skills and work ethics were noted in first line management and supervision. • Morale problems exist in two of the five garages. • Mechanics believe that their skills are not respected.	• A usual response concerning the fleet condition is, "they do the best they can with what they have". • Because of poorly trained or motivated first line supervision, the fleet is poorly maintained in two locations. • Two of the five garages have a history of unhappy employees and grievances.

AREA	FINDING	INDICATORS
Vehicle Assignment (take home vehicles)	• Policies governing the use of take home assignments are not understood or kept current. • Take home vehicle assignments are inconsistent throughout Metro.	• There is no central record of 24-hour vehicles, and it is unclear whether IRS regulations are being followed in all cases. • Guidelines vary between departments • The use of take home vehicles and private tags is sometimes considered a benefit for certain jobs. • Information concerning payroll and IRS treatment is not widely disseminated. • The current take home policy was issued in 1989. Portions of the policy are not documented.
Replenishment of Motor Pool Operating Fund.	• The cash fund for replacing motor pool vehicles is declining. • Vehicle replacement has been handled in an inconsistent fashion. • Procedures and processes concerning fleet replenishment are not well documented.	• The current asset portion of the fund has declined from $10,000,000 in 1999 to $4,300,000 on June 30, 2001. • Users have little information concerning the replenishment process. • The current rate for police vehicles is significantly less than required.
Fuel Operations	• Fuel use and distribution is not coordinated Metro wide. • Record keeping for fuel purchasing is not centralized. • Expertise on fuel purchasing and storage varies widely. • Efforts to monitor tank inspection and reporting are disjointed and separated from the units responsible for dispensing fuel.	• Several Metro departments were purchasing higher octane than required. • Fuel usage and shrinkage is not monitored consistently. • Even for tanks that are properly installed and have appropriate measuring devices, no process is in place to monitor for leaks. • It took TCI and Metro Internal Auditing five months to find the status of tank inspections.

Overall, our performance audit concludes that Metro departmental fleets are disjointed, costly, inefficient, ineffective and, in many cases, unsafe. Furthermore, we found an aging, oversized fleet that is poorly maintained, has inadequate administrative support, and has poor or nonexistent fleet management information with a ponderous parts inventory system with weak internal controls. Poor preventive maintenance practices and a disinterested operator work force exacerbate the situation. TCI has completed dozens of reviews such as this and Nashville clearly ranks in the bottom 25% (if not the lowest 10%) that we have worked with over the years. In fact, the only best practice we could identify would be the on-line surplus property auction process.

There were signs of improvement. In most areas new management has been put in place. There is a core of competent and certified mechanics in three departments, and two component units have well maintained fleets. The Nashville Electric Service has the best run fleet in Metro.

Recommendations

Our overall recommendation is that all fleet operations and all vehicles, heavy equipment, and other related equipment be transferred to a consolidated, centrally managed fleet function that will serve all Metro departments. This would include:

- Immediate formation of an **Office of Fleet Management** to govern a consolidated fleet function.
- A consolidated fleet function that operates as an **Internal Service Fund** with central ownership of fleet assets and full cost recovery.
- A new **fleet information system** for all fleet components that represents the latest technology and meets the basic requirements of asset control, work order processing, fuel and financial interfaces, inventory control and vehicle history.
- Agreed upon, published **metrics** that clearly state the performance goals of the organization and serve as a basis for intergovernmental service agreements.
- A vehicular fleet that is 85 - 90% of the current size and governed by an industry standard replacement schedule.
- Consolidation of a myriad of facilities into **three** main facilities for heavy, light and grounds equipment, plus one facility for limited preventative maintenance activities.
- Recognition that a strong, compliant **preventive maintenance system** should be the center point of operations.

Following is a summary of the major recommendations affecting Metro's departmental fleet operations. As detailed later in this section, these recommendations are expected to save over $2,900,000 in operating expenses over the next 5 years.

RECOMMENDATIONS

AREA	RECOMMENDATION	BENEFITS
Professional Fleet Management	• Create a strong, centralized fleet management function. This would be accounted for in one internal service fund, which would own the vehicles. • Charges would be made to the user departments of vehicles to recapture all costs (100% cost recovery). • Hire a professional fleet manager to manage this organization. This individual will manage a complex and important organization. Pay and benefits should be appropriate to the task. • Improvements should be made in administrative procedures, inventory management, business practices and the hiring, certification, and training of mechanics. • A new management team (Analysis, Technical Operations, and Administration) should be put in place. Existing managers and supervisors would apply for the positions for which they qualify. • The Office of Fleet Management (OFM) should be responsible for coordinating fuel purchasing and reporting Metro wide. • The OFM should issue new comprehensive policies and procedures; clear guidelines on the use of take home vehicles and updated departmental lease agreements. • An interim plan should be implemented until full implementation by 1/1/03.	• A smaller, safer and well-maintained fleet. • A significant reduction in the number of vehicles obtained through the salvage of inactive vehicles, the implementation of pooled heavy and specialty vehicles and a reduction in the number of take- home cars. • Long-term reduction in capital requirements through better management of repair parts and equipment inventory. • Over time, a reduction in the number of employees involved in fleet management. • Metro-wide improvement in effectiveness created by vehicles that are not out of service or require road calls. • Better coordination of the purchasing and storage of the biggest fleet expense – fuel.

AREA	RECOMMENDATION	BENEFITS
Operational Efficiency and Effectiveness, Maintenance and Preventative Maintenance, and Garage and Vehicle Safety.	• The current network of six locations will be consolidated to two major garages, augmented by two smaller facilities. • The two major garages will be organized by type of vehicle – light and heavy. Two daily shifts will be needed in both. • A new Light Vehicle Garage (new construction or public acquisition) should be planned if the existing location will be developed for other uses. • The existing Motor Pool location will serve all light (3/4 ton and below) units on an interim basis, and could serve on a long-term basis with minor modifications. • The existing Public Works garage should be the main repair location for all heavy and specialty trucks. • A smaller facility, probably in the existing Parks space, will service grounds equipment. • One small location may be developed to provide responsive PM service. All major repairs will be done in the two main garages. • The network will also coordinate mobile service and necessary wrecker response. • Central control of assets.	• Consistent procedures and systems across the fleet. • Long term reduction in capital cost because of better utilization of space and equipment. • Far greater efficiency of scale and related cost reductions through reduced needs for supervisors and administrative support. • Greater mechanic efficiency through the leveling of workload. • The reuse of valuable parcels of real estate (Fire Garage and Water Services facility). • Better training, tools and a safer work environment for mechanics. • Better working conditions and more recognition for mechanics.

AREA	RECOMMENDATION	BENEFITS
Fleet Management Information Systems and Reporting, and Repair Parts and Inventory	• Obtain a new fleet management information system. This system will contain all fleet management features to support all fleet locations. It will support fueling systems, feature bar coding and will fully integrate with other Metro systems, such as FASTnet. • Utilize this system to control and drive a timely and thorough PM process.	• Accurate and complete management reporting. • One inventory management process to manage parts. This will reduce salvage and capital, increase service and improve procurement. • Better labor utilization and fewer person hours needed to enter data. • Better user data and user information. • A much higher percentage of preventative versus corrective maintenance, creating greater fleet utilization and greater user efficiency. • Better tracking of parts history and warranties. • Better and timelier user information.

Office of Fleet Management

The most far-reaching recommendation deals with the establishment of an Office of Fleet Management. The following paragraphs detail important information relative to this critical organizational change.

In order to implement the recommendations embodied in our report, we recommend an appropriately empowered Office of Fleet Management (OFM) to be organizationally housed within the Department of General Services.

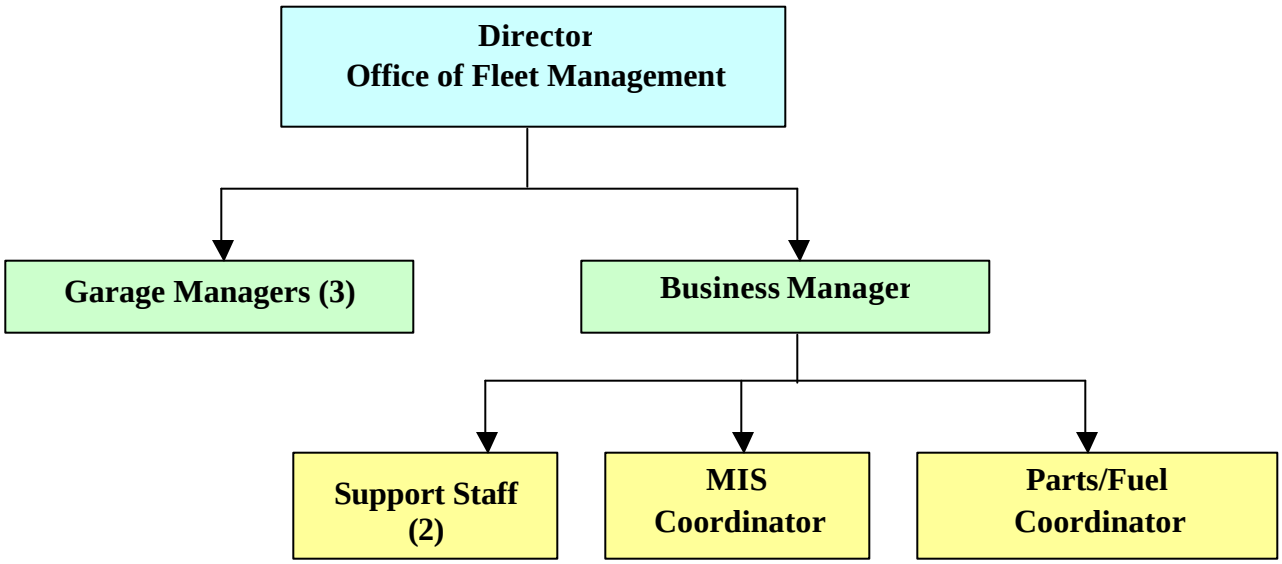
We recommend an overhaul and strengthening of Executive Order 89-14 that designated certain regulatory powers to General Services with respect to vehicles. The drafting and execution of this document will be the logical starting point for the governance issues distributed throughout this report. The new executive order should:

- Create a new Office of Fleet Management within General Services.
- Establish a Metro-wide Internal Service Fund effective July 1, 2002. This will feature a 100% cost recovery plan.
- Stipulate a transfer of all wheeled and self-powered assets to the Office of Fleet Management. This would apply to any unit in a Metro department assigned a Metro asset number in the Government's fixed asset system. The OFM will also co-ordinate the repair of certain department owned assets, such as grounds tools and compressors.
- Transfer all fleet management and fleet maintenance staff to the new Office of Fleet Management effective July 1, 2002.

The executive order should be a high-level policy document creating the organizational structure and authority to implement the recommendations made in this report but should not include detailed policies and procedures more appropriately developed and administered by the Office of Fleet Management. Once a fleet manager is in place, all existing policies and procedures should be reviewed, and comprehensive policies and procedures should be developed to address the following:

- Replacement Policy/Financing
- Internal Service Fund operations
- Safety Regulations
- User Responsibilities
- Preventative Maintenance Procedures
- Use of 24 Hour Vehicles
- Utilization Standards
- Establishment of a fleet of vehicles to be pooled and used to provide vehicles for Metro employees who need vehicles on a temporary basis.
- Reporting Requirements
- Fuel Policy and Procedures
- Labor Classifications
- Insurance Coverage
- Appearance Standards
- Facility Assignments
- Performance Standards

The proposed organization structure should appear as follows:



Our vision organizationally at this juncture is to have three fleet managers/supervisors reporting to the Director. These would be:

- Garage Manager – Heavy Equipment
- Garage Manager – Light Equipment
- Garage Supervisor – Grounds Equipment

Some administrative positions in existing organizations will become superfluous or will be transferred to the Office of Fleet Management. Further details on staffing within the organization are included later in this section.

We further envision a network of facilities to maintain this equipment. This should be as follows:

- Heavy Equipment – Current Public Works Facility
- Light Equipment – Current Motor Pool or New Facility
- Grounds Equipment – Current Parks facility
- Heavy PM Facility – West Center (Public Works)

Major Responsibilities of Metro Fleet Management Team

The ingredients of a sound fleet management system are detailed below:

Office of Fleet Management:

- Articulation of Fleet Goals and Objectives
- Intra-Governmental Service Agreements
- Coordinating User Groups
- Management of Fleet Supervisors & Facilities
- Execution of Business Plan

Maintenance Practices:

- Preventative Maintenance Practices
- Multilevel Preventive Maintenance Scheduling
- Preventative Maintenance Performance

Repairs :

- Scheduled Repairs
- Unscheduled Repairs
- Accident Repairs
- Parts Control
- Warranty Recovery

Other Services:

- Mobile Repair Units
- Priority Setting
- Environmental Compliance
- Subcontracted Services/Outsourcing
- Quality Control and Investigations (Technical)

Safety:

- Vehicle Safety
- Shop Safety
- Drug Free Work Place

Specifications:

- Equipment Specifications
- Specifications for Parts and Supplies

Fleet Information System (Proposed):

- Work Order System
- Parts Inventory System
- Fixed Asset System
- Fleet Performance Reports
- Fuel Information System

Vehicle Replacement:

- Replacement Schedule
- Equipment Replacement Criteria

Financial:

- Chargeback System
- P & L for Fleet Services
- Labor Rate Establishment
- Budgeting and Budget Monitoring
- Insurance (Recovery and Claims)
- Inventory Management

Contracts and Services:

- Parts and Supply Contracts
- Equipment Disposal
- Contracted Services/Outsourcing
- Fuel Management
- User Policy, Information, Relationships and Lease Agreements

Administration:

- Staff Scheduling
- Personnel issues

The requirements and qualifications for the Director of Fleet Management are listed below:

Desired Knowledge, Skills and Abilities of Director, Office of Fleet Management

Thorough knowledge of standard shop practices, methods, tools and machines of the various skilled mechanical trades; thorough knowledge of gas and diesel automotive and specialized highway equipment; mechanical operation and hydraulics systems; considerable knowledge of warehousing and stock control procedures; ability to plan, assign and supervise the work of Garage Manager and to advise them on technical and mechanical matters; ability to communicate effectively both orally and in writing; ability to establish and maintain effective working relationships with employees, the public and other Metro Departments.

Minimum Qualifications

Progressive experience with centralized fleet management programs over several years; experience in execution of a business plan for large fleets; experience in managing an organization of comparable size; graduation from a four year institution of higher learning; Certified Automotive Fleet Manager (CAFM); or any equivalent combination of education and experience which demonstrates possession of the required knowledge, skills and abilities.

FINANCIAL ANALYSIS

The next three tables detail the savings to be obtained from implementing the recommendations of this report.

The key assumptions for this analysis are as follows:

- Fleet size requirements do not change over the life of the analysis
- All estimates are in current dollars.
- Metro will begin immediately to replace the fleet based on the replacement schedules recommended.
- All excess, inactive vehicles will be scrapped.
- The new organization will focus on implementing best practices.
- Candidates fully qualified for the job will fill all positions.

The ultimate potential annual savings listed in Table 1 are based on cost per vehicle targets and targets for vehicles per mechanic. These targets are based on TCI's past experience and on information obtained from other municipal fleet operations. Both measures are dependent on the mix of the fleet within the maintenance location.

Table 4 summarizes projected capital needs over the next 5 years, including one-time capital expenses necessary to implement these audit recommendations.

Table 1: Summary of Current Costs and Potential Long Term Savings

	Fire	Motor Pool	Parks	Public Works	Water	Total
Current Metro Conditions						
Annual maintenance cost	$1,030,000	$2,057,000	$1,029,000	$3,153,000	$1,465,000	$8,734,000
Number of active vehicles	258	1,589	305	488	459	3,099
Number of mechanics	9.0	21.0	4.5	31.0	10.0	75.5
Number of other employees	5.0	9.0	1.5	9.0	8.0	32.5
Estimated mechanic utilization (should be 75%)	Unknown	46%	Unknown	55%	39% - 45%	
Cost per vehicle	$3,992	$1,295	$3,373	$6,461	$3,191	
Industry Norms						
Active Vehicles per mechanic	28	68	70	21	37	
Cost per vehicle	$4,000	$1,075	$3,000	$3,000	$3,000	
Projected Mechanics Needed						
Target - based on norm	9	23	4	23	12	71
Recommended - based on norm and utilization	9	21	4	23	10	67
Potential Long Term Savings - Based on Current Active Vehicles and Current Dollars	None	$349,000	None	$1,689,000	$87,000	$2,125,000

Table 2: Projected Long-Term Staffing Needs
(Assumes Current Active Vehicle Levels)

	Light Garage	Heavy Garage	Grounds Garage	Total
Mechanics				
Number of active vehicles	2,153	629	317	3,099
Number of mechanics/leads	33	28	6	67
Mechanic salaries ($37,000 avg.)	**$1,221,000**	**$1,036,000**	**$222,000**	**$2,479,000**
Garage Administrative Staff				
Number of managers	1	1	1	3
Managers salaries	$50,000	$55,000	$45,000	$150,000
Number of supervisors	2	2		4
Supervisors salaries	$80,000	$80,000		$160,000
Number of parts/admin staff	4	4	1	9
Parts/admin salaries ($30,000 avg.)	$120,000	$120,000	$30,000	$270,000
Projected mechanic and garage salaries, with fringe benefits at 25%	**$1,838,750**	**$1,613,750**	**$371,250**	**$3,823,750**
Current personnel costs				**$4,827,000**
Projected gross personnel savings				**$1,003,250**
New Office of Fleet Management				
Director				$90,000
Business manager				$60,000
Fuel/Parts Coordinator				$50,000
Systems support				$50,000
Administrative support (2 positions)				$70,000
Projected OFM salaries, with fringe benefits at 25%				**$400,000**
Net Personnel Cost Savings				**$603,250**

Table 3: Targeted Annual Operating Budgetary Impact
(In Fiscal Year 2000-01 Dollars)

	2001-02*	2002-03	2003-04	2004-05	2005-06	Ultimate Annual Savings
Personnel**	$4,827,000	$4,824,754	$4,601,284	$4,377,814	$4,223,750	$603,250
Parts, tires, batteries***	2,316,000	2,271,250	2,126,500	1,981,750	1,737,000	579,000
Outside repairs/equip rental***	918,000	890,625	833,250	775,875	688,500	229,500
Oil/lubrication	88,000	88,000	88,000	88,000	88,000	0
Small tools	63,000	63,000	63,000	63,000	63,000	0
Building/Utilities	369,000	369,000	369,000	369,000	369,000	0
Other	153,000	153,000	153,000	153,000	153,000	0
Total	**$8,734,000**	**$8,659,629**	**$8,234,034**	**$7,808,439**	**$7,322,250**	**$1,411,750**

* Assumes expenses will be approximately the same as 2000-01.

** Assumes a net reduction of 3 positions in 2002-03, followed by 5 positions the following 2 years, then 3 positions in 2005-06.

*** Assumes an ultimate savings of 25% as age of fleet declines and as efficiencies are achieved through better management.

Note that the above projected savings are very conservative, in that they do not include savings for a reduction in the size of the active fleet and in that they do not assume that all savings of $2,125,000 annually that could be expected based on industry standards will be achieved in a 5 year period.

Table 4

METRO-WIDE FLEET MANAGEMENT CAPITAL ESTIMATES 2001 – 2002					
Category	**2001 – 2002**	**2002 – 2003**	**2003 – 2004**	**2004 – 2005**	**2005 – 2006**
Fleet Software Package: [1]					
Software, training, implementation, purchase	$200,000				
Server, cabling	30,000				
Contingency	20,000				
Total fleet software costs	**250,000**				
Consolidation and Moving Costs: [2]					
Moving equipment, parts, furniture	40,000				
Enhancements to DPW and GSD garage space	30,000				
Enhancements to DPW and GSC office space	25,000				
Improvements to Parks to support new mission	20,000				
Costs to establish West center as a PM location	30,000				
Contingency	25,000				
Total Consolidation and moving	**170,000**				
Costs to Support Other Recommendations: [3]					
Repairing roof at Ambulance storage building	15,000				
Design fees for new light fleet/public safety garage	75,000				
Clean up of GSD site	20,000				
Total Others	**110,000**				
Amortization/Debt Service on New Light Garage: [4]			$2,000,000	$2,000,000	$2,000,000
Vehicular Fleet Replacement: [5]					
GSD – Police (a)	682,000	1,812,000	1,897,000	2,931,000	7,271,000
GSD – Non-Police (a)	525,000	602,000	599,000	1,101,000	1,520,000
Fire (b)	1,640,000	1,722,000	1,808,000	1,898,000	1,993,000
Water (b)	2,028,000	2,129,000	2,236,000	2,348,000	2,465,000
Department of Public Works (b)	3,140,000	3,297,000	3,462,000	3,635,000	3,817,000
Parks and Recreation (b)	1,750,000	1,837,000	1,929,000	2,026,000	2,127,000
Other capital needs	500,000	500,000	300,000	300,000	300,000
Total Vehicle Replacement	**10,265,000**	**11,899,000**	**12,231,000**	**14,239,000**	**19,493,000**
Total Estimated Capital Needs	**10,795,000**	**11,899,000**	**14,231,000**	**16,239,000**	**21,493,000**

Note: See accompanying worksheet for assumptions and rationale

CAPITAL ESTIMATE WORKSHEET FOOTNOTES

1. **Fleet Software Package** Based on a recent quotation from an industry leader for a city similarly sized to Metro.

2. **Consolidation and Moving Costs**

   Moving: Estimate to vacate Fire and Water garages and move parts and movable equipment to Public Works and Motor Pool.

   Enhancements: Estimates to correct sloped floor in Public Works and prepare Motor Pool for expanded evening shift.

   Improvements to Parks: Clean up, lighting, and office improvements.

3. **Costs to Support Other Recommendations**

   Repairing Roof: Roof where reserve ambulances are stored is partially caved in. Costs may be reallocated to locate ambulances elsewhere in rented space.

   Design Fees: Initial conceptual design fee estimated for new light garage.

   Clean Up: Removal of storage barrels and roof repairs in two GSD buildings closest to the river.

4. **Amortization/Debt Service on New Light Garage** Based on recent construction cost of a comparable facility.

5. **Vehicular fleet replacement**

   a. Detailed, vehicle by vehicle replacement schedules from this report.

   b. Informed estimates compiled from on site work sessions at Fire, Water, DPW and Parks and Recreation. This represents normal replenishment for a fleet of this type, adjusted for 5% inflation.

STRATEGIES AND IMPLEMENTATION TIMELINES

TCI has developed the following phasing and implementation strategies to guide Metro officials in the implementation timing of this report.

Phasing Strategy

We recommend that Metro employ the balance of calendar year 2001 to absorb and adopt this report. Should approvals be in place by the end of this year, we envision a three-phase implementation program that will occupy most of the calendar year 2002. In capsule form, they may be described as follows:

Dates	Phase	Implementation Step
1/1/02 – 6/30/02	Phase I	– Empowerment – Recruiting – Task Force Initiation – Task Force Oversight of Interim Recommendations
7/1/02 – 9/30/02	Phase II	– Development of Business Plan – MIS Procurement – Outline of Operating Procedures – Transfer of Staff
10/1/02 – 12/31/02	Phase III	– Utilization Study – Full Implementation – Motor Pool Establishment – Intergovernmental Service Agreements

We will now detail the timing and the steps of these various phases:

PHASE I – INITIATION January 1, 2002 – June 30, 2002	
Activity	**Timing**
• Draft revised wording for a new Executive Order establishing and empowering the Office of Fleet Management.	1/31/02
• Convene Task Force to oversee implementation.	1/31/02
• Communicate transition expectations and responsibilities.	1/31/02

PHASE I – INITIATION (continued) January 1, 2002 – June 30, 2002	
Activity	**Timing**
• Task Force oversight of implementation and planning.	1/31/02 - 6/30/20
• Recruit Director of the Office of Fleet Management. Hire by 3/31/02	2/15/02 - 3/31/02
• Craft detailed organization structure and position descriptions. Work with Human Resources on KSA's and salary structure.	4/1/02
• Develop position descriptions, KSA's, etc. for Service Center Managers.	4/15/02
• Develop the structure of the Internal Service Fund. Forecast budget by mid-April. Develop operating rates, guided by an overriding Financial Policy.	4/15/02
• Develop initial goals, targets and reports.	6/1/02

PHASE II – BUSINESS PLANNING July 1, 2002 – September 30, 2002	
Activity	**Timing**
• Develop OFM & Fleet Management Business Plan	7/1/02 - 7/21/02
• Develop new policies and procedures to underpin business plan: – Fuel Management – 24 Hour Vehicles/Private Tags – Vehicular Assignments – User Responsibilities – Surplus Processes – Warranty Recovery – Others as outlined above	7/21/02 - 9/30/02
• Recruit Service Center Managers	7/31/02
• Review parts outsourcing possibilities through a study and possible RFP.	8/15/02
• Finalize the balance of the Fiscal Year implementation plan.	9/1/02
• Effectuate physical moves/asset transfer/staff transfer.	9/30/02
• Convene users group; communicate plans, timetable and user responsibilities	9/30/02

PHASE III – REFINEMENTS October 1, 2002 – December 31, 2002	
Activity	**Timing**
• Commence utilization study of all fleet assets to arrive at a core vehicle count. Strive to reduce 10 – 20% of the current fleet size. Allow for a small backup fleet of 5 – 10% only. Create small fleet of pooled vehicles to accommodate periodic travel.	10/1/02 - 12/31/02
• Select parts strategy and options.	10/1/02
• Develop requirements and procure a Metro-wide Fleet Management Information System. Consider required interfaces, asset control, fuel interfaces, work order processing, inventory management and the like.	10/1/02
• Complete consolidation of fleet facilities into heavy, light, and grounds. Phase out other facilities.	10/15/02
• Develop required replacement schedules and funds to arrive at an orderly and timely replacement of the core fleet.	10/31/02 - 11/30/02
• Initiate vehicle utilization study in Police fleet. Review liaison staff.	11/1/02
• Commence parts outsourcing (or in-house restructuring).	12/1/02
• Initiate comprehensive PM and production planning for the Service Center staff. Develop performance measures to be captured by the Fleet Management System.	12/1/02
• Draft intergovernmental service agreements to govern the relationship between OFM and user departments for next fiscal year.	12/31/02
• Implement new fuel strategy, accountability and controls.	12/31/02
• Implement new asset control procedures to ensure new fleet assets pass through central control.	12/31/02

METRO GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY
CHAPTER ONE-SUMMARY OF METRO DEPARTMENTS

Introduction

This chapter discusses and compares TCI's findings relative to the five Metro Departments. Those five departments are:

- The Fire Department
- The General Services Motor Pool
- Parks and Recreation
- Public Works
- Water Services

Overview of Chapter One

Chapter one contains three sections. They are:

- Comparison and Summary of Findings
- Findings Relating to the Five Metro Department Fleet Areas
- Findings Relating to other Metro-wide issues

Acknowledgements

TCI would like to thank all Metro staff for their cooperation. Without exception, Metro staff were open, professional, and courteous.

The charts beginning on the following page summarize our findings and compare them within Metro and to appropriate industry goals.

METRO NASHVILLE SUMMARY CHARTS

PROFESSIONAL FLEET MANAGEMENT

Area	Fire	Motor Pool	Parks	Public Works	Water	Goal
The fleet is managed, not just maintained	No	Yes	No	Yes	No	Yes
Fleet management reports to an appropriate level	Yes	Yes	No	Yes	Yes	Yes
Appropriate capital funds have been available	No	Yes	No	No	No	Yes
Targets are set and attained	No	No	No	No	No	Yes
Most aspects of professional fleet management are found	No	No	No	No	No	Yes
Top management ensures that users play their role	No	No	No	No	No	Yes

SIZE AND COMPLEXITY OF OPERATIONS

Category	Fire	Motor Pool	Parks	Public Works	Water	Total
Apprx. annual maint. cost	$1,030,000	$2,057,000	$1,029,000	$3,153,000	$1,465,000	$8,734,000
Number of active vehicles	258	1,589	305	488	459	3,099
Number of employees	14	30	6	40	18	108
Number of mechanics	9	21	4.5	31	10	75.5
Parts inventory on hand	Unknown	$146,000	Unknown	$320,000	$134,000	$600,000
Vehicle Cost per FASTnet	$18,817,000	$28,095,000	$5,325,000	$19,745,000	$11,663,000	$83,645,000

METRO NASHVILLE SUMMARY CHARTS (continued)

FLEET REPLACEMENT AND UTILIZATION

Area	Fire	Motor Pool	Parks	Public Works	Water	Total
Fleet Assets: Light cars, vans and trucks	110	481	123	132	286	1,132
Police and fire sedans, excl. 48 motorcycles - Mtr. Pool	38	1,108 [1]	23	0	0	1,169
Fire apparatus	94	0	0	0	0	94
Ambulances	38	0	0	0	0	38
Medium and heavy duty trucks	0	0	64	160	42	266
Specialty heavy duty trucks	0	0	9	83	45	137
Off road and grounds units	0	0	257	180	140	577
Total – active and inactive	**280**	**1,589**	**476**	**555**	**513**	**3,413**
Number of vehicles & equipment/equipment per FASTnet	**318**	**1,670**	**435**	**621**	**538**	**3,582**
Fleet Median Age (In years of age)	**1996 (5)**	**1999 (2)**	**1991 (10)**	**1992 (9)**	**1990 (11)**	**N/A**
Does a viable replacement plan exist?	**No**	**No**	**No**	**No**	**No**	**No**
Vehicles that are inactive or overdue for salvage	**22**	**Minimal if any**	**171**	**67**	**54**	**Over 314 (9)%**

[1] May vary slightly from other subtotals due to timing differences.

METRO NASHVILLE SUMMARY CHARTS (continued)

OPERATIONAL EFFICIENCY AND EFFECTIVENESS

Area	Fire	Motor Pool	Parks	Public Works	Water	Goal
Procedures are documented and employed	No	No	No	No	No	Yes
Targets are set and measured	No	No	No	No	No	Yes
Estimated mechanic utilization based on available data	N/A	46%	N/A	55%	39% - 45%	75% (1)
Cost per active vehicle: Actual	$3,992	$1,295	$3,373	$6,461	$3,191	N/A
Cost per active vehicle: Norm (1)(2)	$4,000	$1,075	$3,000	$3,000	$3,000	N/A
Active vehicles per mechanic:	29	76	67	16	46	N/A
Active vehicles per mechanic: Norm (2)	28	68	70	21	37	N/A
Repair orders complete within 4 days	96%	N/A	83%	80%	81%	90% (2)

N/A = data not available from department

(1) APWA Survey of 174 Public Fleets, 1999

(2) TCI Surveyed Cities To Benchmark Comparable Numbers/Previous TCI Audits

METRO NASHVILLE SUMMARY CHARTS (continued)

MAINTENANCE AND PREVENTATIVE MAINTENANCE

Area	Fire	Motor Pool	Parks	Public Works	Water	Goal
Vehicle Condition	Average	Good	Poor	Poor	Poor	Excellent
Preventative maintenance and inspections are thorough	No	Yes	Yes	No	No	Yes
Preventative maintenance is performed according to schedule	No	Yes	No	No	No	Yes
Percent of maintenance that is preventative	N/A	50%	N/A	24%	20%	Greater Than 50%
Majority of mechanics are certified *	Yes	Yes	Yes	No	Yes	Yes
Random and emergency inspections uncovered multiple safety issues	Yes	No	Yes	Yes	Yes	No

GARAGE AND VEHICLE SAFETY

Area	Fire	Motor Pool	Parks	Public Works	Water	Goal
Safety and cleanliness is a priority achieved	No	Yes	No	No	No	Yes
An effective safety program exists	No	No	No	No	No	Yes
Safety violations were found in the facilities or the area	Yes	Yes	Yes	Yes	Yes	No
Users ignore unsafe conditions	Yes	No	Yes	Yes	Yes	No
Unsafe vehicles are in operation	Yes	No	Yes	Yes	Yes	No
Tire programs ensure that vehicles have safe, properly inflated tires	No	Yes	No	No	No	Yes

* National average is 69%

METRO NASHVILLE SUMMARY CHARTS (continued)

INFORMATION SYSTEMS AND REPORTING

Area	Fire	Motor Pool	Parks	Public Works	Water	Goal
Is a reliable information system in place?	No	No	No	No	Yes	Yes
Are appropriate management reports in place?	No	No	No	No	No	Yes
Is record keeping up to date?	No	No	No	Yes	Yes	Yes
Are systems integrated with key operating and Metro systems?	No	No	No	No	No	Yes

REPAIR PARTS AND INVENTORY

Area	Fire	Motor Pool	Parks	Public Works	Water	Goal
Inventory turnover	N/A	6 Times	N/A	2.5 Times	1.5 Times	4-6 Times
Fill rate (parts available at start of repair)	N/A	85%	N/A	50%	N/A	65-85%
A significant portion of the inventory is obsolete	Yes	No	Yes	No	Yes	No
Mechanics complain about parts availability and quality	Yes	No	No	Yes	Yes	No
Parts storage is neat and suitable	No	Yes	No	Yes	Yes	Yes
Parts service history and warranty records are tracked	No	No	No	No	No	Yes
Inventory is properly accounted for and safeguarded	No	Yes	No	Yes	Yes	Yes

METRO NASHVILLE SUMMARY CHARTS (continued)

FLEET APPEARANCE

Area	Fire	Motor Pool	Parks	Public Works	Water	Goal
The first impression of the fleet is favorable	No	Yes	No	No	No	Yes
A minimum amounts of dings and dents exist	No	Yes	No	No	No	Yes
Vehicles are rust free	Yes	Yes	No	No	No	Yes
The exterior of vehicles is usually clean	Yes	Yes	No	No	No	Yes
The interior of vehicles is usually clean	Yes	Yes	No	No	No	Yes
Operators take pride in their unit	Yes	Mixed	No	No	No	Yes

ORGANIZATIONAL HEALTH

Area	Fire	Motor Pool	Parks	Public Works	Water	Goal
Are the facilities and tools suitable?	No	Yes	No	Yes	Yes	Yes
Did morale problems come to light?	No	Yes	No	No	Yes	No
Was users input documented?	No	No	No	No	No	Yes
Are users thorough about meeting their obligations to the fleet?	No	Mixed	No	No	No	Yes
Do clear training opportunities exist for all employees?	No	No	No	No	Yes	Yes
Do mechanics understand work rules, certification pay policies, and promotional opportunities?	No	No	Yes	Yes	Yes	Yes

The following sections provides a detailed summary of our findings for each Metro Department:

METRO WATER SERVICES FLEET MANAGEMENT GROUP

Introduction

The Metro Water Services Fleet Management Group (MWS Fleet Management) currently employs **eighteen** (18) full time equivalent employees (FTEs) performing a variety of technical and administrative functions related to the management and maintenance of a fleet of **513** equipment units. The equipment consists of three types: light trucks and passenger vehicles, heavy-duty and sewer trucks, as well as off road equipment.

Fleet Management is located on an eighteen-acre campus, located on the western outskirts of Nashville. Three buildings are used to support operations. One building, consisting of 7500 square feet, contains office and tire shop space. The second building utilizes 14,000 square feet to house light and heavy vehicle maintenance, as well as shop offices and parts storage. The third building consists of 10,000 square feet and is used primarily as a paint shop.

After reviewing the budget and monthly financials, TCI noted that the annual budget is partially credited during the year to approximate transfers to other Metro Water Service (MWS) areas. The total 2001 fiscal year budget is approximately **$1,465,000** after adjustments for under or over transfers. At the end of the each fiscal year, remaining Fleet Management expenses are transferred to operating departments within Metro Water Services on a vehicular-based, pro rata share.

In general, we found the Metro Water Services Fleet Management Group to be struggling in most ways, but performing well in others. The Fleet Management Group has been supportive of the MWS' continuing reengineering effort. Many vehicle reductions have been obtained through transferring and sharing of vehicles. Fleet management has also shown positive strides in utilization of the MWS information system and in developing reporting capability. The Fleet Manager has been responsible for developing further support of mechanics Metro-wide. For example, he recommended establishment of a job grade for "Master Mechanic".

On the other hand, several maintenance elements are quite problematic and require either immediate, wide-ranging corrective action or more intermediate attention under a Metro-wide Fleet Management initiative. It should be noted that immediate corrective action was taken when TCI pointed out vehicle and other safety problems, most of which were related to vehicles where the preventative maintenance was performed by Public Works.

MWS Fleet Management operates its day shift five days per week. In addition, an evening shift works four days per week (Monday through Thursday, 2:30PM-1:00am). While some start hours are staggered, the day shift normally ends work at 4:00PM.

Fleet Assets

The fleet includes 286 light vehicles, 87 heavy-duty and sewer trucks, as well as 140 pieces of off the road equipment (generators, compressors, trailers, backhoes) for a total of **513** units.

The Metro Water Services Equipment is much older than expected. See the table below.

Table 1: Metro Water Services Equipment Distribution by Year

1986 / Older	1987-88	1989-90	1991	1992-3	1994	1995-6	1997-8	1999	2000-1
118	92	84	45	43	37	32	32	19	11
23%	18%	16%	9%	9%	7%	6%	6%	4%	2%

The median vehicle in terms of age was purchased in 1990 (11 years).

Staffing

The fiscal year (FY) 2001 budget listed 20 budgeted, full time equivalent (FTE) positions for the Metro Water Services Fleet Management Group. Eighteen employees are currently on the payroll. Actual, filled positions are shown in the following table:

Table 2: Metro Water Services Fleet Management Group Currently Filled FTE's (*As of July 2001*)

Position Type	#
Administrative	3
Mechanics	10
Servicers and Drivers	3
Management and Supervision	2
Total	**18**

Maintenance Metrics

A key element in responsive fleet management is the use of management reports and metrics to measure performance. Over the years, TCI has developed certain metrics and standards that are useful benchmarks. It is useful to track these measures on a historical basis. Listed below are the metrics calculated by TCI to measure the Metro Water Services Fleet Management Group.

TCI experience dictates that at least 50% of shop effort should be focused on **preventative maintenance**. Our review of work orders for the months of April and May indicate that only 19.7 % of garage time is spent on PM's. PM's for the heavy-duty fleet are being sent to the Public Works garage. These PM's are included in the above numbers.

As shown in the table below, the Metro Water Services Fleet Management Group shows acceptable **turnaround** time for most repairs. However, too many repairs exceed four-day turnaround. This can be partially traced to an old fleet, and the fact that parts are difficult to obtain.

Table 3: Metro Water Services Fleet Management Group
Work Order Completion Analysis
June and July Work Orders Turn-around Results

Category	Number	%	Norm
Less than 2 days	359	70	70
2-4 days	56	11	20
More than 4 days	101	19	10

Based on a sample of work orders and a throughput analysis, we calculate **downtime** to be in the 6% range. TCI would expect downtime for a mixed fleet of this nature to be in the range of 6-8%. Again, there is a backlog of maintenance work within the existing fleet. This needs to be taken into account when considering the overall effectiveness of MWS Fleet Management.

The following table measures **mechanic utilization:**

Table 4: Metro Water Services Fleet Management Group
Mechanic Utilization Analysis
March, April and May Work Orders

Month	Work Order Quantity	Work Order Hours	Hours per Work Order	Available Hours	%Utilized
March	517	589	1.1	1,424	41%
April	390	455	1.2	1,361	33%
May	347	554	1.6	1,302	43%
Total	**1,254**	**1,598**		**4,087**	**39%**

TCI would expect utilization to approach 75%. It should be pointed out that labor hours per work hour are based on pre-determined flat rates and not the actual labor hours worked. As noted, the above information also indicates that mechanics are completing less than three work orders per day. The Fleet Manager has pointed out certain extenuating circumstances during this period and concludes with his own calculation of 45%.

While TCI was unable to precisely compute percentages on **repeats or callbacks**, we did manually review service histories. This review did not show a large number of repeat work orders for the same problems. However, in talking with Fleet Management staff and with Equipment operators, the operators perceived that vehicles were coming back to the shop too often.

The **cost per vehicle** calculation poses difficulty for two reasons. First, the MWS fleet has a significant number of inactive vehicles. Second, Fleet Management also maintains over 140 off road pieces of Equipment. The table below indicates the range of results:

Table 5: Metro Water Services Fleet Management Group
Cost Per Vehicle Calculations

Category	Amount
Annual Fleet Costs	$1,465,000
Number of Vehicles	373
Deduct Inactive Vehicles from Fuel Report	54
Cost for Vehicles Only	$4,592
Mobile Off Road Units	64
Cost for Active Vehicles and Wheeled Off the Road	$3,825
Fixed Base Off Road Units	76
Cost for Active Vehicles and Off Road	$3,191

The following section summarizes our operational findings for MWS.

METRO WATER SERVICES (MWS) FLEET MANAGEMENT GROUP
SUMMARY OF FINDINGS

AREA	FINDING	INDICATORS
Professional Fleet Management	• MWS management focuses on the primary functions of running a large Water department. They are not trained in fleet management. While generally interested in the fleet, the water organization, among other things does not stress an adequate replacement process, nor do they insist that operating departments support the fleet program. • Fleet management is a separate organizational function. While an effort has been made to use the department wide information system (Hansen) to manage the fleet, some additional efforts have been made to monitor fleet utilization and to promote fleet replacement. • Many components of solid fleet management have been discussed, but not fully implemented. • Users, while sympathetic, have little interest in playing their role to ensure a safe and well-maintained fleet. • Operators perceive that vehicles were coming back to the shop too often.	• Fleet policy and procedure is not consistently documented. • Management objectives are not set, reported, or tracked. • The fleet is old and in some cases, unsafe and in poor repair. **TCI's review of 64 heavy equipment vehicles PM'ed by Public Works uncovered 653 operating and safety defects. This inspection covered only the heavy trucks. The light fleet was not inspected.** • Measures of efficiency and labor utilization are below TCI expectations and benchmarks. For example**, labor utilization, as measured by the Hansen system, is less than 40%.** • Operators are not well trained, checklists are ignored, and vehicles are mistreated**. Operating management fails to ensure that operators meet requirements.** • **Capital for fleet replacement was often budgeted, but not spent.** • **Drivers approached TCI to point out mechanical defects on their vehicles.** • **Users fail to deliver vehicles for scheduled preventative maintenance (PM's).**

AREA	FINDING	INDICATORS
Complexity and Size of Fleet Operations	• MWS has a significant investment in equipment and expense. • Fleet's vehicles vary in size and complexity. • MWS has significant exposure in areas of liability and safety.	• **18 employees** work in the fleet group • **513 vehicles**, ranging from sedans to ten-ton dumps to backhoes, are listed as assets. • **$1,465,000** in estimated annual costs for labor, parts, outside services (not including fuel). • Fleet asset cost per FASTnet $11,663,000. • A weekend inspection of 64 heavy equipment vehicles of the MWS fleet revealed **282 safety violations.**
Fleet Replacement and Utilization	• The fleet is quite old. • Vehicles are often repaired even after they have exceeded their useful life. • Many vehicles (over 50) are seldom or never used. • The capital dollars budgeted for vehicles last fiscal year were not spent.	• **The median age of heavy vehicles (both active and inactive) is 1990.** A normal replacement cycle of 8 years would yield a median age of 1997. • **The median age of light vehicles is 1991.** A normal replacement cycle of 7 years would yield a median age of 1997. • The fleet inventory lists 373 vehicles. Only 317 of these are fueled on a regular basis. • In the most recent fiscal year, $588,000 was budgeted for capital. $311,000 was actually spent. **Normal replenishment for this fleet should be $2,000,000.**
Operational Efficiency and Effectiveness	• TCI found the MWS garage to be inefficient in several ways. • Administrative processes and procedures are not documented in some cases.	• In several key cases efficiency measures were below TCI's expectations and industry norms. For example, only 39% of mechanics' work time is represented on work orders. **This implies that the work force is only 39% utilized versus a goal of 75%. The Fleet Manager states that 45% is more reasonable due to extenuating circumstances.**

AREA	FINDING	INDICATORS
Operational Efficiency and Effectiveness (continued)	• MWS fleet management is in an enviable position to measure and report on fleet management activities. Their use of the Hansen system and its reporting capabilities shows an appreciation of the value of an information system. • Administrative support was sufficient, but a new person was still being added. • Interviews indicate that the Fleet Manager has delayed certain initiatives because of the MWS reengineering program.	• **The cost per active vehicle maintained is over $3,100 each. TCI would expect to see an average of $3000.** • Training opportunities were not consistently offered to mechanics. • An additional administrative support person was recently added to the staff. The position needs to be reviewed for proper utilization once assigned duties commence. • Procedures are incomplete. • The current method for accounting for fleet expenses does not allow fleet management to track costs on monthly basis. Costs being transferred to users need to be separately shown. • **The parts inventory turns only 1.5 times per year.** • Fleet performance is not measured against industry productivity standards.
Maintenance and Preventative Maintenance	• Maintenance quality is sometimes poor. • PM programs were generally undisciplined, not timely or poorly performed. PM's for heavy vehicles are performed at Public Works. • Training opportunities are not consistently offered to mechanics.	• TCI has **dozens of pictures showing poor mechanical condition**. See the examples on the following pages. • Vehicle condition dictated that TCI coordinate a special weekend inspection. 64 heavy vehicles were inspected. **653 defects were uncovered on all 64 vehicles. 282 of these were safety related.** • MWS has multiple road service or no start calls daily. This may, in part, relate to underutilization of vehicles. • A low percentage (20%) of preventative to corrective maintenance exists. TCI expects to see at least 50%.

AREA	FINDING	INDICATORS
Maintenance and Preventative Maintenance (continued)		• Communications between MWS and Public Works concerning PM's have been poor in the past. • **MWS vehicles do not show up for scheduled PM's on a regular basis**. Last year, fifty vehicles did not appear at Public Works for scheduled PM's.
Garage and Vehicle Safety	• Safety is not a priority. • Unsafe vehicles were in operation. • Safety violations were found in the MWS garage. • Tire programs are erratically applied, and many unsafe tire conditions were observed. • Operators and operations managers do not follow the necessary steps to ensure safe vehicles.	• **Attached are pictures of safety violations.** • TCI's random inspections found multiple vehicles with unsafe operating conditions. These conditions included slick tires, improperly inspected air brakes, frayed belts and hoses, and severely corroded batteries. • **No evidence was found that operators inspect their vehicles or that they are disciplined if they fail to do so.** • Drivers approached TCI to point out mechanical defects on their vehicles.
Fleet Management Information Systems and Reporting	• The Hansen system is being used to support MWS fleet operations. The system seems to be performing effectively, but has not been fully implemented. • Goals, expectations or targets are not fully developed or published.	• While MWS has the Hansen system, which is reliable from an operational standpoint, certain work order components were not fully implemented. **A printed work order is not available to the mechanics, nor is service history.** • TCI did not find clear management targets. Measures that were being developed focused on volume, rather than performance. • The Hansen System is not utilized to manage and measure. A manual status sheet is used.

AREA	FINDING	INDICATORS
Repair Parts and Inventory	• The MWS parts process is a two-part system. The parts room is bypassed on many parts orders. • The parts room is neat and orderly. • The controls and systems are in place to run an efficient parts operation. • The inventory contains obsolete parts.	• Mechanics complained that parts were not available as needed. • **Parts availability (fill rates) has not been calculated or targeted.** • The shop supervisor spends far too much time dealing with ordering parts**. Repairs are delayed while the shop supervisor orders parts.** • The shop supervisor and stock keeper have created a list of obsolete items. • **Parts turned very slowly – 1.5 times per year.** • No reliable service history is kept on parts. Warranty claims on parts are not always made.
Fleet Appearance	• The fleet appearance is poor.	• Many vehicles are operating with dings and dents. • **Some vehicles have been parked for so long that plants are growing through them.** • There is little provision for vehicle cleaning (inside or out). • Operators often turn in vehicles for maintenance in dirty condition. It is difficult for mechanics to be caring of these dirty vehicles.
Organizational Health	• Users have been conditioned to accept mediocrity in maintenance, information, and communication. • The current staff has a range of backgrounds and skills. Some employees are accepted from other MWS functions who are not currently qualified for their position. • Morale problems exist within the MWS garage. • Mechanics believe that their skills are not respected. • The garage and shop tools have been improved in recent years.	• A usual response concerning fleet condition is, "they do the best they can with what they have." • Users reported that vehicles were coming back to the shop far too often and that work orders were not noted to reflect this. • To support MWS reengineering efforts employees who are not currently qualified have been transferred into the fleet group.

This newly installed air brake hose is too long and will be damaged by abrasion and contact with suspension components.

This incorrectly installed air brake hose pinches off the air supply to the right front brake during sharp turns.

This battery was <u>not</u> serviced during the 7/10/01 PM inspection for this unit. The battery is loose in the tray, which will allow it to fall against the frame and short circuit if the unit is involved in an accident or stops quickly. The corrosion will most likely lead to a no start service call.

We found these belts on a dump truck routinely inspected for the Water Department by DPW. Note that the belts are cracked and sure to fail soon.

This photograph illustrates <u>severe</u> rotor damage caused by operating the vehicle with completely worn brake pads. The fact that an operator would continue to drive a vehicle with screeching, scrubbing, and ineffective brakes is disturbing. The condition also represents the lack of an effective preventative maintenance program, which would identify potential problems before they become this serious.

Quantities of sludge were found in a dump truck air brake system. Sludge, water, and other contaminants occupy air tank reservoir volume decreasing the volume of compressed air used to apply vehicle brakes.

Discarded batteries stored behind the garage, waiting for the next disposal trip.

Several areas of the garage are cluttered.

Many of the dump trucks need steering and suspension alignment. Tires are prematurely worn and vehicle handling is compromised.

Many tires are worn well past safe and legal limits before they are removed. This situation occurs as a result of weak driver pre & post trip discipline and less than acceptable preventative maintenance.

The shop property is cluttered with dozens of out of service, unused, junked, and cannibalized vehicles.

More parked vehicles.

Gasoline for shop vehicles, road service calls, and for vehicles dropped off at the garage empty is stored inside the shop in this cabinet. The 5 Gallon containers are refilled nearby and transported by pickup truck. The shop floor drain is only 10 feet from the cabinet. In TCI's opinion, this creates fire, explosion, and waste water drainage exposure.

The shop waste oil is plumbed out to this tank marked as containing kerosene. The tank is not protected from traffic. It should be properly marked and protected as indicated in EPA guidelines for "used oil management".

FIRE DEPARTMENT VEHICLE MAINTENANCE SHOP

Introduction

The Fire Department Vehicle Maintenance shop (the Fire shop) currently employs fourteen (14) full time equivalent employees (FTEs) performing a variety of technical and administrative functions related to the management and maintenance of a fleet of 280 equipment units. The equipment consists of **three types of vehicles**: support vehicles, fire apparatus or equipment, and ambulances.

A major change in management of the Fire Department shop took place late last year. A new team is now in place.

The total 2001 **budget** is $1,030,000, excluding fuel. Actual cost for the fiscal year is running close to budget.

The Fire Department shop is another Metro organization in transition. The retirement of the previous long-tenured department Chief, and the appointment of a new Shop Supervisor in January 2001 have been two of the major changes. In addition a new Metro Fire Chief was appointed in 2001.

Maintenance operations take place in a garage that was built in 1953 and expanded in 1975. The Fire shop occupies approximately one third of a 20,000 square foot building. Fire operations have been conducted on this site since the early 1900's. Maintenance operations have been performed since 1953. The building was added onto in 1975. The site is shared by the Fire Department Building Maintenance group and by an operating Fire station.

The garage is not well suited to perform its function. Entry can only be made from one end. The space is limited to 6 bays. Parking and marshalling space is extremely limited as is parts storage and office space. Low ceilings significantly inhibit the testing of operating equipment, such as ladders.

Operating hours are 7:00am to 4:00pm, Monday through Friday. Two mechanics start at 6:00am to accommodate shift changes. After hours support is offered through the use of a "duty" truck. Each mechanic is on call for one week at a time.

The Fire Department shop maintains **280 vehicles**, as of July 2001. The fleet includes 148 light vehicles, 94 fire trucks, and 38 ambulances. The Fire Department fleet, particularly the light vehicles and the fire equipment, is older than expected. See the table below.

Table 6: Fire Department Vehicles
Distribution by Year
(all vehicles)

1986 / Older	1987-88	1989-90	1991	1992-3	1994	1995-6	1997-8	1999	2000-1
23	24	28	27	10	14	62	29	36	27
8 %	8%	10%	10 %	4%	5%	22%	10%	13%	10%

The median vehicle in terms of age was purchased in 1996.

TCI reviewed the fuel records for the fleet. 22 vehicles appear to be inactive.

The fiscal year (FY) 2001 budget listed **16 budgeted**, full time equivalent (FTE) positions for the Fire Department vehicle maintenance shop. Actual and budgeted positions are shown in the following tables.

Table 7: Fire Department Vehicle Maintenance Shop
Budgeted FTE's

Position Type	#
Administrative	2
Mechanics	11
Parts Storekeeper	1
Management and Supervision	2
Total	**16**

Table 8: Fire Department Vehicle Maintenance Shop
Currently Filled FTE's
(*As of July 2001*)

Position Type	#
Administrative	2
Mechanics	9
Parts Storekeeper	1
Management and Supervision	2
Total	**14**

The following table shows the **age** of the fleet by type:

Table 9 Fire Department Vehicles
Age Distribution by Year
Light Vehicles

1986 / Older	1988	1989	1991	1992-3	1994	1995-6	1998	1999-2000
3	12	13	15	4	13	43	14	31
2 %	8%	9%	10 %	3%	9%	29%	10%	20%

The median vehicle in terms of age was purchased in 1996.

Below is a table showing the **age** of fire apparatus:

Table 10: Fire Department Vehicles
Age Distribution by Year
Fire Apparatus

1983-older	1984-86	1987-88	1989-90	1991	1992	1993-94	1995-96	1997-98	1999-2000	2001
15	5	10	14	11	4	2	10	9	7	7
16%	5%	11%	15%	12%	4%	2%	11%	10%	7%	7%

The above analysis indicates that the median vehicle was purchased in 1991.

Below is a table showing the **age** of the ambulance fleet:

Table 11: Fire Department Vehicles
Age Distribution by Year
Ambulances

1987-89	1990-91	1993-95	1996	1998	1999	2000	2001
3	2	5	9	6	5	7	1
7%	5%	14%	24%	16%	13%	19%	2%

The median vehicle was purchased in 1998.

While the table above indicates that two administrative staff supports the Fire Department shop, only one staff person has been working in the area for one year.

In Fiscal Year 2001 (ending 6/30/01), the Fire Department vehicle maintenance shop budget totaled $1,030,000. Major components included:

- Labor Related Expenditures $541,000
- Small Equipment.....14,000
- Oil.....41,000
- Outside Repair.....84,000
- Automotive Parts.....315,000
- Tires, Batteries 35,000

At the time of our review, year to date expenditures were tracking the budget very well. With the exception of a reduction in parts purchased and an increase in Outside Repair Services, all accounts tracked budget quite closely.

The following section summarizes our operational findings for the Fire Department.

FIRE DEPARTMENT VEHICLE MAINTENANCE
SUMMARY OF FINDINGS

AREA	FINDING	INDICATORS
Professional Fleet Management	• Fire Department management focuses on the primary functions of running a fire department. They are not trained in fleet management. While interested in the fleet, the organization does not stress an adequate replacement process, and does not insist that operating departments support the fleet program. • The new Metro Fire chief is open to different approaches to improving vehicle maintenance. • The previous supervision of the shop had been in place for many years. Certain functions were performed well, while others were not. • The current manager of the Fire shop is a former line fire chief. He is well regarded by the staff and others in the department. • A strong sense of family and team play exists among the staff. • Fire suppression users, while well aware of the importance of reliable vehicles, are indifferent to the key role that they must play as operators. • Key mechanics have been recently hired away by Fire Suppression. • Mechanics believe that their contribution and skills are not appreciated. • Information systems, reports and procedures are minimal.	• Policy and procedure is not consistently documented. • Management objectives are not set, reported or tracked. • Almost all systems are manual. • Certain clerical functions are months behind. • See attached photographs for housekeeping and garage safety issues. • Mechanics report that operators drive vehicles until major repairs are needed. • Over 50% of the Fire fleet is 10 years old or older. 29% of the light fleet is older than 10 years. • Mechanics believe their value is understated, particularly with respect to Fire Fighters.

AREA	FINDING	INDICATORS
Professional Fleet Management (continued)	• Administrative functions are months behind. • Housekeeping is poor both inside and outside of the facility. • No parts records or inventory is maintained. • Capital funding is inconsistent and has allowed key components of the fleet to become aged.	
Complexity and Size of Fleet Operations	• The Fire Department has a significant investment in equipment and related expense. • Fleet's vehicles vary in size and complexity. • The Fire Department has significant exposure in areas of liability and safety. In addition they are responsible for a critical public safety function.	• **14 employees** work in the fleet group • **280 vehicles**, including light vehicles, fire apparatus, and ambulances, are listed as assets. • **$1,030,000** in estimated annual costs for labor, parts, outside services (not including fuel). • **Fire apparatus responds to critical needs at high speeds.** • Fleet cost per FASTnet is $18,817,000.
Fleet Replacement and Utilization	• The apparatus and light fleets are old. • Funding for new equipment varies considerably from year to year. A solid replacement plan replaces equipment on a consistent basis. This ensures a fleet that is balanced in terms of age and condition.	• Over 50% of the Fire fleet is 10 years old or older. 29% of the light fleet is 10 years **or older.** • Management acknowledged that the reserve fire fleet was not up to standard. • Funding for new equipment over the last several years has ranged from $357,000 to $3,727,000.
Operational Efficiency and Effectiveness	• TCI found the Fire shop to be inefficient in some ways. • Data is not available in any mechanized format. • Administrative processes and procedures are not documented. • Efficiency targets and measures are non-existent.	• Less than 25% of mechanics' work time is represented on work orders. Normally, this could imply that the work force is only 25% utilized. In the case of the Fire shop, it could also mean that hours are not properly reported.

AREA	FINDING	INDICATORS
Operational Efficiency and Effectiveness (continued)	• Parts are often not available. Parts are not inventoried. Parts replenishment is episodic. • PM and inspection schedules are inconsistently applied. • Some administrative processes are several months behind. • Expenses for maintenance of Fire vehicles are combined with the expenses for maintaining fire stations.	• PM's and inspections often do not happen on a timely basis. At the time of the TCI audit, over 30% of the fleet had not been inspected within the last 5000 miles. • Procedures and policies do not exist. • The current method for accounting for fleet expenses does not support tracking maintenance costs. • Mechanics and apparatus are often waiting for parts.
Maintenance and Preventative Maintenance	• Maintenance quality is poor. • Maintenance supervision is disorganized. The shop appearance is unsightly and disorganized. • Conversely, the mechanic staff is knowledgeable and certified. • PM and inspection schedules are inconsistently applied. PM's are inconsistently performed. • There is a significant delay and backlog in the inspection process. • The Fire shop has exerted little control over their tire program and inventory. • The Fire shop has recently established a "hall" truck to do mobile repairs. This should be helpful in dealing with no starts and minor repairs.	• TCI has **pictures showing poor mechanical condition, and poor shop condition.** See the examples on the following pages. • TCI was tasked with inspecting some of the heavy vehicles within other Metro areas during our audit. Since we used three Fire mechanics as part of our inspection team, this reinforced our solid opinion of the skills of these mechanics. • The Fire shop emphasizes emergency vehicle certification for mechanics • PM's and inspections often do not happen on a timely basis. At the time of the TCI audit, well over 30% of the fleet had not been inspected within the last 5000 miles. • Over 500 tires are warehoused in the Fire shop. This is excessive when compared to the number of vehicles. Many installed tires were found to have wear, valve, inflation, or matching problems.

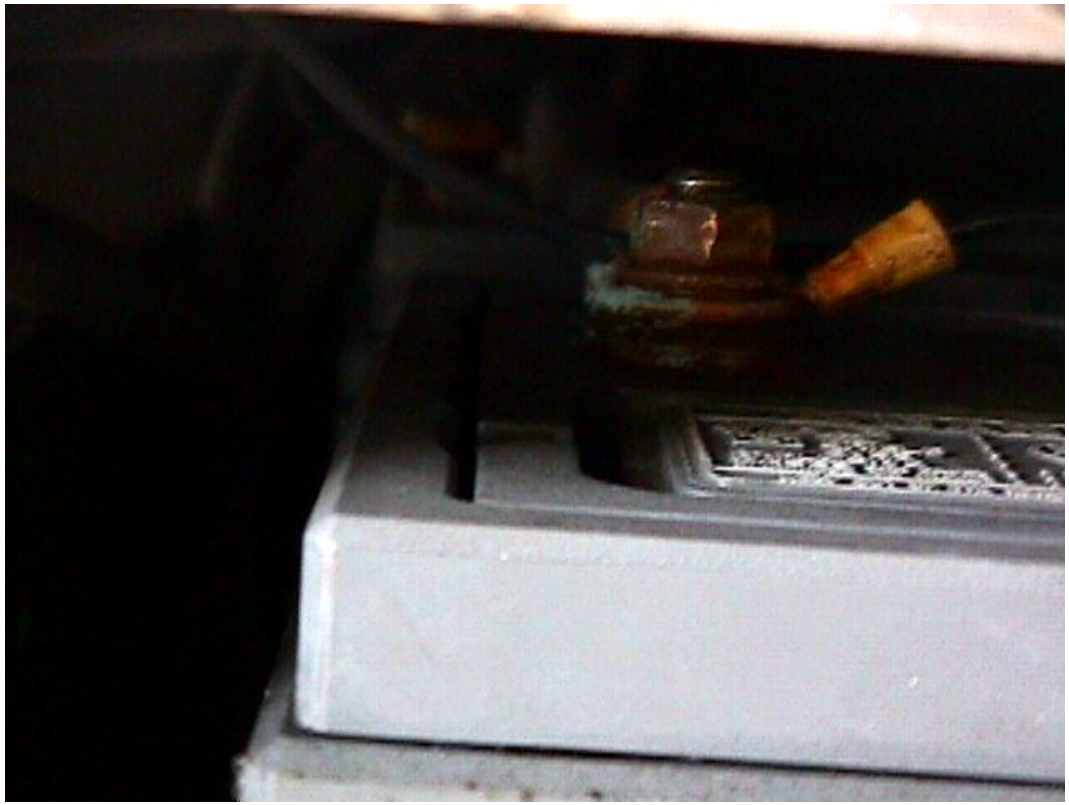
AREA	FINDING	INDICATORS
Maintenance and Preventative Maintenance (continued)		• The "hall" truck process needs better procedures and instructions. In addition, the staff on this truck should identify vehicles that need immediate attention from the garage.
Garage and Vehicle Safety	• Safety is not a priority. • Unsafe vehicles were found to be in operation. • Safety violations were found in the Fire yard, in the Fire shop and in the Fire stations. Ironically, fire safety violations are common. • Tire programs are erratically applied, and many unsafe tire conditions were observed. • Operators and fire management staff do not follow the necessary steps to ensure safe vehicles. • The areas adjacent to the Fire shop are exceedingly untidy, and reflect poorly on the operation.	• **Attached are pictures of safety violations.** • TCI's random inspections found multiple vehicles with unsafe operating conditions. These conditions included tire problems, improperly repaired handles and locks, frayed belts and hoses, and severely corroded batteries. • The Fire shop has stacks of used tires, awaiting disposal. • **No evidence was found that operators inspect their vehicles or that they are disciplined if they fail to do so.**
Fleet Management Information Systems and Reporting	• No effective data collection and reporting were found. • Goals, expectations or targets are not fully developed or published.	• TCI did not find fleet management targets or maintenance goals. • All shop floor management was done manually. Little discipline was observed in most processes.
Repair Parts and Inventory	• The Fire shop has no viable parts system. • The parts room facility is small, crowded and extremely dysfunctional. • Some parts are 20 years old and beyond. • Parts are not inventoried. Replenishment is episodic or subject to the memory of the stock keeper. • In this type of small operation, a separate parts department is difficult to operate and justify.	• Mechanics complained that parts were not available as needed. • **Parts availability (fill rates) was not calculated or targeted.** • **Repairs are delayed awaiting parts.** • The parts inventory contains many obsolete items. • No reliable service history is kept on parts. • Warranty claims on parts are not always made.

AREA	FINDING	INDICATORS
Fleet Appearance	• The fleet appearance is mediocre at best.	• Since the Fire garage is behind on mechanic repairs, appearance issues (dings and broken handles) are also evident. • TCI's expectation is that fire apparatus would be extremely clean because of operator downtime and citizen expectations.
Organizational Health	• Fire Department staff and operators have been conditioned to accept mediocrity in maintenance, information, and communication. • Goals and expectations are not set high enough. • Mechanics believe that their skills are not respected.	• Key mechanics recently transferred to Fire Suppression. They believe that the compensation is better. • Given the strong and critical mission, and the talented mechanics, maintenance quality should be clearly excellent. • All levels of Fire management and Supervisor are accepting less than the best.

This is a serious case of electrical system neglect. We would not expect this vehicle to be reliable.

Another example of maintenance neglect.

Note the start of corrosion on the terminal of this "ready line" ladder truck.



This tire, found on the left front of a ready line pumper at a fire station, does not have sufficient tread and indicates a steering alignment problem.

We found loose wheel lugs on this apparatus. It is essential that mechanics, supervisors, station chiefs, and crews receive adequate training to recognize and report basic vehicle defects.

The shop supervisor's desk is cluttered and disorganized Offices <u>should</u> set the tone and discipline for all shop activity.

Another example of the unacceptable housekeeping.

The repair shop has more than 500 tires on hand. Dozens of sizes, treads, and brands are present.

Note the "repair" for this fire apparatus door handle. "Get By" patch repair should be discouraged, and not accepted by Fire Suppression.

This left front air brake hose has abrasion damage from improper routing. If not repaired, it will lead to a loss in brake air pressure.

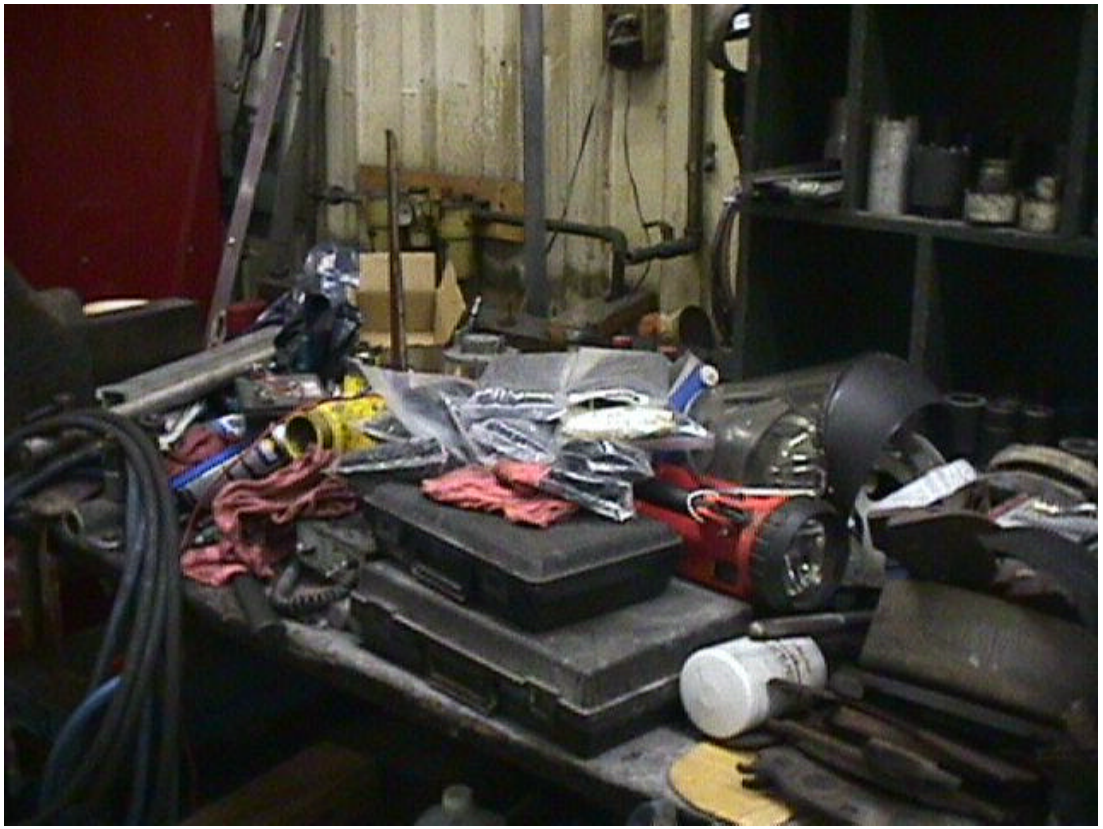
Note that this compartment bay door is "secured" with duct tape.

Shop safety training and enforcement is less than acceptable. These creepers present slip/fall hazards.

A lack of attention to organization.

Workbench example

Workbench example



Antifreeze is stored without secondary containment, and allowed to leak onto the floor. Usage is not tracked.

At each fire station we visited we found engine add oil stored in open gasoline cans. Oil is poured from these into 2 quart uncovered cans and then into apparatus engines. Engines are contaminated with this process. We recommend that only new and sealed gallons of oil be maintained at the station houses.

The debris pictured here represents the inattention paid to shop yard care and maintenance.

These unsightly drums present a poor first impression when arriving at the maintenance shop.

PARKS & RECREATION

Introduction

Nashville Metro's **Parks and Recreation** employs 438.4 fulltime equivalent employees (FTE's) engaged in operating and maintaining 106 parks and /or recreation facilities as well as certain non-park sites such as the Adelphia Stadium grounds. These parks range from unimproved green space, to athletic fields connected to public schools, to the Parthenon, and to a highly impressive SportsPlex that is part of the Centennial Park complex. Current Parks' records indicate that a combination of 476 individual vehicles, pieces of equipment, and support implements are used in the management and maintenance of the parks and facilities. In addition to the larger equipment items, the maintenance shop maintains smaller items such as hand mowers, small generators, chain saws and mowers pulled by tractors.

For a number of reasons, Parks management has been unable to obtain and then allocate capital funds to vehicle replacement. Consequently, the fleet averages ten years of age. Parks & Recreation's fleet maintenance efforts are conducted in an approximately 11,000 square feet section of a 60+ year old warehouse facility located between Park's headquarters and a section of I-440. The shop area (the Parks garage) will easily hold six (6) units although at times the center drive is used for quick repair tasks. There is in addition a separate bay with a lift used for servicing. One of the bays in the main shop area also has a lift. Both of these are floor mounted twin-post lifts designed for sedans, pickups, and vans. The area also includes a small office, two small parts storage areas, a small equipment repair area, and a restroom /locker area. Small maintenance facilities are also maintained at various parks and golf courses.

There are **six FTE's** assigned currently. These include Auto Mechanic Leader (1), Auto Mechanic- Certified (2), Auto Mechanic (2), and Equipment Servicer (1). The equipment servicer acts primarily as a parts runner.

The maintenance operation has a FY2001 budget of roughly **$1,029,000** distributed among the various divisions within Parks & Recreation. Expenses are combined with building and facility maintenance costs, so exact numbers are not available. Given the age of the units maintained, the actual annual average maintenance cost exceeds the value of many of the units.

The fleet maintenance group, especially the auto mechanic leader, is competent and works hard to maintain an aged and tired fleet. The current maintenance and equipment situation has evolved over many years and will require significant effort to correct.

It should be noted here however that Parks routinely purchases premium fuel, as does most of Metro. This unnecessary practice wastes an average of 10 cents per gallon. This is discussed in more detail in the fuel section.

The shop is open from 6:30 am until 3:00pm.This works well for grounds maintenance users, but not for recreation and the park rangers whose shifts run into the evening hours. Staggering the duty hours of the mechanics would be one way to provide better customer service.

The garage was not designed as a vehicle maintenance facility and suffers as a result. The floor is not level, there is inadequate lighting, and the roof leaks. Maintenance on the building in general has been neglected, probably as a result of a lack of funding. The main garage is littered with old parts; oil buckets, cluttered workbenches, and is in a general state of disrepair. Obsolete and surplus equipment is parked outside among active vehicles.

The fleet asset listing provided by Parks includes 476 units. Parks practice seems to be to identify on-road units as "vehicles" and off-road units as "equipment". Interviews and observations led TCI's consultants to the realization that the Parks & Recreation fleet list is in fact inflated with units that are no longer actually serviceable. With the assistance of the Automotive Mechanic Leader, we analyzed the fleet list and generated the following table that we believe is an accurate depiction of the current fleet status.

Table 12: Parks and Recreation
Estimated Actual Status of Current Fleet

Description	Number of Units	Percent of Current List
Front-Line/Everyday Usage	227	47.7%
Backup/Spares/Standby	78	16.4 %
Inactive/Scrap	121	25.4%
Status Unknown	37	7.8 %
No maintenance record	10	2.1 %
Salvaged	3	.6 %

This analysis shows the number of active units to be 305 from the original 476. This analysis also indicates that Parks is operating with at least a **25% reserve**. And, in addition to the high level of reserve vehicles, 171 vehicles on the asset list should probably be salvaged. This illustrates the point made elsewhere that the age of the fleet leads to a build-up of reserves in order to accomplish the mission. With timely replacement, the Parks fleet could be dramatically reduced in number.

The following is a schedule of the age of the 305 active fleet units:

Table 10: Parks and Recreation
Fleet Age based on Model Year of Unit

Model Year	Number	Percent of Total
1980 or Before	15	5%
1981-1990	135	44%
1991-1996	94	31%
1997-2001	30	10%
Unknown	31	10%

Thus we find 90% of the fleet over 5 years old (We have assumed that the units where the year is unknown are not recent purchases). In a normal mixed fleet of local government units we would expect an average life expectancy of 7 years and an average age of 3.5. This fleet has a median age of 10 years (or older depending on the age of the unknowns). The failure to replace a significant number of units in the last five years has made Parks fleet age even more of an issue. Even a ten-year replacement cycle would have produced a 50% turnover in the last five years. A ten percent replacement factor in five years is a 50-year life cycle. The age of the fleet illustrated by the above chart illustrates one of the problems with not replacing fleet units on a scheduled basis.

Table 11: Parks and Recreation
A Comparison of Selected Fleet Indices Based on Size of Fleet

Number of Units	Annual Average Total Cost per Unit*	Annual Average Parts and Services per Unit	Unit to Mechanic Ratio
476	$2,161	$1,470	105:1
305	$3,373	$2,295	67:1

* This total is direct costs only.

The following section summarizes our operational findings for the Parks and Recreation.

PARKS AND RECREATION VEHICLE MAINTENANCE
SUMMARY OF FINDINGS

AREA	FINDING	INDICATORS
Professional Fleet Management	• Parks and Recreation management focuses on the primary functions of running a parks department. They are not trained in fleet management. While generally interested in the fleet, it is clearly not high on top or middle management's list of priorities. • The fleet maintenance facility is part of the building maintenance group. As such, fleet shares management's attention and funding with the repair and renovation of parks facilities. • The Parks garage is supervised by an auto mechanic-lead. He is well regarded by the staff and others in the department. Any leadership that is given to the fleet program comes from him. • Parks vehicle users, while well aware of the importance of reliable vehicles, are indifferent to the key role that they must play as operators. • Mechanics believe that their contribution and skills are not appreciated. • Information systems, reports and procedures are minimal. • The facility is barely adequate in that it is physically constrained and cramped. • No parts records or inventory are maintained. • Capital funding is minimal. The fleet is exceedingly old. It is also oversized by operational decisions to keep equipment "just in case".	• **No fleet management is really performed, only fleet maintenance.** • Policy and procedure is not consistently documented. • **Management objectives are not set, and are not reported or tracked.** • Almost all systems are manual. • **Over 90% of the Parks fleet is 10 years old or older.** • **171 units listed on the asset list should be scrapped.** • Staff believes that management has little interest in seeing any information about status or progress. • The managers and supervisors responsible for the Parks garage have significant other responsibilities. **They seldom visit the garage.**

AREA	FINDING	INDICATORS
Complexity and Size of Fleet Operations	• Parks and Recreation has a significant investment in equipment and expense. • Fleet's vehicles vary in size and complexity. • Parks and Recreation has significant exposure in areas of liability and safety.	• **6 employees** work in the fleet group • **476 vehicles and equipment items** , including light vehicles, medium and heavy-duty trucks, and grounds equipment, are listed as assets. • **$1,029,000** in estimated annual costs is expensed for labor, parts and outside services (not including fuel). • Fleet cost per FASTnet is $5,325,000. • The Parks' fleet is utilized Metro-wide and in many cases travels off road, has hazardous operating components and has a wide variety of equipment components.
Fleet Replacement and Utilization	• The fleet is extremely old and in poor condition. • Funding for new equipment is shared with all Park's capital requirements. • Very little attention is being given to the fleet's desperate need for replenishment. • Evidence exists that vehicle specifications have been poorly developed in the past. • Repair dollars are being spent on vehicles that have little useful life remaining. • Because of the age of the fleet and excessive downtime (7%), management is reluctant to salvage unneeded units.	• **Over 90% of the fleet is older than 10 years.** • Replenishment funding is handled on the funds available method. Needs are not considered. • **Only 30 units have been replaced within the last five years.** • **Parks has acquired over 60 vehicles that have been salvaged by other Metro departments.** • In the past, Parks has purchased heavy duty trucks with gasoline engines in an attempt to stretch their capital dollars. While less expensive to purchase, gasoline motors are much more expensive than diesel to maintain. Very few fleets purchase any gasoline trucks. • A review of maintenance records show investments of thousands of dollars in vehicles over 12 years old and with extensive usage. • **The existing asset list includes 171 items that are inactive and should be salvaged.**

AREA	FINDING	INDICATORS
Operational Efficiency and Effectiveness	• All systems are manual. • Data is not available in any mechanized format. • Administrative processes and procedures are not documented. • Efficiency targets and measures are not existent. • Parts are not inventoried. Parts replenishment is episodic. • PM and inspection schedules are inconsistently applied. • Many work orders are incomplete. • It is impossible to track equipment maintenance costs.	• **Costs per active vehicle are $3,373.** • Since all data is manual and few reports exist, any data developed was obtained from observation and manual review of data. • **TCI's estimate of mechanic utilization was 30%. Well-managed garages aim for 75%.** • 17% of work orders take more than four days to complete. While this is possibly caused by the extreme age of the fleet, it is cause for concern. • **PM's and inspections often do not happen on a timely basis**. Little is done in terms of scheduling PM's. A review of files indicated that equipment is being inspected once or twice per year. Well-run fleets inspect equipment four times per year. • Fleet related procedures and policies do not exist. • **The current method for accounting for fleet expenses mixes vehicle expenses with those of maintaining buildings and office equipment.**
Maintenance and Preventative Maintenance	• Maintenance quality is adequate, but the age of the fleet is a limiting factor. • The shop appearance is unsightly and disorganized. • The mechanic staff is knowledgeable, especially the auto mechanic leader. • The PM and inspection schedules are inconsistently applied. There is a significant delay and backlog in this critical process.	• TCI was tasked with inspecting some of the heavy vehicles within other Metro areas during our audit. **The Parks leader played a key role as a part of our inspection team.** • TCI has pictures showing poor shop condition, maintenance, and cleanliness. See the examples on the following pages. • PM's and inspections often do not happen on a timely basis. **A random selection of 12 vehicle files indicated that 10 were not being inspected in a timely fashion.**

AREA	FINDING	INDICATORS
Maintenance and Preventative Maintenance (continued)	• The Parks garage has exerted little control over their tire program and inventory. • Management does not encourage mechanic certification by ASE.	• Two of the mechanics are not certified.
Garage and Vehicle Safety	• Safety is not a priority. • Unsafe vehicles were in operation. • Safety violations were found in the Parks garage and in other Parks locations. • Even the Parks' Safety Officer was operating an unsafe vehicle. • Operators and Parks management do not follow the necessary steps to ensure safe vehicles. • The areas adjacent to Parks locations are untidy, and reflect poorly on the operation.	• **Attached are pictures of safety violations.** • TCI's random inspections found multiple vehicles with unsafe operating conditions • The safety officer's vehicle contained 50 – 75 loose fire extinguishers that become dangerous in times of accident. • **No evidence was found that operators inspect their vehicles or that they are disciplined if they fail to do so.** Our observations indicate that operator training and follow-up is minimal as well.
Fleet Management Information Systems and Reporting	• No effective data collection and reporting were found. • Goals, expectations or targets are not fully developed or published.	• TCI did not find fleet management targets. • All shop floor management was done manually. Little discipline was observed in most processes.
Repair Parts and Inventory	• The Parks garage has no viable parts system. • Parts are not inventoried. Replenishment is episodic or subject to the memory of the auto mechanic-lead. • Mechanics often participate in the selection and purchase of parts. • In this type of small operation, a separate parts department is difficult to justify.	• Mechanics complained that parts were not available as needed. **Repairs are delayed awaiting parts.** • Over $700,000 is spent on parts with little attention or oversight to the process. • **Parts availability (fill rates) or any indicators of efficiency are not calculated or targeted.** • The parts inventory contains obsolete items. • No reliable service history is kept on parts. Warranty claims on parts are not always made.

AREA	FINDING	INDICATORS
Fleet Appearance	• Fleet appearance is extremely poor.	• As the attached pictures indicate, the fleet shows its age. • Vehicles are not kept clean. • Many units have been purchased at Metro surplus property auction and literally dragged into fleet maintenance for resuscitation.
Organizational Health	• Parks and Recreation staff and operators have been conditioned to accept mediocrity in vehicle condition, information, and communication. • Goals and expectations are not set high enough. • Morale in the garage is amazingly high, considering the state of neglect and operator indifference.	• All levels of Parks management and supervisor are accepting less than the best. • **Users simply accept the fact that Parks will operate with old and unsafe equipment.** • Users acknowledge that the mechanical staff is "holding it all together".

Battery terminals in this condition reflect a lack of preventative maintenance. This situation will surely result in a no start or road call.

Battery Storage must be in a well-marked and well-ventilated area. Note the sulfuric acid on three shelves.

Cluttered workbenches also present safety and productivity issues. All benches must be cleaned at the end of each day.

This workbench is "equipped" with fuel and battery. A lethal combination!

The PMI bay in the main shop is filthy and cluttered. It should be cleaned and organized as soon as possible.

This area should be equipped with secondary containment and improved signage. An overhead reel should be installed for engine oil dispensing.

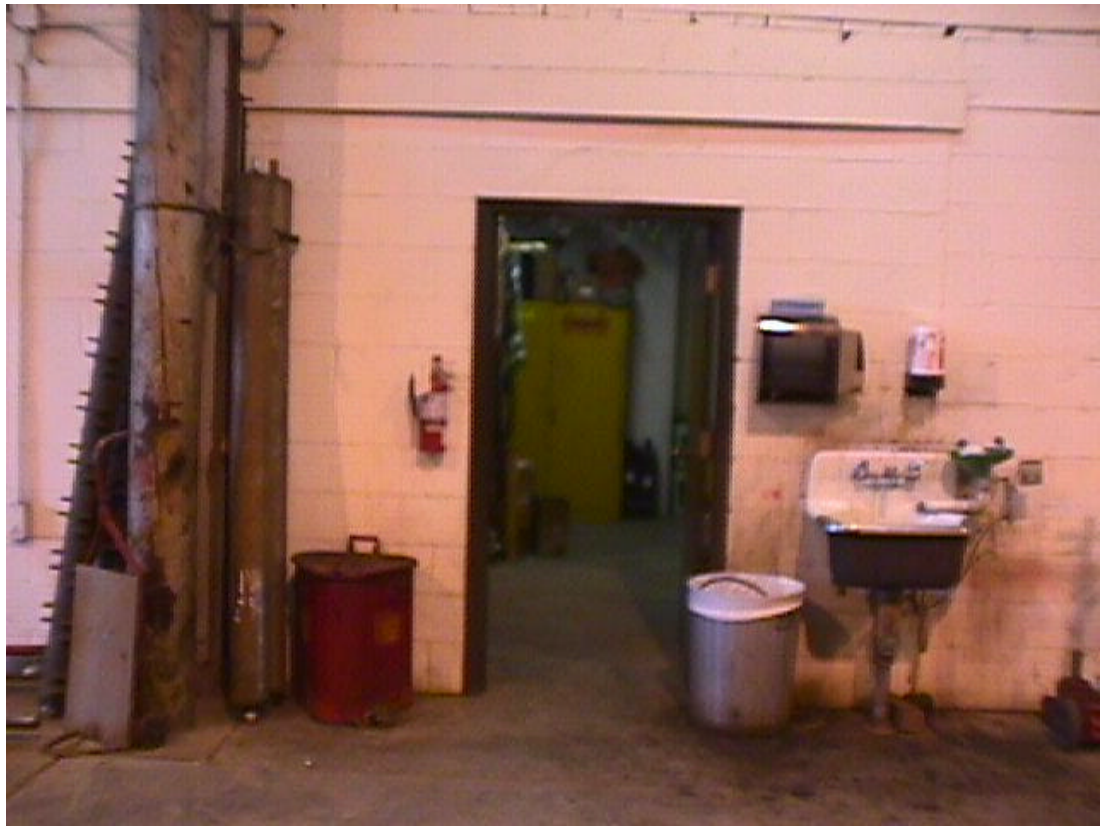
Blocked electrical panels should be cleared with 30” of space to allow emergency personnel access.

Engine oil is transferred from 55-gallon drums to vehicles via buckets and jugs. These are open to dust and dirt particles. An overhead reel system should be installed.

This rust hole in the driver side of an active truck is dangerous. A foot could easily become lodged, and exhaust fumes can come into the cab area.

Loose fire extinguishers in rear seat of the safety supervisor automobile are dangerous, as each could become a projectile in the event of an accident.

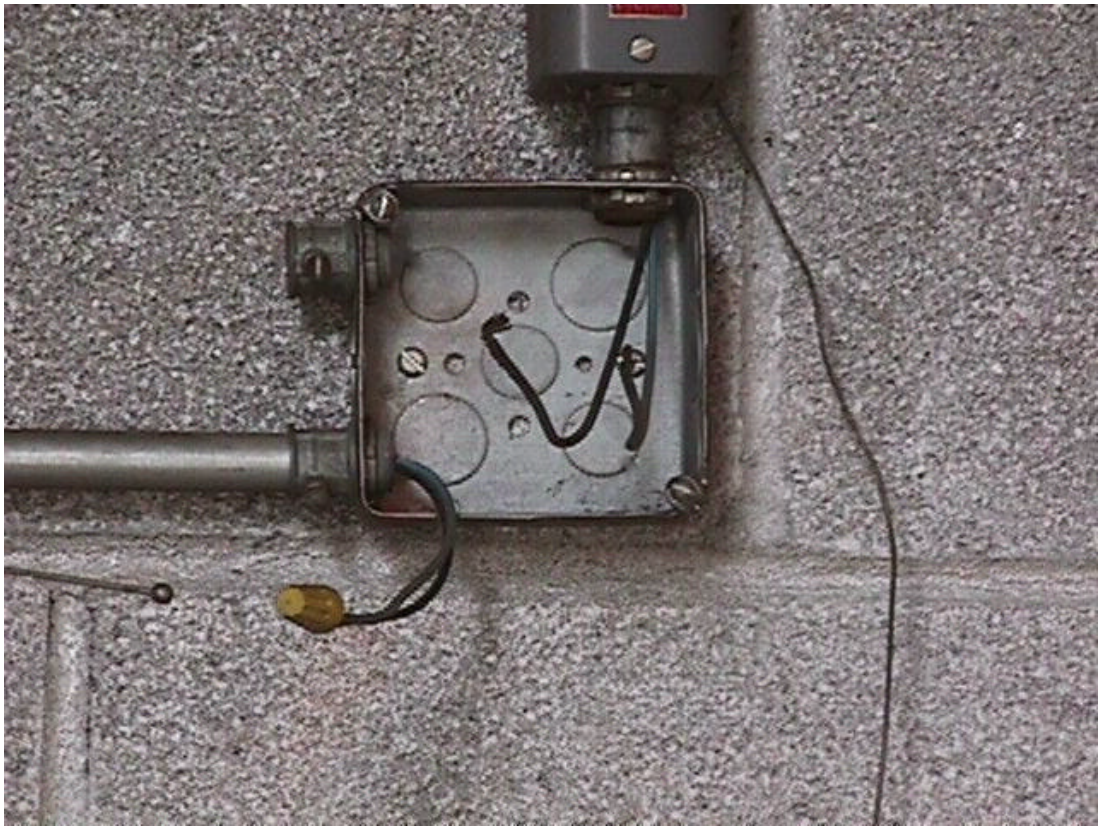
Note the non-marked fire extinguisher location on the wall and the non-ventilated flammable cabinet in the parts room.



Note the non-vented flammables cabinet with rags stored on top.

Shop oil drain area is messy and cluttered.

Open electrical boxes present OSHA and other safety compliance issues.



The PMI new oil supply in the PM bay should be equipped with overhead dispensers.

Rust perforation in the rear door of this van allows exhaust fumes to enter the cab area. These vehicles should be replaced.

Pedal pads are missing from the clutch and brake controls. Safety is compromised.

PUBLIC WORKS DEPARTMENT EQUIPMENT DIVISION

Introduction

The Public Works Department Equipment Division (the Equipment Division) currently employs **forty** (40) full time equivalent employees (FTEs) performing a variety of technical and administrative functions related to the management and maintenance of a fleet of 555 department owned equipment units. This fleet will be defined in detail later in this report. The fleet is quite mixed in terms of type of equipment. Additional units are owned by other agencies and serviced by Public Works.

The maintenance function is performed in one building, consisting of garage, a parts area, and offices. The building has been constructed in at least 2 phases. The last phase took place in 1988. At that time, an addition served to join two existing buildings. The current facility is 75,000 square feet with 32 general and specialty bays. The building is part of a larger Metro complex that includes various Public Works functions and a Police precinct. The maintenance segment of the West Operations Center is closing due to low workload.

A major change in management of the Equipment Division took place in March of this year and a new team is now in place. The Assistant Director of Public Works for Solid Waste is the interim Director of Equipment. An interim Fleet Manager was also appointed.

The total FY 2000 - 01 budget was $3,833,000 after deducting fuel expenses of $600,000. Actual cost for the fiscal year, again exclusive of fuel, was $3,153,000. Maintenance is financed through General Fund appropriations.

The Equipment Division of the Public Works Department is an organization in transition. The retirement of the previous long-tenured Director, new leadership (at the Assistant Director level) on March 1, new budgeting procedures, and the suspension of active maintenance at the West Center have all contributed to this transitional environment.

The shop is open 6:30am to Midnight, Monday through Thursday. Friday hours are 6:30am to 3:00pm. These hours are principally designed to support the Public Works Division that primarily operates four days per week.

The fiscal year (FY) 2001 budget listed 49 budgeted, full time equivalent (FTE) positions for the Equipment Division. A number of these positions are vacant, as shown in the following tables.

Table 13: Public Works Department Equipment Division
Budgeted FTE's

Position Type	#
Administrative	2
Mechanics	26
Other Mechanical	11
Parts Storekeepers	3
Management and Supervision	7
Total	**49**

Table 14: Public Works Department Equipment Division
Currently Filled FTE's
(*As of June 2001*)

Position Type	#
Administrative	2
Mechanics	22
Other Mechanical	9
Parts Storekeepers	2
Management and Supervision	5
Total	**40**

Without going into a great deal of detail, the previous administration is characterized as one that was comfortable with the status quo. The phrase, "that is the way we do it around here" was referred to often as the operating mode.

Two key managers, the Assistant Director and the Fleet Manager, are currently assigned on an interim basis. This does not seem to impede the operation.

The Equipment Division maintains equipment of two general types – those owned by Public Works, and those owned by other agencies. At the time of our review, the Public Works asset list consisted of 555 equipment items.

The other assets, belonging to other agencies, totaled 241. The other agencies' equipment items range from scooters to heavy duty trucks and buses. A review of the

billing records indicates that only 20-30 of these items receives maintenance on a monthly basis. The vehicles being maintained on a fairly consistent basis are school buses being used by Metro Action, and dump trucks being used by the Metro Water Service. These vehicles are maintained on a "as needed" basis. In the case of Metro Water Service, Public Works only performs inspections. All repairs for Metro Water Service vehicles are done at their garage.

In addition to the vehicles mentioned above, Public Works utilized 28 cars obtained from the Motor Pool.

TCI calculates several key metrics, using fleet size as a key factor. In the case of the Department of Public Works, care must be taken to determine the active fleet. That is, we need to determine those vehicles actually being maintained.

During the months of January and May 2001, an average of **290** of the 357 on the road vehicles in the Public Works fleet actually recorded fuel usage. This indicates that 67 vehicles are inactive.

For purposes of our calculations, we used an active fleet count of 488 (555 less the 67 inactive vehicles).

The following tables show more details concerning the fleet.

Table 15: Public Works Department Equipment Division Vehicle Allocation by Type

Type of Equipment	Total
Pick ups and vans	132
One ton trucks	46
Single axle, dumps, chippers	114
Tandem axle	32
Bucket trucks	33
Sweepers and vacuums	18
Mowers and tractors	42
Earth movers and road building equipment	54
Miscellaneous equipment	84
Total	**555**

Below is a table that indicates the **aging** of the Public Works fleet, as included in the information system:

Table 16: Public Works Department Equipment Division
Fleet Distribution by Year

1979 / Older	1980-84	1985-89	1990-92	1993-95	1996-97	1998	1999	2000-01
25	38	144	76	100	45	29	28	70
4 %	6%	27%	14 %	19%	8 %	5 %	5%	12 %

The median age of this fleet is 9 years

We also reviewed the age of the light vehicles in the fleet. These are utility vehicles (vans and pick up trucks):

Table 17: Public Works Department Equipment Division
Light Fleet Distribution by Year

1991 / Older	1992-94	1995-96	1997-98	1999	2000-01
29	32	23	8	13	27
22 %	24%	18%	6%	10%	20%

The above analysis indicates that the median vehicle was purchased in 1996. This indicates an age of five years. The average age for a light fleet should be 3 and ½ years.

PUBLIC WORKS DEPARTMENT FLEET MANAGEMENT
SUMMARY OF FINDINGS

AREA	FINDING	INDICATORS
Professional Fleet Management	• Public Works management focuses on the primary functions of running Public Works. They are not trained in fleet management. While interested in the fleet, the organization does not stress an adequate replacement process, and does not insist that operating departments support the fleet program. • Fleet management responsibility has been assigned to the Equipment Division. • New Public Works Department and Equipment Division leadership has, by and large, set the correct strategic direction of fleet management. Importantly, they have the support of users, technicians, and administrative staff. • Users, while sympathetic, are not impressed with the service, and have little interest in playing their role to ensure a safe and well-maintained fleet. • Costs to support the fleet are very high.	• Policy and procedure is not consistently documented. • Management objectives are not set, and are not reported or tracked. • The fleet is old, unsafe and in poor repair. **TCI's review of 11% of the fleet uncovered well over 554 operating and safety defects.** • Measures of efficiency and labor utilization are below TCI expectations and benchmarks. For example**, labor utilization measures in the 50-55% range.** TCI's norm for utilization is 75%. • Operators are not well trained, checklists are ignored, and vehicles are mistreated**. Operating management fails to ensure that operators meet requirements.** • **Mechanics were eager to point out cases of operator misuse.** • **Users fail to deliver vehicles for scheduled preventative maintenance (PM's).** • Costs per vehicle are over $6,461 per active unit. **This is over twice what TCI would consider normal and what is reported by peer organizations.**
Complexity and Size of Fleet Operations	• Public Works has a significant investment in equipment and expense. • Fleet vehicles vary in size and complexity.	• **40 employees currently** work in the Equipment Division. • **555 equipment items,** ranging from light trucks to waste packers to ten-ton dumps, are listed as assets.

AREA	FINDING	INDICATORS
Complexity and Size of Fleet Operations (continued)	• Public Works has significant exposure in areas of liability and safety.	• **$3,153,000** in estimated annual costs for labor, parts, outside services (not including fuel). • Vehicle cost per FASTnet is estimated to exceed **$19,745,000**. • A weekend inspection of just 63 vehicles of the Public Works heavy fleet revealed **265 safety violations**.
Fleet Replacement and Utilization	• The fleet is old. • Vehicles are often repaired well after they have exceeded their useful life. • No fleet replacement plan or discipline is in place.	• TCI would a fleet of this type to have a median age of 4-5 years. **The median age of the fleet is 1992 or 9 years**. A normal replacement cycle of 8 years would yield a median age of 1996-7. • **Of the 357 on the road vehicles in the Public Works only 290 receive fuel on a regular basis, based on fuel records covering two months.** • A fleet replacement plan was previously prepared but not implemented.
Operational Efficiency and Effectiveness	• TCI found the Equipment Division to be inefficient. • Administrative processes and procedures are not documented in some cases. • Public Works fleet management is in a position to measure and report on fleet management activities. They have worked hard to improve the results obtained from their Fleet Anywhere System.	• In several key cases efficiency measures were below TCI's expectations and industry norms. For example, only 55% of mechanics' work time is represented on work orders. **This compares to a TCI and peer expectation of 75%.** • **The cost per vehicle maintained is over $6,400. TCI would expect to see an average closer to $3,000.** • The ratio of vehicles served per mechanic is 16 to 1. This is significantly lower than TCI expectations, lower than other Metro organizations, and lower than peer groups. • The parts inventory turns slightly more than 2 times per year. TCI would expect to see turns of at least 4 times per year.

AREA	FINDING	INDICATORS
Maintenance and Preventative Maintenance	• Maintenance quality is poor. • PM programs were generally undisciplined, not timely, or poorly performed. • Training and certification opportunities were not offered to mechanics. • Public Works operators and operations management do not execute their responsibilities in vehicle maintenance. • No evidence was found of a well-defined, well executed tire management program.	• TCI has **pictures showing poor mechanical condition**. See the examples on the following pages. • Vehicle condition was so bad that TCI coordinated a special weekend inspection. 63 vehicles were inspected. **554 defects were uncovered. 265 of these (48%) were safety related.** • Only one mechanic is ASE certified. Mechanics are receiving limited training. • Dozens of used tires are lying around. Tires are replaced inconsistently. The attached pictures show operating tires that are unsafe. • A low percentage (under 24%) of preventative to corrective maintenance exists. TCI expects to see at least 50%. • PM "no shows" happen on a regular basis. • Mechanics showed us evidence of operator misuse.
Garage and Vehicle Safety	• Safety is not a priority. • Unsafe vehicles were in operation. • Safety violations were found in the garage and fueling area. • Tire programs are erratically applied, and many unsafe tire conditions were observed. • Operators and operations managers do not follow the necessary steps to ensure safe vehicles.	• **Attached are pictures of safety violations.** • TCI's random and weekend inspections found multiple vehicles with unsafe operating conditions. These conditions included slick tires, improperly inspected air brakes, frayed belts and hoses, and severely corroded batteries. • **No evidence was found that operators inspect their vehicles or that they are disciplined if they fail to do so.**

AREA	FINDING	INDICATORS
Fleet Management Information Systems and Reporting	• The Fleet Anywhere system is being used to support Public Works fleet operations. The system has not performed well in the past. • Management reporting is in the beginning stages. • Users still mistrust the system.	• The Fleet Anywhere system was installed without proper equipment, user training and programming support. Gradual improvement has been shown in recent months. Metro ISD is now supporting the system. • The system is down on a daily basis. • The test system and the operating system are using different operating software. • Management reporting is cumbersome. • TCI did not find clear fleet management targets and any history of tracking those targets. • Shop floor and parts room supervision use the system gingerly.
Repair Parts and Inventory	• The parts room is neat and orderly. • The controls and personnel are in place to run an efficient parts operation. • Problems with the Fleet Anywhere system and lack of reporting have had a negative impact on inventory efficiency. • The Parts Supervisor has had little involvement in the past in setting specifications and working with Metro Purchasing.	• Mechanics complained that parts were not available as needed. • **Parts availability (fill rates) was not calculated or targeted**. TCI's estimates indicate a fill rate of less than 50%. With the type of fleet and the investment in inventory and personnel, the fill rate should exceed 75%. • **The parts inventory turns slightly more than 2 times per year**. TCI would expect to see turns of five to six times per year. • No reliable service history is kept on parts. Warranty claims on parts are not always made. • Mechanics voiced the opinion that parts were not available and took too long to obtain. In addition, they felt that low bid requirements required the purchase of low quality parts.

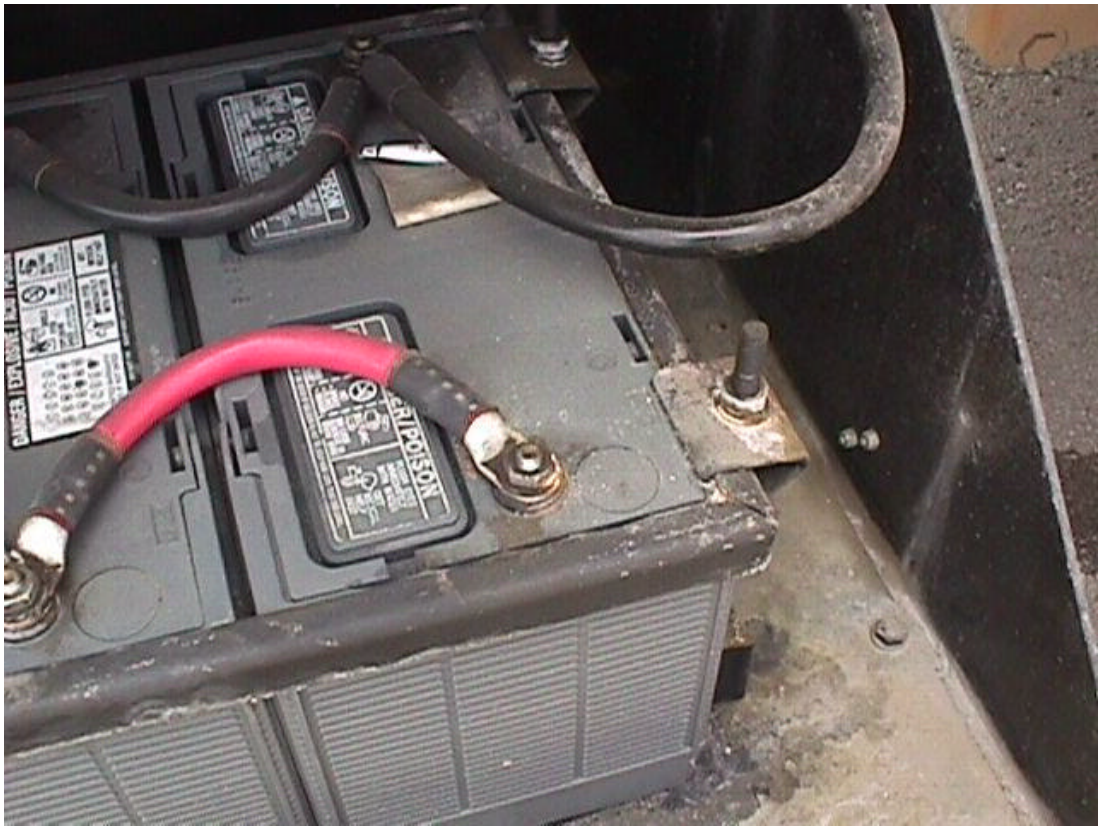
AREA	FINDING	INDICATORS
Fleet Appearance	• The fleet appearance is poor. • The interiors of the vehicles are dirty.	• Many vehicles are operating with dings and dents. • There is little provision for vehicle cleaning (inside or out). • Operators often turn in vehicles for maintenance in dirty condition. It is difficult for mechanics to be proud of working on vehicles in this condition.
Organizational Health	• Public Works Department and Equipment Division leadership have the support of users, technicians, and administrative staff. • Users have been conditioned to accept mediocrity in maintenance and equipment condition. • The garage and shop tools have been improved in recent years.	• Users voiced confidence in the new management team. • Users were concerned that the new management team has little technical experience. • Mechanics were generally pleased with the direction of the new organization.

Note the missing clutch pedal pad. The slick steel surface will allow a wet shoe to slip off and cause either personnel or vehicle damage.

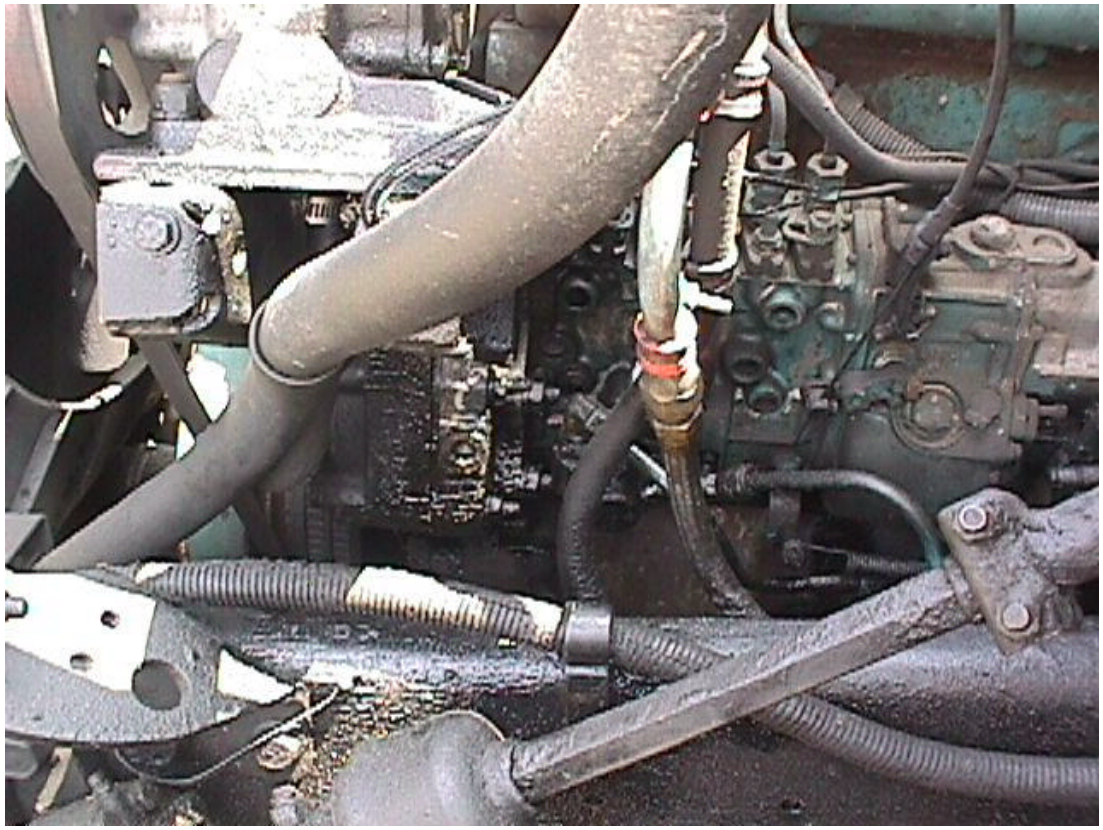
This corroded battery terminal will cause a breakdown and a no start emergency.

Another example of poorly maintained battery terminals.

Note the corrosion has been allowed to damage the battery hold down bracket.



Note the heavy oil leaks on this DT466 engine. It should be degreased and repaired.



This cracked front air brake hose was found on a vehicle that had been in the PM shop six days earlier.

This tire was ruined due to incorrect axle alignment. Note the remaining tread.

The bench grinder tool rests are not in proper adjustment. This adjustment is important to prevent the loss of a finger if the stone "grabs" the object being ground.

The diesel fuel dispenser is not well maintained. It should be routinely cleaned and the supply hose should be attached to a hose tender.

The antifreeze should be purchased in bulk, pumped to overhead reels, and set up with secondary containment.

Where is the fire extinguisher?

Note the open electrical wiring conduit on the fuel island.

GENERAL SERVICES DIVISION MOTOR POOL

Introduction

The General Services' Motor Pool (the Motor Pool) currently employs **thirty** (30) **FTE's** performing a variety of technical and administrative functions related to the management and maintenance of a fleet of 1637 units, primarily sedans and light trucks. These vehicles are assigned to a number of Metro agencies, but Police (1156) and the Sheriff's Office (131) are the major users – in fact, except for Codes with 66 vehicles, none of the other 22 agencies have as many as 40 vehicles assigned. This function is performed in three buildings with a total of about 60,000 square feet. These building are of a historic nature, not designed for vehicle maintenance but reasonably utilized for such.

The Motor Pool also manages **six fuel sites** around Metro that provide fuel routinely to some 1,800 Metro vehicles and six outside agencies. Although the total 2001 budget is in excess of $10,000,000, that number is misleading since it includes fuel and significant capital (shop equipment, motor vehicle replacement funds and computer equipment) as well as funds apparently not intended to be expended by the Motor Pool ($1,571,352 reserve for a building). The fiscal year 2002 expenses, not including capital and fuel, are budgeted to be $3,893,000.

The Motor Pool under ran fleet and maintenance expenses for the 2000 – 2001 fiscal year. The under run was approximately $970,000. In addition Motor Pool expenses include significant costs related to administrating the fleet and the fuel system. In order to fairly evaluate the effectiveness of the fleet maintenance issues, TCI further excluded such costs as Radio Shop charges, new Police car outfitting, vehicle insurance, information system and vehicle registration from its total of actual **maintenance** costs. This resulted in net annual expenses of $2,057,000 being used to analyze **maintenance** performance.

Since the Motor Pool operates an **internal service fund**, it is important to understand the financial position of that fund. The primary liquid assets have significantly declined in recent years. At June 30, 1999 cash and investments totaled $8,512,926, and amounts due from other funds totaled $1,090,295. Those two amounts at June 30, 2001 were $3,367,159 and $761,397, respectively.

It is clear that liquid assets have declined significantly

The Motor Pool maintenance function is performed in two separate, though physically close buildings. Both buildings are basically equal in size and shape (roughly 20,000 square feet each). One building serves as the "quick shop" handling preventative

maintenance, tires and similar small jobs that do not require a skilled mechanic. The second building, the "Main Shop", is the site of most mechanical repairs. The Quick shop has 14 general maintenance bays and a total of 6 vehicle lifts. The Main shop has 30 bays and 9 lifts. All the lifts are above ground –type and were purchased with the intent that they could be moved if necessary.

Motor Pool currently **employs thirteen** (13) mechanics and **eight** (8) equipment servicers. The shop is open 6:00am to Midnight, Monday through Friday and 7:00am to 4:00pm on Saturday. Twelve of the thirteen mechanics have some ASE certifications. Turnover among the mechanics in the shop is extremely low, and as a result, the opportunity for advancement for Equipment Servicers is quite limited. The FY2001 budget listed 46 budgeted positions total for the Motor Pool. A number of these positions are vacant and others are employees who actually work in other parts of General Services.

Table 18: General Services Motor Pool
Currently Filled FTE's

Position Type	#
Administrative	6
Mechanic	13
Equipment Servicer	8
Parts Storekeeper	2
Fuel Coordinator	1
Total	**30**

The fleet served by the Motor Pool is composed of vehicles from many sources, owned and funded by different agencies. Determining the actual number of vehicles in the fleet and being serviced by the Motor Pool was challenging, since vehicles are constantly being added or subtracted from the fleet. Our analysis is that the number of vehicles serviced by the Motor Pool is 1,589 (not including motorcycles). TCI also was given a retrieval from GSD asset records. That list totaled 1500 vehicles. The next two tables provide more information about those 1,500 vehicles.

Table 19: General Services Motor Pool
Fleet Distribution by Year

1993 / Older	1994	1995	1996	1997	1998	1999	2000	2001
102	68	64	116	116	176	454	162	242
7 %	4.5%	4.5%	7.7 %	7.7%	11.7 %	30 %	10.8%	16 %

As the reader can see, the median age of this fleet is 2 years. The average life expectancy for this fleet should be 6 years (in general, 5 years for patrol cars and 7 for all others). Assuming a rational replacement pattern, we would therefore expect to find the median age to be 3 years. The fact that it is less is due entirely to the effect of the purchase of the equivalent of 30 % of the fleet two years ago.

It is also important to analyze the fleet by type of use. Table twenty breaks out both police patrol units and motorcycles since their estimated life is different from that of the rest of the Motor Pool.

Table 20: General Services Motor Pool
Vehicle Allocation by Assignment and Type

	Police Patrol	Motorcycle	General Administrative	Totals
Police	736	48	372	1156
Sheriff			131	131
Judicial			116	116
Health/Social Services			71	71
Codes			66	66
Motor Pool			30	30
Other			67	67
Totals	736	48	853	1637

Motor Pool vehicles fall into three categories when it comes to replacement capital. Roughly 1000 of these units were purchased, and will be replaced, by the Motor Pool fund. Of the remaining, approximately 140 used by the Police in vice operations were purchased and will be replaced using seized funds. The remainder were purchased with monies budgeted specifically for that purpose.

The next section of this report details the operating findings from our review of the Motor Pool.

THE GENERAL SERVICES DIVISION MOTOR POOL
SUMMARY OF FINDINGS

AREA	FINDING	INDICATORS
Professional Fleet Management	• The Motor Pool management does some things well and some things poorly. • The garage operation is well equipped and provides reliable service. • Mechanics are well trained. • TCI found that the fleet is in good mechanical condition. • Management of the various user groups are often confused as to the terms of the arrangement with the Motor Pool, such as clarity of the relationship and the monthly charges. In some cases the relationship is strained. • Management reporting is minimal. Policies and procedures are unclear. • The internal services fund balance has been poorly managed. • Some employees had poor morale. • Costs are high for a fleet of this type.	• Policy and procedure is not consistently documented. • Management objectives are not set, and are not reported or tracked. • All but one mechanic is ASE certified. • Measures of efficiency and labor utilization are below TCI expectations and benchmarks. For example**, labor utilization is less than 50%.** The average cost to maintain a vehicle is **$1,295.** This is high for a fleet this new. Data from a benchmark city showed costs for a similar fleet to be **$1,070.** • The Police Department has a staff of **eight** employees (including uniformed) assigned to ensure that the Motor Pool is handling and billing their cars properly. This group was enlarged due to the lack of information relative to monthly charges. One person spends full time auditing the bills and asking the Motor Pool to correct errors. • Virtually all users interviewed expressed frustration about billing errors and the difficulty in getting corrections. • Motor Pool employees expressed morale issues that were referred to Human Resources.
Complexity and Size of Fleet Operations	• The Motor Pool has a significant investment in equipment and ongoing expenses. • The Internal Service Fund requires careful attention and financial review.	• **30 employees** work in the fleet group • **1,589 light vehicles** are owned or serviced by the Motor Pool.

AREA	FINDING	INDICATORS
Complexity and Size of Fleet Operations (continued)	• The Motor Pool has significant exposure in areas of liability and safety.	• **$2,057,000** in estimated annual maintenance costs for labor, parts, outside services (not including fuel). • Vehicle cost per FASTnet is $28,095,000. • Police pursuit vehicles are serviced here. • Over **60,000 square feet** of space.
Fleet Replacement and Utilization	• As mentioned, the internal service fund has been poorly managed. • No policy exists explaining replacement policy. • The police fleet is very new. The rest of the fleet is not quite as new. • Different users are treated in different ways. • Approximately 150 different rates are in place.	• **The median age of vehicles is 1999.** A normal replacement cycle of 4 years for patrol vehicles and 7 for other vehicles would yield a median age of 1997. • The distribution of fleet age is almost bi-modal. Although the median age is 1999, the mean is 1997. 350 cars are model year 1996 or older. • In the last three years **the internal service fund liquid assets have decreased from $9,500,000 to $4,000,000.** • The average user does not understand how or when vehicles are replaced.
Operational Efficiency and Effectiveness	• TCI found the Motor Pool garage to be inefficient in some ways. • Many measures of operational performance are acceptable. • Administrative processes and procedures are not documented. • Management reports and targets are not clearly defined or prepared.	• In several key cases efficiency measures were below TCI's expectations and industry norms. For example, only 46% of mechanics' work time is represented on work orders. **This implies that the work force is only 46% utilized.** The norm and expectation would be 75%. Part of the reason for the low utilization rate is that the fleet itself is relatively new and is well maintained.

AREA	FINDING	INDICATORS
Operational Efficiency and Effectiveness (continued)	• The Motor Pool information system is unreliable, poorly designed, and inflexible. • Administrative support for the billing system was not adequate. • Morale problems exist in some parts of the operation.	• **The cost per active vehicle maintained is $1,295. TCI would expect to see a number in the range of $1,070.** • Measures of parts inventory and order filling are **good** – the inventory turns 6 times per year, and the fill rate approaches 85%. • Fleet downtime is only 2.6%. This is better than expected. • The percentage of preventative maintenance versus corrective maintenance is a reasonable 50%. • As mentioned, procedures are incomplete or nonexistent. • Also as previously mentioned, management of the internal service fund has been poor. • Meetings with all areas of the staff revealed **morale issues** that were referred to Human Resources.
Maintenance and Preventative Maintenance	• Maintenance quality is good. • The garage is, in most areas, well equipped and suitable for the tasks at hand. • Service history, maintenance manuals, and on line technical information is not available to the mechanics. • The PM program, while relatively unstructured, works effectively. • Because of Police Department concerns about tire condition,tires are scrapped with usable tread remaining.	• Approximately 50% of the maintenance effort is preventative as opposed to corrective. This is reasonable performance.

AREA	FINDING	INDICATORS
Garage and Vehicle Safety	• Areas adjacent to the garage contain improperly stored items and unsafe conditions. • While the garage is generally in a clean and safe condition, some safety violations were noted. • Very few safety issues were noted on vehicles.	• **Attached are pictures of unsafe storage areas adjacent to the garages.** • Attached are pictures of some safety violations found within the garages.
Fleet Management Information Systems and Reporting	• An internally developed system is being used to support the Motor Pool fleet operations. The system is not performing well. • Any management information has to be retrieved from the system by programmers. • Programming assistance is not available on site. • Goals, expectations or targets are not fully developed or published. • Computer hardware is old and incompatible.	• TCI did not find clear fleet management targets or reports. • The information system is written in multiple databases. **It routinely loses information.** • Requests for information are returned with disclaimers like, **"this may not be right".** • One of the Information Systems staff members involved with maintaining the Motor Pool system described it as **"in the ICU on life support".** • In the past the Motor Pool received computers that were handed down from other agencies.
Repair Parts and Inventory	• The Motor Pool parts process generally works well. • The parts room is neat and orderly. • While management has been increasing the workload of the parts room by adding responsibilities, the area is still overstaffed. • The information system supporting parts is the same as the system supporting the rest of the Motor Pool. It delivers the same unacceptable performance.	• Most measures of performance are good – the inventory turns 6 times per year, and the fill rate approaches 85%. • Parts personnel fill three requests per hour. This is low considering the simplicity and condition of the fleet. • The parts inventory system has been manually reset to allow the system to function. **Most inventory numbers are incorrect**. In addition, because of the multiple data base system, transactions are processed without obtaining the desired results. • Mechanics believe that backordered parts are not followed up on until receipt.

AREA	FINDING	INDICATORS
Fleet Appearance	• The fleet appearance is acceptable. • Limited opportunities are available for operators to clean and wash their vehicles. Prisoners assist on most days.	• The fleet is relatively new and as such maintains a good appearance. • Users have requested access to better facilities for vehicle cleaning and washing**.**
Organizational Health	• Users are unhappy with the information available to them about billing and vehicle replacement. In cases the relationship is adversarial. • The current staff has a range of backgrounds and skills. The mechanics are generally well qualified. Some employees are not physically able to perform assigned duties.	• A usual response concerning fleet condition is, "they do the best they can with what they have." • One mechanic had been on light duty for a period of 19 years. • One user spoke of having complained about errors for over a year without resolution.

Storage Building – View 1

Storage Building – View 2

Storage Building – View 3
Note the batteries that must be removed.

The roof on this Motor Pool storage building is collapsing.

The Motor Pool storage building contains 55-gallon drums.

Flammables are not properly secured.

This abandoned battery in the Police parking lot suggests that batteries are not closely controlled.

The following section provides summary information relative to a variety of special issues that impact Fleet Operations within Metro:

SPECIAL ISSUES

This section examines the Metro-wide issues listed below:

- Vehicle Assignment (including take home vehicles)
- Radio Operations
- Parking/Traffic Violations
- Central Motor Pool Fleet Replacement
- Motor Vehicle Fuel
- Vehicle Insurance

Any recommendations pertaining to these issues are contained in either the **Executive Summary** or **Chapter Two.**

VEHICLE ASSIGNMENT:

Introduction

This section examines the policy and practice of 24-hour vehicle assignments by Metro departments, the appropriateness of those assignments, the application of federal tax regulations, and the use of non-government license plates on Metro vehicles.

Methodology

In March 2001, Metro Motor Pool sent an inquiry to all departments requesting information on all vehicles assigned to employees on a 24-hour basis. This was necessary because there are no central records of 24-hour vehicle assignments. Each department was asked the following:

- How many vehicles are assigned on a 24-hour basis,
- Decals of those vehicles, and
- Assigned driver's name

Responses from various departments were received and tabulated by staff in the Metro Motor Pool. TCI collected this data from Metro Motor Pool and conducted an analysis of the responses. Internal Audit sent a follow up request to responding departments requesting copies of the policy they follow when making these assignments.

Additionally, personal and telephone interviews were conducted to follow up on various aspects of this policy and departments' compliance with federal regulations.

Current Policy

Regulations that govern the assignment of vehicles were found in the following areas:

- Metropolitan Government of Nashville and Davidson County Automotive Fleet Policy", dated 11/20/89
- Metropolitan Police Department, General Order No. 97-15, "Police Vehicle Policy and Procedure", dated 12/31/97, and
- Nashville Fire Department Standard Operating Procedures, dated 07/01/88
- Davidson County Sheriff's Office, Policy Index Number 1-3.155, "Vehicle Use and Control", dated 8/10/01.

Vehicle Assignment

Most departments follow the Motor Pool Regulations for fleet management, "Metropolitan Government of Nashville and Davidson County Automotive Fleet Policy", dated 11/20/89. The Police, Fire and Sheriff Departments have developed their own policies governing take home vehicles.

Motor Pool Regulations state that there are five types of vehicle assignments that may be made by department heads, subject to the approval of the Director of General Services:

Type A – Individual Take Home Assignments. For employees whose job responsibilities include a requirement of making frequent business trips during normal off-duty hours or who must have the vehicle available to answer emergency calls while off-duty

Type B – Rotating Take Home Assignment. For a work group or crew whose job responsibilities include a requirement of one or more members to make frequent business trips during normal off-duty hours or who must have the vehicle available for emergency calls while off-duty.

Type C – Individual Workday Assignment. For employees whose job responsibilities include making frequent business trips during normal duty hours.

Type D – Group Workday Assignment. For workgroup or crew whose job responsibilities include making frequent business trips during normal duty hours.

Type E – Temporary Dispatch. The Motor Pool will make vehicles available for individual trip assignments for temporary use.

The policy further states, in section 4.4, that it is the duty of each department head to enforce these Regulations and to take appropriate disciplinary action against employees violating the Regulations.

Police Vehicle Policy and Procedures states there are two types of individual assignment vehicles: "Twenty-four hour" vehicles and "Official Business" vehicles. Twenty-four hour vehicles are assigned to personnel such as:

- Chief of Police
- Bureau Commanders
- SWAT Team members
- Police Negotiator Team members
- "On-Call" personnel
- Others as authorized by the Chief of Police

Official business vehicles may be used by individuals to conduct official business for the department, such as to and from work sites, court/other hearings, meetings, training sessions, vehicle repair appointments and when otherwise authorized by the Chief of Police or his/her designee.

Fire Department Standard Operating Procedures for overnight permitting states these permits are issued and regulated by the Fire Chief's Office. Overnight permits may be issued to Fire Department personnel who have work assignments that require them to respond to emergencies occurring outside their normal working hours. Overnight permits may also be issued to other employees whose use of the take home vehicle serves the needs of the City.

The Sheriff's Office Policy on Vehicle Use and Control states that "take-home" vehicles are assigned as directed by the sheriff/designee. Normally, these type of assignments will be made to employees required to use a D.C.S.O. vehicle on a regular basis in the scope of job performance, and subject to be called for duty at irregular hours or days.

Out of County Travel

Section 7.1 of the Motor Pool Regulations states that no fleet vehicle shall be operated outside the geographic jurisdiction of the Metropolitan Government except upon the prior approval of the Director of General Services. Exceptions are provided for emergency and law enforcement vehicles when operation is provided by law or departmental rule.

Police regulations at Section VII. K. state that employees with assigned vehicles who live outside Davidson County must park their vehicle at a Metropolitan Nashville Police Department facility unless otherwise authorized by the Chief of Police.

Fire Department regulations at Page 1, item 6) state that "special" permission is needed by the Director-Chief in order to leave the county with an Overnight vehicle. D.C.S.O. policy found at Page 6, "Out of County Travel" states that out of county travel must be pre-approved through the Metro General Services Administration.

Compliance with IRS Regulations

Section 9.5 of the Motor Pool Regulations states that it is the responsibility of the employee to maintain and file appropriate records of the amount of personal use of these vehicles which a federal tax liability exists, as determined by the Internal Revenue Service and as directed by the Director of General Services.

The IRS Commuting Rule states that the value of a vehicle must be determined when a vehicle is provided to an employee for commuting use. This can be done by multiplying each one-way commute by $1.50. If more than one employee commutes in the vehicle, this value applies to each employee. Public Safety personnel in uniform are exempt from this practice.

Current Practices

Based on interviews and analysis of data provided to TCI, it has been determined that department heads generally assign 24-hour vehicles to employees based on past administrative practices. Although we were able to find Motor Pool Regulations governing the assignment of 24-hour vehicles, very few department heads knew of its existence. We were not able to determine whether 24-hour vehicle assignments were made in accordance with central policies.

Data requests were made to the Finance Department to try and determine if IRS regulations were being followed for all employees assigned a 24-hour vehicle. We found that there are some employees who are experiencing a payroll adjustment, however, there is no consistent method to identify and adjust all employees who fall into this category. A Commuting Form

is required to be completed by commuting employees and attached to the Payroll Authorization Form and forwarded to Payroll for processing. TCI was unable to find the policy that governs this process. As a result, all departments do not consistently follow this unwritten policy. For example, there were a total of **983** 24-hour vehicle assignments identified, but only **65** employees identified with payroll adjustments.

The departmental breakout is as follows:

Table 21: Metro Nashville
Summary of 24-Hour Vehicles

Department	Number of Vehicles
Water Services	24
Sheriff	45
General Services	14
Public Schools	22
Office of Emergency Management	6
Public Works	14
Fire	65
Police	782
Other departments	11
Total	**983**

Other Findings

- Some employees are driving 24-hour assigned vehicles out of county on a daily basis. A data match was conducted comparing home addresses with vehicle assignments. Approximately **37** drivers live out of county.
- Private tags on government vehicles appear excessive when compared to industry standards.
- Our survey of benchmarked Cities indicates 24-hour vehicles are limited to emergency response personnel and, in one City, emergency road response crews.

Summary of Findings

In summary, our review concluded with the observation that there are no centralized records summarizing 24-hour vehicle usage, no evidence that policies are being followed and a low correlation of employees assigned a vehicle for 24-hour usage who are complying with IRS regulations.

RADIO OPERATIONS:

Introduction

TCI was asked to conduct a brief review of the Metropolitan Government radio operations to ascertain or assess the process of placing units into service, maintenance of mobile radios and any impact this operation might have on vehicular downtime. The Metropolitan Government Radio Shop is an entity of General Services and operates on an Internal Service Fund basis. New rates were put into effect August 15, 2001.

Approximately 17 – 18 personnel staff the operation. Most personnel (12 of the 18) install and maintain mobile radios for various Metropolitan entities. The balance of staff supports billing, base station maintenance and service calls.

Three (3) radio systems are currently supported and maintained; VHF, UHF and the new 800 Mhz system. Over time, staff believes that most users will switch over to the new 800 Mhz system.

Other tasks performed by the Radio Shop include:

- Maintenance of fixed base radios
- Maintenance of mobile radios
- Installation of mobile computers
- Installation of automatic vehicle locators (AVL)
- Maintenance of 7/8 radio towers
- Installation of light bars, sirens, screens and racks for new police vehicles

Approximately 60 – 70% of the units' workload is devoted to Police. Other customers include:

- Water and Sewer
- Fire Services
- Codes Compliance
- Public Works

Most billing is accomplished from work orders entered into an old database system and summarized on spreadsheets. Very little (if any) management information is compiled.

Findings

By and large, we found the Radio Shop to be well organized and financially viable. The new rate structure appears to be well formulated.

The Radio Shop became an area of concern in late Spring of 2001 when the delivery of 150 new Police cars caused a severe backlog in the system. In previous periods, new vehicle deliveries occurred on a more piecemeal basis, and the installation times of 12 – 16 hours per vehicle were comfortably integrated with the entire new vehicle preparation cycle. This large delivery simply overwhelmed Radio Shop staff and exhausted thinly stocked supply items. All parties, including Police, have assured TCI that both a new awareness and a new purchasing process will preclude this event from reoccurring. In fact, parts are now on hand to handle the next 25 deliveries due to an operational decision to convert 25 new vehicles to sergeant cars instead of patrol.

We do have concerns about the lack of solid viable management information to measure backlog, labor utilization, turnaround time and the like. TCI believes that Radio Shop vehicle installation operations should become a part of the new Metro-wide Office of Fleet Management. This eventually should assist in managing such critical issues as parts availability and labor capacity; two key elements in managing patrol car downtime.

PARKING/TRAFFIC VIOLATIONS:

Introduction

Concerns were voiced about a backlog of Metro Departmental parking tickets that had accumulated in the Traffic Violations Bureau. TCI was asked to investigate the handling of violations and the appropriate charge backs to the users.

Findings

TCI interviewed employees in the General Services Motor Pool and the Violations Bureau about this situation. We did find that the Motor Pool had recently (June 2001) received a batch of tickets from the Violations Bureau dating from December 1999 to June 2001 and totaling over $7,000. Both the Division and the Bureau indicated that 75% of the tickets are attributable to Metro Vice personnel with private vehicle tags who were parking in the vicinity of the Court House. Motor Pool staff is concerned that a number of vehicles (and employees) have turned over in the 18 months or so since tickets were issued. As a result, only $4,250 may be either charged back to the offending department or collected from the individual offenders.

We have reviewed section 6.0 of the Automotive Fleet Regulations related to this topic. The language is quite clear as to responsibilities and action in that employees to whom vehicles are assigned will be responsible for the costs of traffic or parking tickets issued to the vehicle while it is assigned to their care. We have provided the Violations Bureau with a copy of the aforementioned regulation. Staff there indicate that they will begin to forward these tickets to Motor Pool on a much more current basis than previously provided. The Motor Pool will also commit to submitting all the required information outlined in sections 6.4 and 6.5 to the

Departments so swift action can be taken. These sections require Motor Pool to promptly pay the fine and bill the cost back to the offending department. The department head shall determine if the charges should be paid by the department or by the employee.

CENTRAL MOTOR POOL FLEET REPLACEMENT:

Introduction

The Metropolitan Nashville central motor pool operates as an internal service fund and is a division of the Department of General Services. They lease, maintain, and service vehicles for approximately 42 departments and agencies, including the Police Department. Agencies in Metro Nashville contribute to the internal service fund or vehicle replacement fund through approximately 150 different charge-back rates. A charge-back rate is established at the time the vehicle is purchased and put into service. This rate includes a monthly lease charge for the vehicle over a 60-month period, plus allowances for escalation and inflation costs.

Findings

Charge-Back Rates for the Police Department: An informal understanding was reached in 1997 between previous administrations of the General Services Department and the Police Department. Transportation Consultant Inc. (TCI) requested documentation to substantiate this agreement; however, none could be located. Although TCI was unable to locate any documents that outlined or discussed this agreement, its policy is widely known and accepted. As a result, the Police Department enjoys an advantageous all-inclusive charge-back rate of $335 a month for marked, pursuit vehicles. This rate covers capital replacement costs, maintenance, and repair expense allocations, but does not include expenses associated with abuse and accident damages. Based on full cost recovery needs and industry standards for charge-back systems and methodologies, the $335 a month charge-back rate does not provide the capital to allow the General Services Department to replace necessary police vehicles at the appropriate time. In order to provide adequate funding for police vehicle replacements, a higher charge-back rate must be established.

This rate, commencing with the introduction of the fully burdened rates in the Internal Service Fund on July 1, 2002, should be constructed as follows: Accruals should be levied against a particular vehicle to provide for its replacement at the end of its' useful life. The formula is as follows:

Original Purchase Price
Times Inflation (3%)
Divided by Useful Life Expectancy (in months)
Plus salvage allowance (10%)
Equals monthly charge

Therefore, for a $28,000 police vehicle purchased in FY 2001 with a life expectancy of four years, the monthly accrual would be $591.00 per month ($28,000 x 1.03 for four years x .90% divided by 48 months). These rates do **not** include maintenance, fuel, radio shop installations, or insurance.

Existing Police Fleet Replacement Policy

The Police Department's fleet liaison personnel monitor the fleet inventory on a continuous basis. Police personnel target vehicles for replacement by keeping track of vehicle age, condition, and mileage through an automated computer program. Once a vehicle reaches 75,000 miles, it is targeted for replacement; actions are taken at 90,000 miles to begin the replacement process. Priority is given to Patrol cars first, then cars assigned to other units. Sometimes vehicles are removed from service because of poor mechanical condition, high mileage, repair costs, and substantial damage from accidents.

It is typical of internal service funds that the vehicle replacement funding mechanism that will adequately cover all estimated costs of supplying and replacing the fleet. This is not the case for the Motor Pool with Police vehicles. It is also typical that a standard replacement plan be in place using well-defined criteria. This is also not the case.

Listed below are criteria that TCI recommends for police vehicle replacement.

Table 23: Typical Life Cycles of Police Vehicles

Unit Description	Life Cycle	Mileage
Light Administration	6	100,000 – 115,000
Patrol Units	4	90,000 – 105,000
Pickups	6	100,000 – 115,000
Vans	6	90,000 – 105,000
Station Wagons	6	90,000 – 105,000
4 Wheel Units	6	90,000 – 105,000
Motorcycle	3	42,000 – 58,000
Paddy Wagon	7	Various

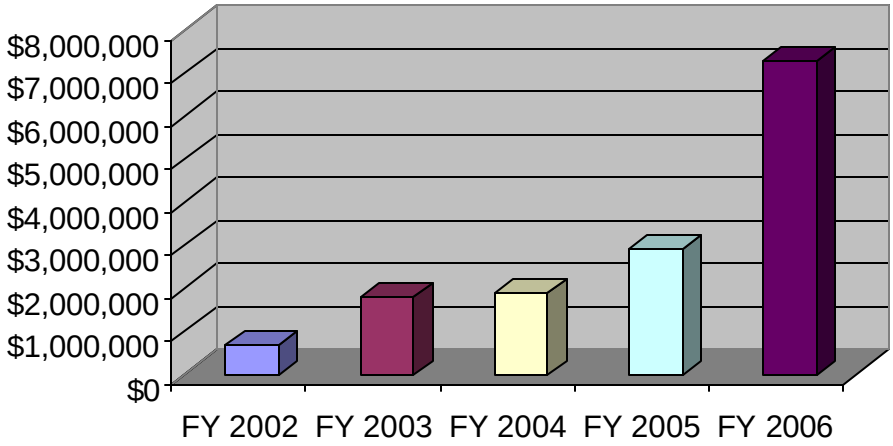
Note: **All figures for Normal Life Cycles are in years. All other figures are mileage unless otherwise noted.**

Based on our analysis of the current fleet, its age and condition, we have determined that over the next five years, the Department will have to replace 464 vehicles for an estimated cost of $14.6 million. Table 24 shows the replacement schedule for that portion of the fleet needing replacing in year 2002, and Table 3 shows the replacement schedule summary by year and projected costs.

Table 24: Replacement Schedule Police Units
(Based On Mileage)

Year	Vehicles Needed	Anticipated Expenditures
FY 2002 – 03	24	$692,160
FY 2003 – 04	61	$1,812,017
FY 2004 – 05	62	$1,896,974
FY 2005 – 06	93	$2,930,825
FY 2006 – 07	224	$7,270,967
Subtotal	**464**	**$14,602,943**
FY 2007 – 08	252	$8,425,116
FY 2008 – 09	24	$826,464

Chart 1: Police Units Recommended Vehicle Replacement Analysis
Next 5 Fiscal Years



We realize that the budgetary impact of this schedule is significantly greater than current appropriations. However, the Department has a relatively modern fleet; thus, substantial expenditures will not occur until the fiscal year 2005/2006. Chart 1 is a graph of these same projected expenditures for vehicle replacements over the next five years.

For the new fiscal year, the analysis indicates that 24 vehicles need to be replaced at an estimated cost of $690,000. Interviews with staff indicate that these retiring vehicles are not adequate with respect to providing safe and reliable service to the Department. Table 25 lists these vehicles by location, decal number, year, model, and odometer reading as of May 2001.

Table 25: Metro Nashville
Police Vehicles Requiring Replacement In Year 2002

DECAL	MODEL	YR	LOCATION	MILEAGE
07P2331	TAURUS	97	ADMIN SRVS-RECORDS	111,240
07P6435	CROWN VIC	96	COP-FISCAL-FLEET MGT	109,844
07P6445	CROWN VIC	96	COP-FISCAL-FLEET MGT	94,646
07P6195	CROWN VIC	94	COP-FISCAL-FLEET MGT	93,950
07P6408	CROWN VIC	96	COP-FISCAL-FLEET MGT	93,678
07P6476	CROWN VIC	97	COP-FISCAL-FLEET MGT	90,266
07P2178	CENTURY	95	INVEST SRVS-CID-MURDER SQU	91,701
07P1063	3/4 TON	85	INVEST SRVS-VEHICLE IMPOUN	102,514
07P6479	CROWN VIC	97	INVEST SRVS-VICE-EQUIP & S	92,011
07A2997	E-350	89	UNIF SRVS-BUREAU COMMAND	100,988
07P6216	CROWN VIC	94	UNIF SRVS-PATROL-CENTRAL	124,692
07P6240	CROWN VIC	94	UNIF SRVS-PATROL-CENTRAL	94,845
07P6452	CROWN VIC	96	UNIF SRVS-PATROL-CENTRAL	94,808
07P6239	CROWN VIC	94	UNIF SRVS-PATROL-CENTRAL	92,627
07P6281	CROWN VIC	95	UNIF SRVS-PATROL-CENTRAL BIKES	94,613
07B4001	E-350	89	UNIF SRVS-PATROL-EAST	149,480
07P6396	CROWN VIC	96	UNIF SRVS-PATROL-SOUTH	92,487
07P6507	CROWN VIC	97	UNIF SRVS-PATROL-WEST	96,400
07P6369	CROWN VIC	95	UNIF SRVS-SPCL INVST-CANIN	97,000
07P6376	CROWN VIC	96	UNIF SRVS-SPCL INVST-CANIN	92,932
07P6276	CROWN VIC	94	UNIF SRVS-TRAF-A&I	106,663
07P6378	CROWN VIC	96	UNIF SRVS-TRAF-A&I	97,130
07P6451	CROWN VIC	96	UNIF SRVS-TRAF-A&I	92,693
07P6480	CROWN VIC	97	UNIF SRVS-TRAF-A&I	90,091

The capital recovery rate for marked police vehicles using present costs would be $591 per month. This is capital only and does not include fuel, insurance, radio installations and maintenance. This capital recovery rate would be applied to new vehicles only and does not provide for any catch up to a fund deficit.

Interviews with GSD accounting staff indicate the following:

- The 716 marked vehicles under the $335/month program are breaking even with no provision for capital replacement.
- The 497 vehicles in the P-2000 series have a $321/month capital component that contributes substantially to the replacement of that vehicle.

The impact on the Police budget for the upcoming fiscal year depends largely on implementation options, these are:

- Should the $591/month be levied on all 716 marked units currently under the $335 program, the fiscal impact would be 716 x $591 x 12 or $5,077,872.
- Should the $591/month be levied on **new** vehicles as they arrive, the impact will be substantially less as per Table: 24 (Recommended Option)

Other assumptions inherent in this analysis include:

- Assume both the 335 Program and the P-2000 Programs are discontinued after 6/30/02.
- Full cost recovery for operations will be a separate calculation and accrual. This will be billed in addition to the capital recovery charge.

Therefore, the recommended rate structure is as follows for the Police vehicles:

Table 26: Metro Nashville
Capital Replacement Billed

	Marked Police			Unmarked Police and Non-Police		
Fiscal Year	**Number of Vehicles**	**Rate**	**Total**	**Number of Vehicles**	**Rate**	**Total**
FY 2002-03	24	591	170,208	873	292	3,058,992
FY 2003-04	85	591	602,820	873	292	3,058,992
FY 2004-05	147	591	1,042,524	873	292	3,058,992
FY 2005-06	240	591	1,702,080	873	292	3,058,992
FY 2006-07	464	591	3,290,688	873	292	3,058,992
FY 2007-08	716	591	5,077,872	873	292	3,058,992
FY 2008-09	716	591	5,077,872	873	292	3,058,992
Thereafter	716	591	5,077,872	873	292	3,058,992

Non-Police Vehicles

Findings

Current Policy for the Department of General Services Automotive Fleet: Regulations that govern the acquisition, use, maintenance and replacement of the automotive fleet in the Department of General Services were found in the "Metropolitan Government of Nashville and Davidson County Automotive Fleet Policy", dated 11/20/89. This policy applies to all departments and agencies and their employees except the Mayor and other elected officials who have promulgated their own regulations and filed them with the Metropolitan Clerk.

The policy states that the Director of General Services is to periodically review the performance and condition of the automotive fleet and determine if each vehicle should continue in service, or be replaced because of age, damage, poor performance or change in need.

The Director is also responsible for surveying department heads on a periodic basis in order to obtain information regarding:

- Vehicle needs
- Performance of units currently assigned
- Future needs

The department head may initiate requests for fleet services at any other time through written request to the Director. The requests must describe the type of vehicle needed, the proposed assignment, the name(s) of persons to whom the vehicle will be assigned, their driver's license numbers, the account from which payment for services will be made and any requirements for special equipment. Additionally, the requests must include a statement justifying the need for such services.

Replacement Policy for the Automotive Fleet

There is no orderly replacement program for the automotive fleet. It was generally assumed that approximately 15% of the fleet would be replaced each year. This equates to a replacement cycle of approximately 6.7 years.

Annually, the Director of the Central Motor Pool solicits information from each department head regarding his or her vehicle replacement needs. Once the department heads respond, the Director of the Central Motor Pool consolidates the requests and prioritizes them based on need.

Priority System

Vehicle replacements are based on existing budget. This creates a challenge especially when department requests for vehicles are greater than the budget will allow. For example, a total of 166 vehicles were requested for FY 2001. However, the budget allowed for the replacement of no more than 65 vehicles.

It was reported to the team that the following priority system is a fairly informal process. The first level in the prioritization process involves replacing vehicles with high mileage. The next level in the prioritization process involves replacing vehicles in departments considered "worst off". Each major department's fleet is reviewed taking into consideration vehicle age, mileage and condition. The last step is an attempt to give each requesting department at least one new vehicle. A vehicle acquisition plan is then developed based on fund availability. Table 24 provides typical recommended replacement cycles for light vehicles.

TCI's working papers contain a listing of the entire non-police fleet inventory by decal number, make, model, year, department name, odometer reading, and projected year for vehicle replacement.

Table 27: TYPICAL LIFE CYCLES OF NON-POLICE VEHICLES

Unit Description	Life Cycle	Mileage
Light Administration	6	100,000 – 115,000
Pickups	6	100,000 – 115,000
Vans	6	90,000 – 105,000
Station Wagons	6	90,000 – 105,000
4 Wheel Units	6	90,000 – 105,000

Note: All figures for Normal Life Cycles are in years. All other figures are mileage unless otherwise noted

Based on our analysis of the current fleet, its age and condition, we have determined that over the next six years, the Department will need to replace 452 vehicles for an estimated cost of $10.4 million. Table 25 shows the replacement schedule for that portion on the fleet needing replacing by year 2008.

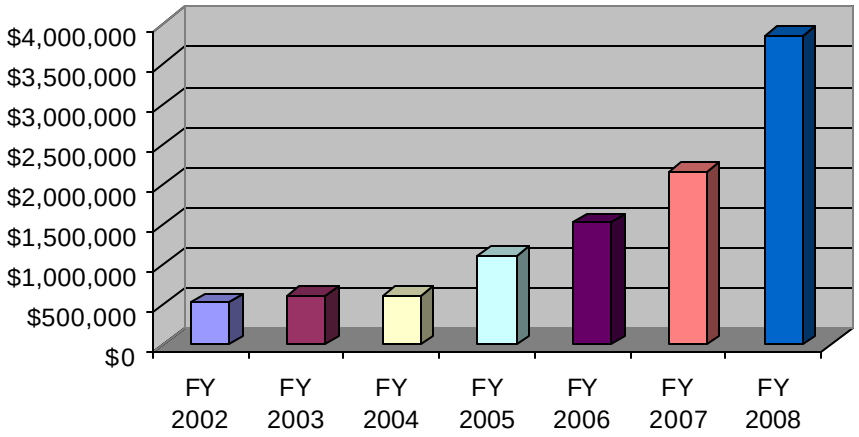
Table 28: NON-POLICE REPLACEMENT SCHEDULE
(BASED ON MILEAGE)

Year	Number of Vehicles Needed	Anticipated Costs
FY 2002	26	$524,085
FY 2003	29	$602,093
FY 2004	28	$598,771
FY 2005	50	$1,101,310
FY 2006	67	$1,520,029
FY 2007	92	$2,149,820
FY 2008	160	$3,850,981
Subtotal	**452**	**$10,347,089**
Thereafter	**421**	**$10,437,011**

Source: Created by TCI using data received from Department of General Services, June 2001.

Analysis of Table 28 above indicates that the budgetary impact of this schedule may be greater than current appropriations, with the greatest impact occurring in FY's 2007 and 2008. Chart 2 is a graph of these projected expenditures for non-police vehicle replacements over the next seven years.

Chart 2: Recommended Vehicle Replacement Analysis



For non-police vehicles provided by the Motor Pool with a six-year life and a base value of $19,570, the monthly charge would be $292.00 ($19,570 x 1.03 for six years x .90% divided by 72 months). The current rates vary widely by the type of vehicle purchases. This does not include costs for fuel, insurance, or maintenance.

As indicated earlier, the following rate schedule applies for the next several years:

Table 29: Metro Nashville Capital Replacement Billed Unmarked Police and Non-Police

Number of Vehicles	Rate	Total
873	292	3,058,992

For the new fiscal year, the analysis indicates that 26 vehicles need to be replaced at an estimated cost of $524,000. The majority of these vehicles are located in the following areas: Sheriff's department (nine), the Metro Major Drug Enforcement Program (five) and Community Corrections (three). Interviews with staff indicate that these vehicles may not be adequate in respect to providing safe and reliable service to the various departments. Table 26 below lists these vehicles by decal number, make, model, year department, color and odometer reading as of June 2001.

The following tables recapitulate the comparison of current and proposed rates as well a summary of project cash flow for both vehicle classes.

Table 30: Metro Nashville Motor Pool Vehicle Replacement Plan
Projected Cash Flow Analysis

	Capital Replacement Billed						Capital Replacements				
	Marked Police			Unmarked Police and Non-Police			Marked Police		Unmarked and Non-Police		
Fiscal Year	Number of Vehicles	Rate	Total	Number of Vehicles	Rate	Total	Number of Vehicles	Cost	Number of Vehicles	Cost	Impact on Cash Flow
FY 2002-03	24	591	170,208	873	292	3,058,992	24	692,160	26	524,085	2,012,955
FY 2003-04	85	591	602,820	873	292	3,058,992	61	1,812,017	29	602,093	3,260,657
FY 2004-05	147	591	1,042,524	873	292	3,058,992	62	1,896,974	28	598,771	4,866,428
FY 2005-06	240	591	1,702,080	873	292	3,058,992	93	2,930,825	50	1,101,310	5,595,365
FY 2006-07	464	591	3,290,688	873	292	3,058,992	224	7,270,967	67	1,520,029	3,154,049
FY 2007-08	716	591	5,077,872	873	292	3,058,992	252	8,425,116	92	2,149,820	715,977
FY 2008-09	716	591	5,077,872	873	292	3,058,992	24	826,464	160	3,850,981	4,175,396
Thereafter	716	591	5,077,872	873	292	3,058,992	61	2,163,609	421	10,437,011	(288,360)

* Note that the rates for marked police vehicles would be reviewed for adequacy by 2005-06, and the rate for other vehicles would be reviewed by 2007-08.

Table 31: Motor Pool Vehicle Replacement Plan
Comparison of Current and Proposed Rates

Funding Plan	Vehicle Types	Method of Charging Operational Cost	Current Amount Billed Monthly for Capital Replacement	Proposed Monthly Capital Replacement Rate	Number of Vehicles in Plan
$335 Plan	Marked Police	Covered by the $335	$ -	$ 591	716
P-2000 Plan	Unmarked Police, Non-Police	Billed as incurred	$ 321	$ 292	497
Other Plans (Averaged)	Non-Police	Billed as incurred	$ 299	$ 292	376
Total					**1,589**

Table 32: Vehicles Requiring Replacement In Year 2002

Decal	Make	Model	Year	Department	Color	Mileage
P2149AC	GMC	Sierra	1994	Bordeaux Hosp. - Household & Property	White	94,343
P2010AC	Dodge	Ram Van	1994	Central Serv. - Aged & Handicapped	White	370,742
P2206AD	Ford	Club Wagon	1995	Central Serv. - Aged & Handicapped	White	96,124
P1136	Ford	Bronco	1986	Community Corrections	Tan	106,640
P2255AE	GMC	Century	1996	Community Corrections	N/A	98,401
P1457	Ford	Aerostar	1992	Community Corrections	White	98,382
07E2994	Ford	Bronco	1989	General Hospital - Environ.Serv.	White	131,862
P2061AC	Chevrolet	CM11005	Unknown	GS Bldgs	White	96,115
P1298	GMC	1/2 Ton Pickup	1989	Juvenile Court and Detention Ctr.	White	107,868
P2186AD	Ford	E-250 van ¾ Ton	1995	Library - Oper. & Main.	White	92,633
07D4427	Oldsmobile	Cutlass	1992	Metro Major Drug Enforcement Prog	Black	137,968
07D4453	Oldsmobile	Royale	1992	Metro Major Drug Enforcement Prog	Gray	112,276
07D4447	Jeep	Cherokee	1992	Metro Major Drug Enforcement Prog	Black	108,722
07D4286	GMC	Regal	1991	Metro Major Drug Enforcement Prog	Black	97,942
07D4454	Mazda	MX-6	1992	Metro Major Drug Enforcement Prog	N/A	93,070
P1323	GMC	3/4 Ton Truck	1990	Motor Pool	White	128,309
P1281	Ford	Wrecker	1988	Motor Pool	White	123,318
P1518	Ford	Taurus	1992	Sheriff Corr. Wrk Ctr	Blue	104,194
P2050AB	Ford	Taurus	1993	Sheriff Processing	White	439,333
P2005AB	Ford	Crown Vic	1993	Sheriff Processing	White	131,106
P2003AB	Ford	Crown Vic	1993	Sheriff Processing	White	107,517
P2004AB	Ford	Crown Vic	1993	Sheriff Processing	White	105,757
P2002AB	Ford	Crown Vic	1993	Sheriff Processing	White	101,124
P2006AB	Ford	Crown Vic	1993	Sheriff Processing	White	98,109
P2233AE	Dodge	Ram	1996	Sheriff Transportation	White	103,582
P2234AE	Dodge	Ram	1996	Sheriff Transportation	White	91,664

SOURCE: Created by TCI using data received from Department of General Services, July 2001.

MOTOR VEHICLE FUEL:

Introduction

Motor Vehicle Fuel is a major part of any fleet's annual expenses. Proper fuel management, like all other parts of fleet management, requires accurate and complete information and someone to act upon that information.

Responsibility for fuel management in Nashville Metropolitan Government is spread among a number of functional areas. The Metro Division of Purchases is the sole procurer of fuel for Metro. They secure daily quotes for next day delivery and fax the results to a staff person at the Motor Pool for follow-up. General Services Motor Pool operates seven fuel sites providing either gasoline (Peabody, West Police, and Hermitage) or gasoline and diesel (West Center, South 5th, South Police, and East Center). In FY2000, 2,055,329 gallons of gasoline and 551,391 gallons of diesel were purchased by Motor Pool for these sites. These fuel sites are controlled by an automated, electronic key-operated dispensing system.

Some 5,600 keys to the fuel dispensing systems have been distributed to Metro and non-Metro users (Nashville Table, 2nd Harvest Food Bank, U.S. Marshall Service, FBI, and Greater Nashville Federal Interagency Motor Pool). The information available indicates that around 2000 vehicles use these sites on a regular basis. For the first ten months of FY2001, the total Motor Pool charges to the outside agencies amounted to $31,520. It is clear that the majority of Motor Pool managed fuel is used by law enforcement (Police and Sheriff's Departments), Public Works, Water, and general administrative vehicles.

We learned of two local not for profit agencies receiving fuel from the Motor Pool. While they appear to be legitimate 501(c) 3 entities, it is **not** appropriate for their vehicles to receive fuel from Metro sources. Their use of the Metro fuel system may allow these agencies to avoid paying state sales tax.

The other Metro Departments with fuel management responsibilities are Fire, Parks and Recreation, Housing, Public Schools, MTA, NES, and the Hospital Authority. At the time of our review, there were 77 fuel tanks operating within Metro. No one Metro function is responsible for oversight.

Table 11: Metro Fuel Purchasing
2000 – 2001 Fiscal Year

Department	Type of Fuel	Expenditures
General Services Motor Pool	Diesel and Unleaded	$2,500,000
Fire Department	Diesel and Unleaded	200,000
Parks and Recreation	Diesel and Unleaded	85,000
Metro Transit	Diesel and Unleaded	1,356,000
School Board	Diesel and Unleaded	1,121,000
Nashville Electric Service	Bio-Diesel, Unleaded, and Ethanol	559,000
MDHA	Diesel and Unleaded	42,000
Total		**$5,863,000**

Our first major issue is that all of these numbers are **approximations**. Before beginning this audit TCI, through Internal Audit, requested information from each using department regarding fuel purchase, storage, and dispensing. The above data is based on the best data available that we were able to obtain. Based on what we have received, there is a general lack of uniformity in the manner in which fuel information is kept.

There are **four** major reasons for properly managing fuel. First, fuel usage is a key ingredient in any fleet management plan. It represents a significant expense in that approximately $6,000,000 in direct cost is incurred. Second, it is an indicator of the need for maintenance if, for example, average miles per gallon decreases over time. Third, and potentially most significant, is that the laws governing the storage and use of motor fuels are quite complex and the potential penalties are severe. Fourth, fuel is a valuable commodity that requires strict internal control measures for safeguarding and security. The responsibility for these management functions are not centralized or clearly defined in the Metro government. As a result, many basic control and management functions are not adequately performed.

Fuel Management

Motor vehicle fuel in Metro is purchased using two different methods. As mentioned, Metro Purchasing Department personnel obtain daily quotes on gasoline and diesel for delivery the next day. General Services Motor Pool, Schools, Fire, and Parks & Recreation use these quotes. NES, MTA, and MDHA purchase fuel on their own. Motor Pool has an employee whose primary function is to manage its seven sites. This employee checks each site daily to ensure that everything is working properly and to determine if fuel is needed. If fuel is required, he notifies Purchasing and is told which vendor to call. Delivery is then scheduled, and the employee meets the vendor on site since the fill caps are locked. This purchasing method takes advantage of market fluctuations and a competitive environment. In a time of relatively stable prices or decreasing prices, this method is to Nashville's benefit. If prices rise significantly, then the fact that Nashville does not have a locked price would obviously be a disadvantage. The problem is that if you pursue a locked or fixed price contract on an annual basis, you force the vendors into "padding" their bid price per gallon in order to protect themselves from future price increases beyond their control. The current method allows Nashville to receive the best price on a routine basis. The "risk" involved - that of significant price increases in the short term - is one that many local governments have found acceptable. All Metro agencies should be purchasing fuel using the daily quotes obtained by Purchasing.

In both Fire and Parks & Recreation, fuel is ordered based on stick readings taken at the physical location of the tank. According to the information provided, none of the Parks & Recreation sites have automated fuel dispensing and only three of the twenty Fire Department locations are automated. Automated fuel dispensing is an electronic means of identifying the person and/or vehicle obtaining fuel and recording the key elements of the transaction. It is the same process, though the methodology and hardware vary, that private consumers employ when they drive up to the pumps and insert a credit card to obtain fuel. The information on the card identifies the consumer, checks to verify that credit is acceptable, turns on the dispensing equipment, and records the key elements of the transaction. The use of this technology in local government has proven cost effective since it provides both control over access to the fuel and automatic recording of the transactions.

The information concerning fuel management among the other major departments is mixed. NES has an up to date sophisticated fuel monitoring and dispensing system. As an electric utility they have Federal mandates for the use of "clean fuels." that exceed the rest of Nashville. They currently use ethanol for some gasoline vehicles and are switching to "bio-diesel" to help meet the Federal mandates. NES is also leading the way in fuel dispensing and recording equipment with installation of the "Fleetlink" fuel authorization and data recording system. The vendor is Petro Vend. The system involves placing an identification device in the

vehicle. This eliminates entry errors and reduces the possibility ofn gas being pumped into non-Metro vehicles. Automated systems of this type provide the best possible controls and accounting solutions. In addition, they are convenient for the user and significantly speed up the dispensing of fuel. This sets the standard for a possible Metro-wide fuel solution.

Nashville Public Schools uses a combination of in-house fuel storage and commercial purchases. During the period of our review, approximately 55% of the total usage was in-house (3 locations with a total of 12 tanks) and 45% was commercial. As mentioned in our MNPS Chapter, Metro Schools augments their in house fuel sources with a Fleet One fuel card program. MNPS pays approximately $.109 more per gallon under the Fleet One program, not taking into account the administrative and overhead costs associated with maintaining fuel in house. Taxes are excluded on Fleet One invoices. They have no automated dispensing and recording equipment, though their tanks have automated tank level sensing equipment to comply with the environmental mandates.

Metropolitan Transit has one central fuel site for its 220 vehicles. This works well since the fuel tank is at the MTA garage, and vehicles are re-fueled at night.

There are several reasons for closely monitoring fuel usage - in order to accurately account for the usage of a valuable commodity, for fleet management purposes, and for environmental reasons. Close monitoring requires several steps. First, fuel deliveries must be witnessed and reconciled before and after physical measurements, either manual or automated. Second, fuel issues must be recorded accurately. Although it is theoretically possible to do this manually, it is very easy for individual transactions to be inaccurately recorded or not recorded at all. Third, all tanks must be monitored for leaks perpetually. Finally tanks, lines, and vapor recovery systems each have periodic testing required to ensure integrity and functionality of the systems. Since fuel management at Metro is the responsibility of the individual tank site, these important functions are performed in an inconsistent fashion. There is no central oversight to insure that all the required steps are taken and that all state and federal regulations are complied with.

For commodity management, it is essential that fuel usage be balanced periodically against fuel deliveries and the actual physical fuel inventory. For fleet management purposes, and to deter pilferage, it is important to know how much fuel is dispensed to which vehicles. General Services Motor Pool does maintain good physical control of fuel inventories and deliveries, as does most Metro agencies with their own fueling facilities. There is very little evidence of any effort to divert fuel usage by individual vehicle for management or control purposes.

During our first conversation concerning fuel, we were informed that General Services Motor Pool and other Nashville gasoline users had purchased 89-octane and 93-octane fuel for years. There is no mechanical or other justification for Nashville to purchase 93-octane fuel for its standard gasoline vehicles.

Environmental Issues

The State of Tennessee has adopted as a minimum the Federal guidelines for underground fuel storage tanks (Tennessee code 68-215-101). This places control over tank regulations in the hands of the State. In 1992, Nashville hired the engineering firm of ATEC Environmental Consultants to develop a plan to bring Metro's underground storage tanks into compliance with State law. The plan appears to be a solid one, addressing the environmental issues and making sound recommendations.

Although TCI found no evidence of non-compliance of state regulations, our audit found no consistent pattern of ensuring and documenting compliance. The responsibility appears to rest with the sites that support the tanks. In some cases the responsible employees or department had little knowledge of the requirements or their responsibility. Because fuel management is not centralized, there were no records maintained centrally at Metro documenting that all Metro owned fuel storage tanks are in environmental compliance. Federal and State law and regulations mandate that records proving compliance with environmental rules be kept and be accessible, and the difficulty we had determining whether Metro was in compliance with these rules indicates that Metro not adequately meeting the record keeping requirements.

Metro Nashville has spent significant dollars in certain areas to comply with both the legal and managerial aspects of fuel management. However, the lack of centralized, uniform management could lead to further environmental, legal and public relations problems.

Reserves

Metro Nashville was faced in the early 1990's, as was every other local government, with the necessity to make a long-term decision concerning fuel for it's fleet of vehicles. Federal Clean Air and Clean Water regulations dramatically increased the cost and management responsibilities relating to storage and dispensing of motor fuels (and other possible pollutants). Companies (such as FuelMan) that had previously served "non-centrally fueled" fleets or very small fleets saw an opportunity to expand their service to centrally fueled fleets that did not have the expertise (nor the desire to obtain the expertise) to address the Federal mandates in – house. Many local governments and many private fleets chose to limit their future liability by getting out of the fuel storage and dispensing business entirely. For local

governments, particularly for emergency services functions of local governments, this created a concern regarding the availability of fuel in case of a future shortage. Most Police and Fire Departments, for example, are unwilling to become completely dependent on commercial sources for fuel. It is prudent to maintain a fuel reserve if normal fueling is contracted to private vendors.

In the early 1990's Metro decided to remain in the fuel storage and dispensing business. A plan was developed to bring Metro's storage facilities into compliance. We believe this was done. Given changes in the market since then, Metro should re-evaluate the decision to dispense all fuel in-house. Schools has a fuel card program that is used for half of the bus fleet that costs $.109 more per gallon than the cost of fuel purchased directly. This higher cost should be analyzed in comparison to the operating/overhead costs associated with buying and dispensing fuel, the additional capital investment needed to modernize fuel dispensing equipment, user efficiency and control problem in the current Metro systems, and other anticipated future capital costs.

Non-Attainment Area (alternative fuels)

Metro Nashville is not currently listed by EPA as a Clean Air Non-attainment area. This means that Metro, with the exception of NES, is not mandated to use alternative fuels. NES, along with other power and gas utilities, is mandated to use alternative fuel power vehicles as a certain percent of their fleet. NES is complying with this requirement.

Tennessee generally, and Metro Nashville specifically, has shown itself sensitive to clean air/clean water issues. One way that these issues can be addressed is through the increased use of alternative fueled vehicles. From a practical standpoint, several types of alternative fuel vehicles are currently available from manufacturers- compressed natural gas, electric, ethanol, and propane. Each of these has advantages and disadvantages.

1. Compressed Natural Gas – Natural Gas is widely available and is plentiful. Dedicated CNG vehicles, including transit buses, police units and pick-ups, are available from the manufacturer. Performance difference from gasoline is not a significant issue. CNG has been in use as a motor fuel for years.

2. Electricity – Available as either completely electric or as a hybrid gasoline/electric unit. These units are less "standard" than other alternative fuel vehicles. The usable range before needing a recharge with full electric units is about 80 miles. Hybrids do not need to be recharged, currently. Seattle, for example, is expanding their hybrid fleet dramatically.

3. Propane – Propane (L P G) has been used as a motor fuel for many years and until recently was the most widely used alternative fuel. Propane is available as part of a bi-fuel vehicle (it will operate on propane or gasoline). Propane is currently available on larger vehicles from the manufacturer.

4. Ethanol – Normally available as an 85/15 blend of ethanol and gasoline. Ethanol is an agricultural derived fuel. Ethanol vehicles can operate on either ethanol or straight gasoline.

There are several issues with each of these alternative fuels. CNG and Electricity limit the owners ability to drive "out of town" due to the lack of refueling availability. The hybrid electric, the propane bi-fuel, and the ethanol bi-fuel do not have this handicap. Except for the hybrid electric, and ethanol all require refueling infrastructure different from that most commonly already available. The cost of these refueling sites varies significantly, with CNG "fast-fill" compressor stations running into the hundreds of thousands of dollars.

If Metro wished to make the most significant impact in the alternative fuel area, the obvious choice would be the purchase of CNG – powered Crown Victorias for Police Patrol use. It would require a commitment to use a significant amount of CNG to justify the cost of a compressor station.

Another option for non-Police vehicles at this point would be for Metro to join with NES and test hybrid gasoline/electric sedans. These vehicles are self-contained – that is, its batteries are recharged during operation, and no special refueling infrastructure is required. At a cost of about $20,000 for a four-door, four passenger sedan, this option is a reasonable alternative to a major investment in new infrastructure and would contribute to clean air in a very cost effective manner.

Conclusion

In conclusion, TCI believes that responsibility for fuel management be elevated and centralized in the new Office of Fleet Management. In the interim, a more senior level person at the Motor Pool should be assigned responsibilities, as fuel coordinator, for vendor contact, purchasing liaison, fuel tank monitoring, reorder control and volume and fuel type analysis. This person should also be familiar with the fuel interface of the Metro-wide fleet information system. Both the Metro Fleet Manager and the Fuel Coordinator should be responsible for accurate counts of fuel sites, volumes and flow.

INSURANCE AND RISK MANAGEMENT:

This section summarizes the current policies and practices of the Nashville Metropolitan government relative to risk management for vehicles. It also submits recommendations on this topic.

The Insurance and Claims Division of the Department of Law establishes insurance and risk management procedures. They have established a self-insurance pool for vehicles and general liability exposures. This pool covers two vehicle risks – liability and comprehensive. Coverage is not maintained for collision. The vehicle reserve is maintained in the Self-Insured Liability Fund. This division handles claims made against Metro in cases involving vehicles.

Commercial insurance coverage is maintained on certain unusual risks. Examples are out of state liability, helicopter operations, and major comprehensive damage to school buses.

The pool is financed both by general appropriation and by charges to the departments owning vehicles. Charges are made on the basis of vehicle value, not on any type of risk experience.

The liability reserve requirements are cushioned by the protections that municipal governments enjoy via state statue. These statues limit liability awards. These limits have been recently been increased. The effective date for these increases will be July 1, 2002. The table below shows the current and increased amounts.

Table 35: State Tort Liability Claim Maximums

Risk	Current Maximum	2002 Maximum
Liability Per Person	$130,000	$250,000
Liability Per Incident	$350,000	$600,000
Personal Property	$50,000	$85,000

This has the potential of increasing costs to the pool in the future, since higher liability awards become possible. We understand that Metro is going to undertake a risk management study that will include consideration of these increases.

Based on interviews with owning departments, some of them are generally unclear about insurance coverage and its impact on them. The following paragraphs summarizes the information that we obtained:

Collision

There is no coverage.

Liability Claims and Charges

The owning department is charged $130 per year for each vehicle. The only exception to this rate would be for vehicles carrying large numbers of passengers. Liability claims are fully insured with no deductible. Claims are processed and defended by the Claims group and Legal Department.

Comprehensive Claims and Charges

The owning department is charged a rate based on the original value of the vehicle. The rate is $.50 per $100 of original value. The owning department is responsible for a deductible on comprehensive claims. This deductible varies based on original value, ranging from $100 for a vehicle valued at less than $20,000, to $10,000 for a vehicle costing over $100,000.

OTHER METRO DEPARTMENTAL RECOMMENDATIONS

The Executive Summary addresses Metro-wide organizational issues, and this chapter of the report details recommendations that either should receive immediate attention or are related to more specific aspects of fleet operations. Net financial implications noted are included in cost savings outlined in the Executive Summary, and specific capital recommendations should be absorbed in the capital spending recommendations in the Executive Summary.

METRO-WIDE INTERIM RECOMMENDATIONS:

(1) Current Situation: **Staffing Levels**

Finding: One of the major benefits of TCI's recommendations is the gradual reduction of staff.

Recommendation: All hiring and promotions should be suspended until a central fleet manager is in place, unless approved by the Metro Finance and Human Resources Departments.

Cost Implications: Included in overall savings in the Executive Summary.

(2) Current Situation: **Metro-wide Tire Program**

Finding: The tire programs in most of the Metro garage locations are ineffective. Costs and inventory are high, and many operating tires are not in good condition. Several locations had excessive numbers of tires on hand awaiting disposal. The only exception is Nashville Electric Service. They contract with an outside source and obtain better service at reduced costs.

Recommendation: Issue an RFP for a tire contract for all Metro locations, using the NES contract as a model.

Cost Implications: While tire expense data is often combined with other parts, TCI's estimates that savings to Metro would equal $49,000. The NES contract costs $106 per vehicle for labor, towing, shrinkage, and carrying cost, while existing Metro costs are $122 per vehicle for the same costs.

(3) Current Situation: **Vehicle Color**

Finding: Metro purchases fleet vehicles in various colors – some white, some gray, some yellow.

Recommendation: Adopt white as the recommended color for all fleets except emergency vehicles. Convert to white as new items are purchased. White is less expensive to obtain, safer on the road, easier to maintain, and provides greater resale value.

Cost Implications: While it is difficult to forecast the exact savings, TCI expects that the savings would accrue from initial purchase (white requires no special painting or ordering), maintenance (one paint color, less prone to fading), and resale (wider market for white). TCI estimates that the Metro buys and sells an average of 250 non-emergency vehicles per year. If the savings for purchase and resale were only $100 per unit, the savings would be approximately $25,000 per year.

(4) Current Situation: **Oil Analysis**

Finding: Metro locations are not utilizing oil analysis as a regular maintenance diagnostic procedure.

Recommendation: Develop a contract for this service for Metro departments

Cost Implications: This type of analysis typically costs $7 per vehicle and should be done 2 times per year. The total annual cost for this procedure is estimated at $42,000, but this cost should be more than offset with reduced maintenance expense in the long run.

(5) Current Situation: **Uncertain Fleet Count**

Finding: No single source can provide a list of authorized vehicles that is acknowledged as definitive for fleet management purposes. Fixed asset records underlying the general ledger are not reconciled with operating records, and there is a 169 vehicle discrepancy between the records.

Recommendation: There should be a comprehensive fleet management system that includes a formal record of vehicles assigned to each department, service and fuel history, and other information. This record should either be the basis for the general ledger balance or should be reconciled with the general ledger at least annually.

Cost Implications: Included in capital expenses recommended in the Executive Summary.

(6) Current Situation: **Technical Training**

Finding: Current training programs do not meet the needs of the organization or the staff. Throughout Metro, mechanics and first line supervisors are in need of added training on technical issues.

Recommendation: All Metro fleet areas should strive for 40 hours per person per year of training. Metro Human Resources should assist the individual departments in obtaining the needed training.

Cost Implications: The costs for training are included in existing budgets.

(7) Current Situation: **Not All Mechanics Certified**

Finding: Several Metro departments do not stress mechanic certification. A recent survey of municipal garages indicated that almost 70% of mechanics were certified. TCI believes that all Metro departments should begin to stress certification.

Recommendation: Stress certification. Reimburse mechanics for tests. Provide assistance in obtaining test appointments and in obtaining study materials.

Cost Implications: Included in the existing budgets.

FIRE DEPARTMENT INTERIM RECOMMENDATIONS

(1) Current Situation: **Clerical Backlog**

Finding: Certain functions have not been performed for months.

Recommendation: Ensure that the newly selected employee begins work immediately. Bring in temporary help to file and help clean up the area if this second person is not able to reduce the backlog within a reasonable time period. This clean up is necessary regardless of the long term reporting relationship of the Fire shop.

Cost Implications: None – this should be absorbed by budgeted positions.

(2) Current Situation: **Lack of Fleet Management Reporting**

Finding: No fleet management reporting exists.

Recommendation: Until the previously recommended organizational and software changes are implemented, the Assistant Chief should determine the very few, critical areas for measurement. TCI recommends reports on vehicles pending repair, shop turnaround time, vehicle downtime, and PM status.

Cost Implications: None.

(3) Current Situation: **Equipment Service Backlog and Staffing Level**

Finding: Equipment repairs are backlogged. Two mechanics have transferred to Fire Suppression.

Recommendation: Transfer part or all of the light vehicle maintenance to the General Service Motor Pool as an interim step, and use existing resources to catch up on repairs. Develop an ongoing list of repairs to be performed, and work through any safety-related repairs first.

Cost Implications: None for Metro as a whole. Motor Pool staff has existing capacity to absorb this additional work.

(4) Current Situation: **PM Backlog and Quality Level**

Finding: Preventive maintenance is backlogged. PM procedures, schedules and checklists are not documented. PM quality needs to be improved.

Recommendation: Develop a detailed preventive maintenance schedule by type of vehicle. Use PM checklists to actively and aggressively complete each PM. Train personnel on specific PM procedures. Ensure completion of scheduled PM's on a timely basis.

Cost Implications: None. Mechanic utilization suggests that this backlog can be addressed in-house with additional training and more efficient procedures.

(5) Current Situation: **Parts Inventory Management Lacking**

Finding The parts area is dark, unkempt, poorly labeled, and not well organized. No inventory records are kept. Many parts are acknowledged to be obsolete.

Recommendation: Clean out the obsolete parts and salvage them. Continue plans to establish separate areas by type of equipment and for fast moving parts. Keep inventory levels at a minimum.

Cost Implications: None. – mechanic utilization rates indicate this project can be absorbed in-house. Some salvage may be gained.

(6) Current Situation: **Financial Accountability**

Finding: The construction of the vehicle repair segment of the budget does not lend itself to cost analysis.

Recommendation: Separate accounts for vehicle maintenance from building maintenance.

Cost Implications: None

(7) Current Situation: **Low Management Standards**

Finding: Expectations are too low in many areas, including housekeeping, maintenance quality, preventive maintenance scheduling, safety, record keeping and parts storage.

Recommendation: Management needs to set higher and clearer expectations. Since the tasks are many and complex, the first steps need to be simple and straightforward. The shop and adjacent areas need to be cleaned up, debris needs to be carted away, and all safety and fire hazards need to be addressed.

Cost Implications: None. Mechanic utilization rates indicate this can be absorbed without additional labor cost.

(8) Current Situation: **Lack of Fire Engineer Support and Training**

Finding: Inspection of fire apparatus indicates that engineers are not performing checklist inspections or lack the training to properly inspect vehicles. Occasional cases of operator misuse were noted.

Recommendation: Develop an action plan, involving the Fire Academy and Fire Suppression management, to address this problem. Additional training and supervision of fire suppression personnel are needed. Disciplinary measures should be put in place.

Cost Implications: None.

(9) Current Situation: **Mobile Mechanic Program Not Properly Executed**

Finding: Inspection of fire apparatus indicates that the mobile mechanic is not properly performing checklist inspections or lacks necessary training to properly inspect vehicles. Information concerning this program has not been circulated to all of the fire halls.

Recommendation: Develop an action plan, involving the Fire Academy and Fire Suppression, to improve this program. Additional training and supervision are needed.

Cost Implications: None

MOTOR POOL INTERIM RECOMMENDATIONS

(1) Current Situation: **"dBase" Information System**

Finding: The current system is flawed with internal inconsistencies and does not provide adequate data retrieval for decision-making. There is no programming support on site.

Recommendation: TCI recommended earlier in this report that a Metro-wide system be purchased and installed. In the interim we recommend that programming/problem solving personnel be available on site on a routine, agreed upon schedule that will meet Motor Pool's day-to-day operating needs.

Cost Implications: None to Metro as a whole.

(2) Current Situation: **Old Computer Hardware**

Finding: Some PC's in use at Motor Pool are technologically obsolete.

Recommendation: Replace all PC's with new or up-to-date used units, and equipped all PC's with current software versions.

Cost Implications: We estimate that six machines are needed at an approximate cost of $1,200, for a total cost of $7,200.

(3) Current Situation: **Police Support Group**

Finding: The Police Department deploys a group of eight people to supervise billing and repair operations and to monitor the flow of cars at the Motor Pool. This group includes six officers and costs approximately $465,000 in salaries and benefits.

Recommendation: The number of Police personnel assigned to coordinate Motor Pool activities should be limited to two employees, and the uniformed staff can be released to perform law enforcement duties.

Cost Implications: None to Metro as a whole.

(4) Current Situation: **Reuse of Tires Removed from Police Vehicles**

Finding: Police policy does not permit the remounting of repaired tires on their vehicles.

Recommendation: Find ways to utilized these usable tires. Consider resale or reuse by non-critical vehicles.

Cost Implications: While exact cost figures are not available, new tire purchases of up to $25,000 could be eliminated.

PARKS AND RECREATION INTERIM RECOMMENDATIONS

(1) Current Situation: **Housekeeping and Building Maintenance Lacking**

Finding: The main garage area is littered and dirty, and safety violations were noted. A clean and orderly work area promotes a sense of professionalism that tends to be reflected in the work standards of the employees.

Recommendation: We recommend that the garage be cleaned and organized, that all be junk be discarded, and that all unsafe conditions be corrected. All old and salvaged vehicles should be surplused and sold on the on-line surplus property system. Steam cleaning followed by painting would result in a major improvement in the shop and office area.

Cost Implications: Much of the clean-up and light maintenance could be done with existing staff, given utilization rates. Steam cleaning and related supplies are estimated to be under $5,000.

(2) Current Situation: **Significant Building Improvements Needed**

Finding: The roof leaks, and the lights are inadequate. Other repairs are needed.

Recommendation: Have the Office of Facilities Management prepare an analysis of immediate and short-range needs.

Cost Implications: The roof repair and lighting should not exceed $10,000. The costs associated with any other needed repairs are unknown.

(3) Current Situation: **Manual Work Order System**

Finding: Maintenance records are inaccurate, incomplete, and/or non-existent.

Recommendation: Although the information system solution will be addressed Metro-wide, the Parks garage needs to correctly record information on the manual work

orders in the interim. This would include correct hours and parts costs.

Cost Implications: None.

(4) Current Situation: **Maintenance Performed at Remote Sites**

Finding: We have episodic testimony that some sites replace components that do not need to be replaced while others do little if anything to the equipment until they find that it is inoperable.

Recommendation: There should be a set of procedures written to establish and govern what level of maintenance should be undertaken at the remote sites and what common standards should be applied regarding automatic replacement of component parts. Parks management will need to enforce these new procedures.

Cost Implications: Although not readily estimable, this should reduce overall maintenance costs and cost associated with unexpected breakdowns.

(5) Current Situation: **No Formal Scheduled Preventive Maintenance Program is in Effect**.

Finding: The lack of scheduled maintenance leads to increased costs and in-service breakdowns.

Recommendation:

(1). Immediately schedule safety inspections of every on-road vehicle, beginning with those used to transport children and others. Take out of service and repair any unit found with defects.

(2). Create a manually scheduled, posted PM program. Schedule every vehicle for an oil change and safety inspection every 90 days. For this program to work, compliance with the schedule must be mandatory. PM cannot take a backseat to repairs. Deferring PM only increases the number of breakdowns. Publish

the schedule and involve operating management.

(3). Outsource repairs if needed.

Cost Implications: Overtime or outsourcing may be required to do this, but this effort should be able to be absorbed with existing mechanic capacity from one or more Metro departments. Once the fleet is current on preventative maintenance, costs should actually decrease, although this is not readily estimable.

(6) Current Situation: **Evidence of Equipment Abuse/Neglect**

Finding: Lack of operator training often results in equipment being used incorrectly that can result in damage. Lack of training also leaves the operator ignorant of routine operator maintenance that, if not performed, will lead to premature component failure.

Recommendation: Develop a training program for equipment operators directed at specific equipment. Involve operating management. Establish a process for discipline for incorrect operation or failing to perform operator inspections.

Cost Implications: None.

(7) Current Situation: **No Formal Inventory System**

Finding: Parts usage is not tracked or analyzed. Controls are minimal. Inventory management is minimal.

Recommendation: In the long term, TCI's recommendations on consolidating parts operations will solve this problem. In the interim, recording parts usage accurately and completely on the work order should be required, and inventories should be secured with limited, controlled access. Capturing, totaling and reconciling credit card parts purchases to inventory usage should also be implemented.

Cost Implications: Although not readily estimable, enhanced controls will reduce overall maintenance costs.

PUBLIC WORKS INTERIM RECOMMENDATIONS

(1) Current Situation: **Inconsistent Management Reporting**

Finding: The Division is unclear about what should be measured and monitored.

Recommendation: Using this report, the Assistant Director should determine a few critical areas for measurement. The Fleet Manager then needs to develop timely and accurate reports to track performance against expectations. The expectations and reports should be shared with all staff and publicized.

Cost Implications: Although not readily quantifiable, this should reduce costs by focusing activity on key areas. Any system modifications needed are addressed below.

(2) Current Situation: **Lack of Technical Knowledge**

Finding: Recent retirements have caused the Equipment Division to lose key knowledge. These losses impact the purchasing process for equipment and parts, as well as the actual maintenance of equipment.

Recommendation: Using this report, establish goals for improvement. Develop detailed maintenance guidelines. Contact the Motor Pool for assistance in defining guidelines for light vehicles. Contact vendors to obtain assistance in documenting checklists for other vehicles. Put supervisors and managers through development assignments and classes. The lack of technical knowledge and procedures are negatively impacting the quality of repair.

Cost Implications: None.

(3) Current Situation: **Fleet Anywhere System**

Finding: The current installation has some limitations, primarily in the area of reporting and customer support. Many of the problems blamed on the software itself are the result of problems with implementation, training, hardware, and systems support.

Recommendation: Make some inexpensive short-term improvements in hardware and support, including additional technical support of the system, the purchase of a Microsoft license to allow the system to be more reliable, and the development of additional key reports. It is important that the maintenance staff stays involved with these efforts and is comfortable with a system. Making the existing database more accurate will help with the start up of a new system.

Cost Implications: Costs should not exceed $30,000.

(4) Current Situation: **Parts Inventory Management Lacking**

Finding Due to system shortcomings, a lack of confidence in the system, and system failures, it is currently impossible to properly manage the parts inventory.

Recommendation: For the interim, correct the system configuration and support problems. Resume the use of inventory reports.

Cost Implications: Included in the above financial implications.

(5) Current Situation: **Parts Procurement Problems**

Finding Communication and participation of mechanics is lacking regarding the selection of vendors.

Recommendation: Encourage greater line involvement in the procurement process. Perhaps assign mechanics to work in the parts area as a cross training assignment.

Cost Implications: Although not readily quantifiable, this should reduce overall maintenance costs.

(6) Current Situation: **Parts Fulfillment Rate**

Finding Parts are not often available to mechanics at time of request. This has a negative impact on productivity and downtime.

Recommendation: Set higher goals for fulfillment. Consider re-instituting reorder points. Track results on a regular basis. Address the availability of parts on the night shift.

Cost Implications: Although not readily quantifiable, the financial impact should be positive. Mechanic downtime will be reduced.

(7) Current Situation: **The PM process is Not Properly Controlled, Designed or Administered, and quality is poor**

Finding: Vehicles are not being maintained in a timely or adequately from a preventive maintenance standpoint. Vehicles operate with safety and significant repair problems.

Recommendation: Develop a detailed preventative maintenance schedule by type of vehicle. Use preventative maintenance checklists from weekend inspections to actively and aggressively complete each PM. Train personnel on specific PM procedures. Ensure compliance for scheduled PM's. Strive to raise PM to corrective repairs to a 50%: 50% ratio.

Cost Implications: None.

(8) Current Situation: **Operator Training and Use.**

Finding: Evidence of operator misuse of Public Works equipment was noted; e.g. bent packer blades and cracked beds. Mechanics have many examples of burned out clutches or other problems caused by operator error. Truck cabs often contain significant amounts of trash.

Recommendation: Work with Public Works upper management to set higher standards. Develop feedback mechanism. Document each situation on work order.

Cost Implications: This can be implemented with existing staff. TCI estimates that well over $20,000 a year in repair costs are caused by operator error.

(9) Current Situation: **Wash Bay Not Useable**

Finding: Public Works management has identified that their wash bay does not have proper drainage. Because of environmental concerns, it cannot be used as is.

Recommendation: An operating wash bay is essential to the fleet. This not only improves appearance, but also improves maintenance effectiveness by allowing detection of fluid leaks.

Cost Implications: The estimated cost to get the wash bay operational is $200,000.

(10) Current Situation: **User Communication**

Finding: There is no scheduled or routine process to obtain user feedback.

Recommendation: Schedule regular meeting with key users, perhaps on a quarterly basis.

Cost Implications: None.

WATER SERVICES INTERIM RECOMMENDATIONS

(1) Current Situation: **Lack of Fleet Management Reporting**

Finding: Inadequate fleet management reporting exists.

Recommendation: Given the long-term recommendations of this report, management should identify a few short-term improvement targets. TCI suggests focusing on PM maintenance schedules, pending repair status, and repeat service calls.

Cost Implications: None.

(2) Current Situation: **Fleet Management Labor Reporting**

Finding: The practice of using flat or estimated rates to enter labor hours does not reflect labor actually utilized. Standards are not available for many tasks.

Recommendation: Enter actual hours used into the Hansen system and employ these hours to monitor utilization.

Cost Implications: None.

(3) Current Situation: **Work Orders Not Used in the Garage**

Finding: The work order system is not employed in the garage operation.

Recommendation: Begin to print work orders for use by mechanics. Make service history available to mechanics, if easily done.

Cost Implications: None.

(4) Current Situation: **Unused Parts in Inventory.**

Finding: Significant numbers of parts are not being used and are obsolete.

Recommendation: Salvage unneeded or unusable parts.

Cost Implications: Some salvage value should be obtained.

(5) Current Situation: **Low Fill Rate in Parts**

Finding: There are too many parts being ordered by the Shop Supervisor and the Lead Mechanic. Work orders are delayed while waiting for parts.

Recommendation: Move more parts acquisition to the parts storekeeper. Stock all parts that have frequent turnover.

Cost Implications: Although not readily estimable, this should reduce costs and free up the Shop Supervisor to supervise the shop.

(6) Current Situation: **Inventory Turnover Too Slow**

Finding: Significant numbers of parts are not being used frequently, and reorder points are too high.

Recommendation: Set reorder points at levels appropriate for usage and supplier service.

Cost Implications: Although not readily quantifiable, this should reduce capital invested in parts.

(7) Current Situation: **Inadequate Records for Parts Removed from the Parts Room**

Finding: Parts are removed from inventory without proper records.

Recommendation: Develop a form for parts requisitions and instruct all current and potential users on proper use.

Cost Implications: Inventory controls will be enhanced, but the financial impact is not determinable.

(8) Current Situation: **Financial Reporting**

Finding: The current method of transferring costs back to user groups distorts monthly financial reports.

Recommendation: Use a clearer method. Show the transfers as a separate transaction. Show current expenses at the detail level.

Cost Implications: Financial management will be enhanced, but the financial impact is not readily determinable.

(9) Current Situation: **Unused Equipment**

Finding: Significant numbers of vehicles are not being used.

Recommendation: Salvage all unneeded equipment before they deteriorate further.

Cost Implications: Positive – this will generate salvage dollars. TCI estimates that 35-55 vehicles are not in use. The salvage value should be $25-50,000.

(10) Current Situation: **Maintenance Management Not in Place**

Finding: Vehicles are not being maintained in a timely or complete fashion. Many unsafe and mechanically unsound conditions were noted on operating vehicles. Poor PM results exist for the PM's being performed by Public Works.

Recommendation: Management of MWS should set specific performance objectives in the maintenance area. These should be monitored on a regular basis with the Fleet Manager. If dramatic improvements are not evident, outsourcing on an interim basis should be considered.

Cost Implications: None.

(11) Current Situation: **PM's are Often Delayed.**

Finding: Vehicles are not being maintained in a timely or complete fashion from a preventive maintenance standpoint. Vehicles are missing PM appointments.

Recommendation: Develop a detailed preventive maintenance schedule by type of vehicle. Review this checklist with Public Works. Insist that checklists be signed and faxed to MWS fleet. Routinely audit PM's. Send notice of no shows directly to the appropriate member of the leadership team. Provide information to MWS management on status and on failure of departments to meet PM schedules.

Cost Implications: Although not readily quantifiable, timely preventative maintenance will reduce overall cost.

(12) Current Situation: **Lack of Operator Training**

Finding: Inspection of equipment indicates that operators are not performing checklist inspections or lack the training to properly inspect vehicles. TCI's observations and inspections found obvious situations (low fluids, low tires, frayed belts, corroded terminals) of operator indifference.

Recommendation: Develop an action plan, involving the operating departments, to address this problem. Additional training and supervision will be needed. Take appropriate disciplinary action on operators if needed. The MWS leadership team should address this recommendation.

Cost Implications: Although not readily quantifiable, the financial impact will be positive in the long run. This would prevent non-scheduled repairs.

(13) Current Situation: **Inventory of Small Parts**

Finding: Certain inexpensive parts are carried on inventory.

Recommendation: Charge inexpensive parts, such as fasteners, directly to expense as shop overhead or an expendable account.

Cost Implications: Although not readily quantifiable, this will reduce record keeping time.

(14) Current Situation: **Battery Storage**

Finding: Replacement batteries are inventoried in two separate areas, neither of which is ventilated or properly marked.

Recommendation: A battery storage area should be set up to comply with safety regulations.

Cost Implications: Minimal investment should be made until all Metro recommendations are implemented. MWS should try to utilize existing space or shelving. Meeting safety and ventilation goals are a requirement.

(15) Current Situation: **Spare Vehicles**

Finding: Many spare vehicles and pieces of equipment are not in operating condition.

Recommendation: Spare vehicles must be maintained to a degree of safety, reliability, and appearance equal to everyday frontline vehicles. As mentioned, inactive vehicles should be scrapped.

Cost Implications: Although not readily quantifiable, this will reduce costs by making the maintenance operation more efficient.

(16) Current Situation: **Used Lubricant Storage**

Finding: The vessel used to secure used lubricants is improperly identified (kerosene), lacks secondary containment, and is not protected from nearby vehicular traffic.

Recommendation: Make the necessary improvements.

Cost Implications: The costs should be minor to mark the containers and to install surface level containment – less than $500.

(17) Current Situation: **Mechanic's Mixed Feedback**

Finding: The mechanics indicated that they did not have opportunities to express their concerns and share their feedback.

Recommendation: Schedule regular staff meetings to listen to mechanics' concerns and explain operational issues

Cost Implications: None.

(18) Current Situation: **User Communication**

Finding: There is no scheduled or routine process to obtain user feedback.

Recommendation: Schedule regular meeting with key users, perhaps quarterly.

Cost Implications: None.

OTHER RECOMMENDATIONS:

Recommendations Relating to Vehicle Assignments:

(1) Current Situation: **24-Hour Vehicle Assignments are Inconsistent Within Metro**

Finding: Practices vary among departments, and the current policy is outdated and not used by all departments. The use of vehicles and private tags are considered benefits and rewards for certain jobs. There are not adequate controls to ensure payroll treatment is in accordance with IRS regulations.

Recommendation: Review the current policy and practices, and ensure that all 24-hour vehicle assignments are in accordance with the existing policy and that the related payroll issues are appropriately addressed. Limit take-home cars to personnel subject to frequent callback or subject to occasional callback and in need of particular vehicles or equipment to respond. This should result in a reduction in the number of 24-hour vehicles, as well as identify a clear business purpose for the use of private tags.

Cost Implications: None, but a reduction in the number of take-home vehicles should result in overall savings.

Recommendations Relating to Radio Operations:

(2) Current Situation: **Radio Operations are a Key Component of Fleet Management**

Finding: Radio operations are an integrated part of the current motor pool and provide critical support to Metro users, notably public safety agencies.

Recommendation: The vehicle installation aspects of Radio Shop operations should be assigned to the new Office of Fleet Management.

Cost Implications: None to Metro as a whole.

Recommendations Relating to Parking/Traffic Violations:

(3) Current Situation: **Parking and Traffic Violations**

Finding: The Traffic Violations Bureau was not forwarding violations to the Motor Pool in a timely fashion. This limited the effectiveness of any follow up and left certain users with the misperception that they could ignore parking regulations.

Recommendation: The Traffic Violations Bureau should forward this information monthly to the Director of General Services so that user management can take appropriate action on a timely basis.

Cost Implications: None.

Recommendations Relating to Vehicle Replacement:

(4) Current Situation: **Inadequate Funding and Replacement of Police Vehicles**

Finding: The monthly rate charged for marked Police vehicles has been artificially low, which is depleting the Motor Pool fund balance. Replacement has been handled in an inconsistent fashion.

Recommendation: We recommend that Metro adopt a vehicle replacement funding and cost recovery mechanism that will adequately cover the estimated costs of new vehicles on an orderly and timely replacement schedule. Our suggested replacement criteria features use, age, and net replacement cost. Monthly charges to the users should be developed to recapture all costs.

Cost Implications: The current rate of $335 per vehicle per month should be increased by $591 per vehicle, and maintenance and other operating expenses should be billed as incurred. As discussed elsewhere in Chapter 1 of this report, varying implementation schedules will vary the financial impact.

Recommendations Relating to Fuel Management:

(5)	**Current Situation:**	**No Centralized Records on Fuel Purchased, Stored, or Dispensed.**
	Finding:	Current fuel practices do not ensure management has central information about how much fuel is purchased, where and under what conditions it is stored, and to whom and in what quantity it is dispensed.
	Recommendation:	Centralized purchasing, control of storage, and monitoring of dispensing is essential. Control of all fuel functions should be assigned to the new Office of Fleet Management.
	Cost Implications:	None.
(6)	**Current Situation:**	**Use of Gasoline Charge Cards**
	Finding:	Metro is providing gasoline through a network of 77 underground tanks. Metropolitan Nashville Public Schools purchases some of its fuel directly from a local retailer using a charge card system. The extra cost for this service is $.109 per gallon, before considering the cost of maintaining 77 tanks, user drive time and inconvenience, the labor required to run the fuel system, and the cost of capital.
	Recommendation:	TCI recommends a detailed study to see if the long-term strategy of Metro purchasing and dispensing all fuel used is still correct. Options would be continuing to pump the majority of gas through Metro owned tanks, or converting at least a portion of operations to a fuel charge card system.
	Cost Implications:	Unknown without detailed study.

(7) Current Situation: **Experimenting with Alternate Fuel Vehicles**

Finding: With the exception of Nashville Electric, Metro has no program for alternative fuel vehicles. Although Metro is not required to utilize alternate fuel vehicles, there are positive reasons to develop an experimental program. NES is utilizing hybrid fuel and ethanol.

Recommendation: Metro should further explore the costs and benefits associated with alternative fuel options, particularly with regard to gasoline electric hybrid sedans and with regard to the Police Fleet.

Cost Implications: Unknown.

(8) Current Situation: **Supplying Gasoline to Not for Profits**

Finding: Metro allows two not for profit agencies to purchase fuel from the Metro fuel system. This appears to allow the agencies to avoid paying state gasoline tax.

Recommendation: Have Metro's Legal Department review this practice.

Cost Implications: None.

(9) Current Situation: **General Services Motor Pool and other Nashville Departments Purchase High-octane Fuel.**

Finding: There is no mechanical or other justification for Metro to purchase 89 or 93-octane fuel for its standard gasoline vehicles.

Recommendation: No high-octane fuel should be purchased unless recommended by the vehicle manufacturer.

Cost Implications: In the Motor Pool alone, the change to 87-octane will save over $200,000 per year.

(10) Situation: **No Central Records Are Kept Regarding Metro Fuel Storage Tanks**

Finding: Federal and State law and regulations mandate that records proving compliance with environmental rules be kept and accessible. Although Metro appears to be in compliance with the environmental requirements, the records supporting this are not centrally maintained or readily accessible from the various departments responsible for the tanks.

Recommendation: Centralize control of all underground storage tank records, and centralize the responsibility for the periodic testing through the new Office of Fleet Management.

Cost Implications: None.

Recommendations Pertaining to Insurance:

(11) Current Situation: **Documentation of Insurance Procedures/Rates**

Finding: There is confusion on the part of owning departments relative to the insurance pool; it's operations, and the related charges. Additionally, insurance charges for General Fund departments are not reflected in departmental budgets.

Recommendation: The procedures should be documented clearly in agreements and explained to owning departments. Both the Insurance and Safety groups and the Motor Pool should ensure that owning departments understand how vehicle insurance works and what the departmental financial and other responsibilities are in the event of an accident. Insurance premiums should be included in Motor Pool charges to departments, with Motor Pool remitting premiums to the Self-Insurance Fund.

Cost Implications: None for Metro as a whole.

(12) Current Situation: **Collision and Comprehensive Coverage**

Finding: It is difficult for owning and using departments to anticipate and budget for losses. The variable deductible creates confusion. TCI believes that a deductible is important, since it reminds the user of the cost involved in a loss. However, a fixed amount deductible would simplify understanding and handling. Additionally, the absence of collision coverage creates a burden on departments when there is an accident. If the deductible is in place to influence the owner departments relative to operator safety, TCI believes that it is not effective.

Recommendation: Consider adding collision coverage through the self-insurance fund.

Cost Implications: There would be additional costs for administration and for additional actuarial services should Metro decide to insure collision.

PUBLIC SCHOOLS FLEET MANAGEMENT AND MAINTENANCE

Introduction

The Metropolitan Nashville Public Schools (MNPS) fleet management and maintenance program currently employs thirty-six full time equivalent employees (FTE's). These individuals maintain 539 school buses.

Organizationally, MNPS fleet management and maintenance is part of the MNPS Department of Transportation (DOT). The DOT's mission is, "to transport students to and from school, on special field trips, and to and from extracurricular events in a timely, safe and cost-effective manner". To attain its mission the DOT performs the following functions:

- Administration
- Vehicle Acquisition
- Bus Operations
- Bus Routing
- Special Education Transportation
- Training and Certification
- Bus Maintenance

The MNPS fleet management and maintenance facility is part of the Department of Transportation's headquarters facility.

The MNPS also operates 165 maintenance and operations vehicles. These are not maintained at the school bus facility, nor are they operated by the DOT. These vehicles are maintained by 4 mechanics within the plant maintenance and operations groups. Repair cost information is not readily available, since the costs are intermingled with other items.

The portion of the DOT budget for the 2001–2002 fiscal year related to bus fleet management and maintenance is slightly over $2,000,000.

Executive Summary

In general, we found the Metropolitan Nashville Public Schools fleet management and maintenance program to be struggling in several critical areas.

The MNPS was the subject of a recent performance audit performed by MGT of America, Inc. A portion of the audit reviewed the Department of Transportation. TCI used this previous report as a starting point for its observations. Management was responsive to and supportive of TCI's visit. It should be noted that the present management team has been in place at the Department of Transportation for only two years.

The items listed below will be commented on in the body of the report.

More specifically, with regard to bus fleet operations:

- Management has been responsive to the recommendations contained in the MGT report. For example, bus purchases for the last fiscal year were reduced by 17. The number of mechanics has been reduced by five as well.

- Most members of the DOT management team are new to their current position. With the exception of the Shop Foreman, all key managers and supervisors have been in their jobs for less than two years. The previous transportation management team had been in place for over 30 years and had apparently not managed the maintenance shop operation very actively. Some of the changes instituted by the new team have been resisted by the organization.

- Based on our observations, maintenance of the fleet was poor. Detailed inspections of the equipment revealed safety and operating defects that resulted in buses being taken out of service for repair. Many of the vehicles inspected had recently gone through State inspection, MNPS inspection, or both. Because of the poor condition of the MNPS buses, TCI was asked to conduct a weekend inspection of a larger sample of buses. Fifty-five buses were inspected and a total of 413 defects were detected on those buses. Of these defects, 177 were safety related. In addition to the mechanical defects, 19 of the 55 buses had tires that were in need of replacement or were seriously under-inflated.

- An atmosphere of hostility and tension exists between transportation management and shop employees, resulting in the Director of Transportation requesting that a Human Resources person be physically located within the DOT. TCI agrees with this request.

- Three employees are classified in mechanic slots while performing other functions.

- The starting rates of pay for mechanics are under the market rates. This creates recruiting problems. Metro recently studied pay rates for all jobs and established a starting rate for mechanics of $14.62. The MNPS starting point is $10.53.

- The organization of the DOT, pertaining to bus maintenance is stacked, or vertical. All functions report through the Transportation Manager.

- TCI agrees with the MGT report in terms of fleet size, purchase of equipment, and spare ratios.

- The MGT report pointed out that the maintenance organization did not have any records or processes in place to measure the effectiveness of their preventative maintenance (PM) process and their oil change policy. TCI agrees and further suggests that routine oil analysis of the buses begin immediately.

- TCI's visit coincided with the opening of school, allowing us to observe the maintenance shop at one of the most critical times of the year. The planning and control of preparing buses for operation was chaotic. As of the day before the start of school, 48 buses were not suitable for operation. TCI, in conjunction with the shop foreman, inspected several of the buses in the fleet. These buses had been inspected by the shop and were supposed to be ready for service. A number of them were sent back to the shop for additional work. On the first day of school, 18 buses had broken down by 8:00 a.m., and a total of 21 had broken down by the end of the morning runs.

- MNPS fleet management and maintenance uses the Student Transportation Information System (STIMS) to process its work orders. The system has been installed for less than two years. Good progress has been made with the installation, although work remains to be done, especially in the inventory and reporting areas. While we understand the reasons for selection of this system, TCI's observation is that the system has considerable limitations.

- There is a need to enhance written policies and procedures in the maintenance operation. This is vital to improving maintenance consistency and quality.

- Management reporting of maintenance measures is not in place.

- While some targets have been set for improvement, TCI was unable to determine the processes that had been put in place to reach the targets.

- TCI normally calculates cost per vehicle and vehicles per mechanic to measure efficiency. We will speak to those measures in detail, but do not recommend additional cuts in staff at this time. The near term emphasis needs to be placed on improving maintenance quality and the atmosphere within the shop. Once these problems are addressed, MNPS should work toward achieving a mechanic to bus ratio of 25 to one, reducing the number of mechanics from 28 to 22. This assumes the current fleet size and continued improvement in shop efficiency.

- The DOT recently salvaged about $250,000 of slow moving or obsolete parts. Based on our observations, this was appropriate. The parts inventory remains at $250,000. This is high relative to the annual parts purchases of $455,000. Use of the STIMS system as an inventory replenishment system should help to reduce inventory.

- This is a maintenance program that is highly ineffective. Specific targets should be put in place. If improvement is not observed on a clear and consistent basis, full privatization or partial privatization of the maintenance operation should be considered.

With regard to other fleet operations:

- MNPS maintains a fleet of 165 maintenance, operations and security vehicles. The Plant Maintenance group has 85 units maintained by one mechanic, while the Operations group reports 80 vehicles maintained by three mechanics who also maintain grounds equipment.

- Both organizations would like to use ten years and 100,000 miles as replacement guidelines. Of these 165 vehicles, 38 have mileage over 100,000.

- These vehicles are not maintained in a consistent or organized fashion. Some repairs are outsourced; some are sent to the DOT; some are deferred.

Summary of Financial Implications:

Recommended potential annual savings:

- Reduction in parts inventory - savings in carrying costs $8,250

- Potential reduction in mechanics based on current fleet size $240,000

Recommended additional annual cost:

- Addition of a Fleet Manager $15,000

It should be noted that the above savings could be offset by increased mechanic starting salaries, discussed further below. Additionally, the ultimate reduction in fleet size is currently unknown. MNPS recently found it necessary to add 24 drivers, is considering changing bus driver practices, and is going to implement computerized bus routing in the near future. For the current fleet size, TCI recommends reducing the number of mechanics by 2 per year, beginning in 2002-03, over a three-year period. Should changes in practices or routing efficiencies make it necessary to further reduce the number of mechanics in order to keep the vehicle to mechanic ratio at 25 to 1, TCI would recommend accelerating the reduction in the number of mechanics beginning in the 2003-04 fiscal year.

1.1 Overview of Metropolitan Nashville Public Schools Fleet Management and Maintenance

As previously mentioned, the MNPS fleet management and maintenance group is located inside the DOT headquarters. While the office area is limited and temporary buildings have been erected to handle overflow, the maintenance area is well suited for the task.

The space used for repair operations consists of 72,000 square feet. The area includes 16 bays and 16 overhead doors, as well as parts, tire storage, and 2 small workshops.

MNPS fleet management and maintenance operates five days per week. Maintenance operations commence at 5:00 a.m. and end at 5:30 p.m. These hours are designed to support normal bus operations.

The bus inventory totals 539. The median age for vehicles is 1997. The equipment inventory will be discussed further in **Section 1.7, Fleet Assets and Replacement.**

The equipment maintenance shop is currently staffed with 28 mechanics and two working foremen.

1.2 Management Issues/Policies and Procedures

TCI finds that MNPS fleet management and maintenance struggles to keep their equipment in working order. In addition, communications inside the organization and working relationships are strained.

DOT management has responded positively to most of the MGT findings. Immediate changes were made in reducing bus purchases and in reducing the size of the maintenance staff. In addition, a recommendation has been made to MNPS management on the purchase of routing software. While the Director of Transportation has addressed these and many other problems in the two years that he has been on board, there is still much work to be done.

As mentioned above, the organization of the DOT is stacked or vertical. All functions report through the Transportation Manager. While the Transportation Manager has the experience to supervise the maintenance area, he has other, broad responsibilities. The situation is further compounded by the fact that the maintenance area has so many critical problems. The Director is often called upon to assist in the management of the area.

The Director of Transportation is aware of the problem and has requested approval to appoint a Fleet Manager to directly manage the maintenance function. TCI supports the recommendation.

With the challenges ahead for the maintenance operation, one manager should be focusing solely on the maintenance shop.

Certain key components of a solid organization are not in place. These components fall in the areas of employee relations, maintenance quality, inventory management procedures, and reporting. These changes and opportunities are detailed below:

- The relationship between the Director and the Transportation Manager on one hand and the foreman and mechanics on the other is strained.
- Many Human Resources issues exist in the Department of Transportation.
- The quality of repairs and PM's is not acceptable. The fleet contains too many unreliable buses. Unsafe conditions that required buses to be pulled out of service and repaired immediately were uncovered.
- Inventory management needs improvement. This will be addressed in **Section 1.5, Inventory Management.**
- Fleet policy and procedures are not clearly and consistently documented.
- Management reports are not fully developed or deployed.

Below are some recommendations that we have relative to management issues. Some of these issues will also be discussed later in the report.

(1) Current Situation: **Absence of Repair Quality**

Finding: There is a lack of consistent, high quality preventative maintenance and repair work.

Recommendation: Hire a Fleet Manager. Free up the Shop Foreman to inspect vehicles after preventative maintenance and repairs. Develop better checklists for repairs and PM's. Place the best mechanics on the inspection team, and use smaller teams to ensure accountability. Request that state inspectors revisit the shop to complete inspections. Conduct small, quick seminars

on critical areas. Use overtime and outsourcing to reduce the repair backlog. Identify the critical components and train all employees to be sensitive to battery corrosion, brake and steering reliability, tire wear and mirror functionality. If shop expertise for a particular job is questionable, outsource the repair.

Cost Implications: Resources exist in the organization to address this problem. The annual cost of a fleet manager would be $60,000. This would be partially offset by the elimination of a lead mechanic or assistant foreman position. The incremental cost would $15,000.

(2) Current Situation: **Employee Morale**

Finding: There is a lack of understanding, as well as considerable tension, between management and the shop.

Recommendation: Eliminate the stacked reporting relationship. Hire a Fleet Manager who can spend full time on the maintenance situation. In the short run, have the shop report directly to the Director or relieve the Transportation Manager of other responsibilities. Establish weekly small group meetings. Focus on a few critical areas for improvement, starting with safety and repair quality.

Cost Implications: Better management will actually reduce costs and pay for itself over time. Road calls and downtime will be reduced. Less labor will be required over all.

(3) Current Situation: **Multiple Human Resources Issues**

Finding: There is significant tension in the organization, and Management believes that they need more support for these issues.

Recommendation: Station a Human Resources person in the DOT facility to be more readily available to provide HR support to employees and management.

Cost Implications: None. The work is already performed within the MNPS. Location is the issue.

(4) Current Situation: **Absence of Written Procedures**

Finding: There is a lack of consistent and complete written policies and procedures.

Recommendation: Identify the critical areas where procedures are required, starting with PM's and inspections. MNPS has contracted with TCI to work with the shop to improve their checklists and processes. Obtain administrative support to help articulate and then write other procedures with input from key staff. Develop a simple book of procedures so that the information is kept in one place and available for all employees.

Cost Implications: MNPS has contracted with TCI to provide supervision of and training for the maintenance effort. TCI will begin documenting procedures, and this will be included in the cost of the TCI support contract.

(5) Current Situation: **Lack of Maintenance Reporting**

Finding: Little MNPS fleet management and maintenance reporting exists.

Recommendation: Using the metrics below, management should determine the critical areas for measurement. Support should be given to MNPS maintenance in developing reports and collecting information. The expectations and reports should be shared across the board, including users, staff and appropriate members of MNPS management. Some key measures captured by larger fleet operations include:

Downtime:
The number of vehicles **out of service** at a given point in time divided by the number of vehicles in the fleet, expressed in percentage format. A norm for MNPS would be 6-8%.

Utilization (labor):
The amount of direct, billable time recorded by service employees compared to the total amount of

time available for work expressed in a percentage format. A reasonable target is 75%.

Turn-around Time:
The elapsed time beginning when a vehicle (or equivalent) is delivered to a maintenance facility for repairs or servicing and ending when the repairs or servicing is completed and the user is notified that repairs are completed (typically expressed as <8 hours; > 24 hours; 24 to 48 hours; and > 48 hours). TCI expects to see 70% of the repairs complete within 2 days.

Repeats/Come-backs:
Instances where repairs to vehicles, machinery or equipment were not made in a satisfactory manner, necessitating a second request for repairs for a similar labor code.

Preventative Maintenance (PM) vs. Corrective Maintenance:
The ratio of job orders for vehicles, machinery or equipment that are written for scheduled maintenance as opposed to job orders that are written for corrective or unscheduled repairs, divided by the total repairs and expressed as a percentage. A percent in excess of 50% indicates that the PM program is effective and reducing unexpected and untimely breakdowns.

Preventative Maintenance Compliance:
The percentage of on-time arrivals for scheduled preventative maintenance (PM) expressed as within 3 days or 500 miles of the scheduled maintenance date or mileage interval.

Cost Per Piece of Equipment:
Annual department costs divided by the number of vehicles. TCI estimates a target of $3,200 is appropriate for this fleet.

Vehicles Per Mechanic:
The number of mechanics divided by the total equipment. The MGT report suggests a norm of 25 buses per mechanic. TCI supports this.

In the case of the MNPS maintenance effort, we would suggest starting with the measurements that are easy to obtain and understand. Our suggestions would include cost per equipment item, PM compliance, and a status report that shows equipment out of service and turnaround time. We support the MGT recommendation that targets be set and monitored for miles per road call. According to the MGT report, the MNPS is averaging 908 miles between road calls. This equates to a road call every 11 days for each bus. While TCI did not verify these numbers, this is in our opinion an extremely high level of road calls.

Results should be shared with all personnel.

Cost Implications: The staff and expertise is in place to provide this information. The data can be obtained from the STIMS system. Better information means better decisions, and lower costs.

1.3 Maintenance Metrics

As mentioned in the previous section, a key element in responsive fleet management and maintenance is the use of management reports and metrics to measure performance. Over the years, TCI has developed certain metrics and standards that are useful benchmarks. It is useful to track these measures on a historical basis.

TCI examined the work orders contained in the STIMS system for the months of March through May 2001. We obtained the following results.

In terms of **downtime,** the shop averaged 35 work orders per day. If all buses were returned to service the same day, the **downtime** percent would be 7.7% of buses. TCI would expect results in the 6-8% range. The DOT should develop some routine for calculating buses not available for service and set a target for improvement.

TCI's calculation for **utilization** of mechanics resulted in 25 percent. Our norm for this is 75%. As previously mentioned, the shop averages 35 work orders per day. There are 28 individuals performing mechanics duties on a day-to-day basis.

Each mechanic is working on less than two work orders per day. Both these measures indicate inefficient use of labor.

The MNPS maintenance group returns 88% of buses to service within a two-day period. However, this positive measure is negated by the poor mechanical quality of vehicles. The table below shows those results:

Table 1: MNPS Fleet Management
Shop Turnaround Summary
March – May 2001

Category	Number of Work Orders	Percent
Less Than Two Days	1,910	88
2-4 Days	105	5
Over 4 Days	150	7
Total	**2,165**	**100**

TCI did not find precise data to allow us to measure **repeat service calls.** We did review one type of repair, batteries or no starts, and found a number of cases where the same bus had multiple failures.

Our review of **preventative versus corrective maintenance** showed that the MNPS shop spent 33% of its time on PM's. TCI would expect to see at least 50% of maintenance effort directed towards the preventative side.

Section 1.6, Financial Information lists the costs for the maintenance function. The **cost per vehicle** calculation is shown in the table 2 on the following page.

Table 2: MNPS Fleet Management
Cost Per Vehicle Calculations

Budgeted Fleet Costs less Fuel	Number of Vehicles	Cost Per Unit
$2,017,000	539	$3,740

In our opinion this cost is high. The fleet is relatively standard and mileage is predictable. School vacations present an opportunity to ensure all buses are inspected and serviced on a consistent basis. TCI would set a long-term goal of $3,200. This goal should be attained as the maintenance operation is better supervised, as parts and tire purchases are improved, and as labor utilization is improved.

The MGT report suggested a fleet size target of 493. This is based on a 10% spare ratio. The spare ratio is added to the number of buses needed daily. The table below shows the potential savings attainable in the long run, assuming no changes in student population and programs.

Table 3: MNPS Fleet Management
Estimated Cost Per Vehicle

Estimated Fleet Costs less Fuel	Target Number of Vehicles	Target Cost per Vehicle
$1,577,600	493	$3,200

The MNPS Equipment inventory contains 539 buses. This inventory is further defined in **Section 1.7, Fleet Assets and Replacement**. The shop utilizes 28 individuals who perform mechanical functions daily. This calculates a **bus to mechanic** ratio of 19 to 1. The recently completed performance audit of the MNPS recommended a goal of 25 buses per mechanic, which would ultimately reduce the total number of mechanics from the current level of 28 to 22. Once MNPS implements the recommendations of this report, we expect to see an improvement in this ratio. We suggest that the first order of emphasis be the immediate improvement of the PM and repair processes. The next step would be improving the cost situation.

TCI estimates that the remainder of FY 2001 – 02 will be spent improving the PM and repair processes. During the following fiscal years, DOT management should develop targets that gradually improve the vehicle to mechanic ratios over the next three years by beginning to reduce the number of mechanics by 2 per year beginning in FY 2002 – 03.

Another important factor in future staffing is any change in the fleet size. For example, subsequent to the TCI visit, the Board of Education approved a pilot program to add 24 drivers, which will impact the ability to reduce the fleet size to levels recommended by MGT. This will increase total cost and the required number of mechanics.

The Board of Education also has approved the purchase of a computerized routing system. Once in place, this system should contribute to a reduction in the number of buses.

Regardless, TCI supports the recommendation of the MGT performance audit that stipulated a 10% spare ratio and an eventual ratio of 25 vehicles per mechanic.

These are important measures for the DOT to track and to target.

TCI agrees with the MGT report that road calls are an important metric. During the months of March, April, and May, the MNPS fleet required 229 road calls. The road calls in turn created 65 wrecker calls. The incidents are very expensive. From a service standpoint, road calls often represent children late for school or returning home later than scheduled.

1.4 Information System

Timely and accurate management and maintenance information is an essential ingredient in successful fleet management and maintenance. Today's best fleet management and maintenance information packages provide barcode data entry on a real time basis and allow quick access to both current and historical data that is needed by technicians and management for proper decision-making.

MNPS is using the STIMS software to monitor maintenance and inventory. This system has some significant weaknesses. Here are some of them:

- User documentation is poor.
- The standard reports are not useful.
- The system has capacity limitations that require frequent archiving.
- The software utilizes FoxPro. This is a database language that is becoming obsolete.

While the STIMS software has the above limitations, we support management's implementation of this system and do not recommend replacement at this time. The system is functional and does meet the information needed to operate on a daily basis.

As TCI builds the requirements for a Metro-wide system solution, MNPS needs should be considered for future system conversion.

(6)	**Current Situation:**	**STIMS Improvements**
	Finding:	While the system is adequate for today's operation, it has significant drawbacks.
	Recommendation:	Utilize STIMS for the short term. Incorporate MNPS needs into the overall Metro system needs, and convert STIMS at an appropriate future time.
	Cost Implications:	None for MNPS.

1.5 Inventory Management

The parts area in MNPS fleet maintenance is located adjacent to the garage area. Parts are stored on two levels. The space, lighting, and shelving are appropriate for this parts function.

The MNPS maintenance group recently reviewed the inventory and salvaged $250,000 in parts. These were mostly held over from previous management. In our judgment, some further culling could take place. $250,000 of inventory remains. The current parts budget calls for spending of $455,000. The inventory turnover in this case would be 1.75. TCI would expect turnover to be at least five times with this fleet.

DOT management expects to make additional reductions in inventory, and has set a target of $100,000. Given the consistent fleet type and rapid availability of many parts, this target seems reasonable.

The STIMS software has the capability to utilize reorder points and other inventory tools to help reduce inventory.

MNPS utilizes Metro contracts to good advantage. Other purchases are obtained through a verbal quote basis. The current operation requires three quotes, regardless of amount.

TCI reviewed the physical inventory process with parts personnel. They pointed out that there is no formal cut off for inventory. This creates an inaccurate count.

Fuel is purchased through the Metro contract. The annual fuel purchases approach $1,000,000. Fuel is distributed through a network of MNPS tanks and also purchased through a chain of local gas stations.

MNPS augments their in-house fuel program with external or commercial purchases authorized through the Fleet One program. Currently 55% – 60% of fuel usage is pumped from sites at:

- Bellevue Middle School (West)
- Ewing Park (North)
- Woodycrest Terminal (Central)

MNPS issues drivers the Fleet One card for their convenience and to minimize long drives to MNPS fueling sites. MNPS currently pays for Fleet One purchases cost plus basis with an administrative charge of $.109 per a gallon. The cost is based on the daily spot purchase price as reported by OPIS. Taxes are excluded from the calculation.

During May 2001 gasoline purchased for delivery to MNPS tanks averaged $.95 per gallon. Fuel purchased through the Fleet One program averaged $1.07 per gallon. TCI will continue to review this program as part of its support contract.

(7) Current Situation: **Inventory Level Too High**

Finding: The inventory is turning less than twice per year.

Recommendation: Provide the necessary training and resources to the parts staff to implement inventory control techniques, notably re-order points. Set gradual reduction targets and track them. Salvage the remaining obsolete parts.

Cost Implications: Most of the work can be done by using existing staff. Support by a contract employee with inventory experience would be helpful. Overtime may be needed. These changes could probably be made for less than $5,000, with 200 hours of overtime at $20 per hour. Inventory carrying cost would be reduced by at least $8,000 in the first year. If inventory were turning at five times per year, the inventory dollar value would be $85,000, a reduction of $165,000. Using a cost of capital of 5%, this would provide a savings of $8,250 per year.

(8) Current Situation: **Three Quote Requirement**

Finding: Parts personnel are obtaining three quotes for all orders not on contract.

Recommendation: Consider waiving the 3-quote requirement for orders under $1,000, which is the amount established in Metro's procurement code.

Cost Implications: Although not readily quantifiable, this should reduce labor costs by more than any increase in parts costs.

(9) Current Situation: **No Formal Cut Off for Physical Inventory**

Finding: It is difficult to get accurate counts when counting is being done during normal operations.

Recommendation: Shut down receipts and requisitions on Friday afternoon. Issue any parts in advance for work orders in process. Have several count teams scheduled to count Friday afternoon. Reconcile any major count discrepancies Saturday morning.

Cost Implications : Some minor overtime costs.

1.6 Financial Information

The Department of Transportation maintenance operation has a budget of $2,017,000. This budget does not include $1,121,000 budgeted for fuel. These numbers does not include any costs for the Operations and Plant Maintenance vehicles, which are not available.

The annual budget can be separated into major components as follows:

- Labor Related Expenditures $1,400,000
- Shop Tools 17,000
- Outside Repair.....70,000
- Automotive Parts.....455,000
- Tires 75,000

1.7 Fleet Assets and Replacement

TCI reviewed the equipment inventory. Table three shows the age of the fleet:

Table 3: MNPS Equipment Aging

	Equipment Units	Median Age
School Buses	539	1997
Light and Maintenance Vehicles	165	1995

The median age for buses was 1997. Of the 539 buses, 20 have reached retirement guidelines and are due for salvage within one year. Based on the MGT report and TCI's recommendations, the fleet total should be dropping over the next several years. This decline in numbers will be caused by better management of spare buses and drivers, better maintenance, and the results from a routing system. Buses should continue to be replaced according to state guidelines (12-15 years).

This assumes that requirements do not change. Growth or reduction in programs or students will influence bus totals.

Current operating practices, such a bus location and scheduling for absenteeism increase bus requirements and reduce bus utilization. If drivers are absent, their assigned bus is idle. A review of these practices should precede the installation of the new routing system.

MNPS maintains a large fleet of maintenance, operations and security vehicles. Fleet records are not maintained centrally, and information is not current. TCI did visit the maintenance and operations facilities. The Plant Maintenance group has 85 units, while Operations reports 80. Both organizations would like to use ten years and 100,000 miles as replenishment guidelines. Of these 165 vehicles, 38 have mileage over 100,000.

In addition to being relatively old and high mileage, this light vehicle fleet is maintained by a variety of sources. The Operations fleet is maintained by the general purpose mechanics that maintain the grounds equipment. They also utilize outside vendors for some functions. The Plant Maintenance group recently hired a mechanic to service their vehicles. The vehicles are serviced in an old school building. They also tend to outsource any significant repair. The priorities and core competencies of the Operations and Plant Maintenance groups do not include vehicle maintenance. Key ingredients to a good vehicle maintenance program (systems, tools, specialization) do not exist.

This situation creates many problems. Personnel are exposed to unsafe operating conditions. Vehicles are often called out on emergencies during the night. An unreliable vehicle can create unsafe conditions for employees. In addition, vehicles are being repaired when they are well past their expected life. Recently, the engine in a 1988 truck was replaced. The cost of the new motor was greater than the value of the vehicle.

Both organizations have very high vehicle to employee ratios. This may be caused by the need for spare vehicles, since the fleet is not reliable.

(10) Current Situation: **Bus Utilization**

Finding: Current practices for bus staging and storage, and for replacement of absentee drivers increase bus requirements.

Recommendation: Consider alternative methods for bus staging. Stage all spare buses on MNPS sites to improve utilization.

Cost Implications: Unknown until study is done. Should result in some reductions in the fleet.

(11) Current Situation: **Maintenance and Operations Fleet**

Finding: These two fleets have old and unreliable vehicles. Maintenance is unevenly performed.

Recommendation: Consideration should be given to transitioning maintenance responsibilities to the General Services Motor Pool for the light fleet, to Public Works for heavy equipment, and to Parks for grounds maintenance equipment as the recommendations related to the Metro departments are implemented and those operations are in a position to absorb MNPS non-bus fleets.

Cost Implications: Because costs were not readily available, savings are unknown at this time but will be determined as part of TCI's ongoing support contract. Transferring maintenance responsibilities to Metro is expected to result in enhanced maintenance of the fleet at reduced cost.

(12) Current Situation: **Need for Vehicle Utilization Study**

Finding: Both Plant Maintenance and Operations have high ratios of vehicles to employees. Plant maintenance is decentralizing some functions to high school locations.

Recommendation: Do a vehicle utilization study on both departments and develop an ongoing capital replacement plan based on the number of vehicles needed. For the current year, only replace the vehicles that are over 10 years and 100,000 miles and that are actually in use, but do not replace more that 25% of the vehicles in any one operation.

Cost Implications: Although not readily quantifiable, a reduction in vehicles would provide savings.

1.8 Maintenance Operations

Maintenance Management

Work scheduling, inspection of completed tasks, planning, and productivity measurement and improvements are not being addressed. Supervision, **especially student transport supervision**, must remain focused on maintenance quality and detail to provide safe, reliable, economical and cost competitive service to the community.

Maintenance quality, reliability, and student safety are **compromised** as a result of the ineffectiveness of the maintenance operation. For example:

- Supervisors report that "on yard" inspections and inspections of completed mechanical repairs had **never** occurred within the past twenty years.
- The Transportation Department is not practicing basic accountability steps or establishing and enforcing reasonable quality and productivity standards.
- Management reports a lack of support in disciplining or terminating mechanics with long histories of qualification or performance problems.
- The starting rates of pay for mechanics are under the market rates. This creates recruiting and retention problems. For example, the starting rate for a mechanic in the MNPS system is $10.53. The last time a job opening was advertised no viable applications were received. Based on our observations the going rate for a mechanic in Nashville approaches $15 per hour. It takes several years of service for a mechanic to reach an adequate level of pay.

Photographs are attached to document some of our observations.

Preventative Maintenance

Management of comprehensive and well scheduled preventative maintenance is the major reason any fleet would absorb the cost and effort of maintaining a garage and mechanic staff. Most other fleet related maintenance and repair could be performed cost effectively by outside vendors.

Preventative maintenance is usually best performed by in house personnel **if** ownership, pride of workmanship, accountability and a strong sense of responsibility exists. We did not find the necessary ingredients in place required to

develop, cultivate, and maintain an acceptable level of preventative maintenance. This observation is validated by the condition of the fleet, as described below. A major philosophical shift and redeployment of effort will be required to successfully implement applicable preventative maintenance processes into this operation. Formats currently exist for 10,000, 20,000, and 40,000-mile inspections. A separate 20-day schedule also exists. Our review revealed that the inspection procedures were not adhered to. Supervision indicated that trimming inspection times down to less than 20-30 minutes per bus was **positive.** An adequate inspection and PM would take 90 minutes, using two people. Drivers have become accustomed to cursory inspections and accepting frequent no-starts, break downs, and generally slow response times to reported defects. The current inspection routine and schedule does not reduce breakdowns. "Team" approaches to the inspection process has reduced any possible accountability or follow up, as it becomes difficult to identify which team member failed to perform discrete tasks.

Documentation of bus condition is not consistent with actual conditions. We discovered examples where one-mile old data differed greatly from the actual bus status. For example, when TCI conducted weekend inspections of 55 buses, the tire wear measures were often different from the most recent PM records.

The preventative maintenance inspection process should be rewritten and reintroduced using the best technicians with direct supervision. It must become the "backbone" of the fleet maintenance operation. TCI is currently working with MNPS to improve this process.

Fleet Condition

A standard routine of our review includes auditing randomly selected buses for safety, mechanical condition, reliability, and appearance. Ten of the twelve selected buses required dispatch back to the garage to correct safety and reliability concerns. School was scheduled to start within the week of our audit. The fact that ten of twelve random buses were **not ready for service**, and that supervision was **surprised** at the serious nature of the identified defects, defines the current unacceptable fleet condition.

Workmanship and repair quality for many recent repairs was found unacceptable. Several shoddy repairs were found that would have resulted in immediate breakdowns and more expensive repair with subsequent damage.

Several newly assigned buses required jump-starting prior to leaving the lot before the first day of school. When the fleet maintenance staff began to ready the fleet for the new school year, 95 buses on the lot were found to have dead batteries. Management and staff felt that this was an unusually high number. They observed that many of the buses were parked with interior lights or radios left on. This shows a lack of discipline in preparing buses for storage, carelessness, or a willful disregard for MNPS property.

Excessive road call and on yard breakdown frequency also indicates less than acceptable maintenance levels. The August 13 "trial run" and the first school day commenced with many simple and preventable but costly delays causing breakdowns. Eighteen buses broke down during the trial run, and twenty-one service calls came in on the first morning of school.

The condition of the fleet resulted in TCI inspecting a greater part of the fleet. A weekend inspection of 55 buses was done. **TCI's inspection identified 413 defects, of which 177 were safety related and required that several buses undergo immediate repairs**. DOT personnel inspected additional buses with similar results. Many defects were very serious in nature. In addition to the lack of competency of the garage in addressing these issues, it is equally **distressing** that the bus operators were not uncovering or reporting these defects during their daily checklist reviews.

Tire Program

Effective tire program management is essential to fleet safety, cost effectiveness, and readiness. We identified serious problems with the current tire procedures that require prompt attention and follow up.

Removed tires (227) are retained on the property too long and collect rainwater that provides mosquito-breeding areas. Scrap tires provide easily observed evidence of operating tires past acceptable tread depths; tires do not become "slick" after removal. Removed tires should be discarded off site or forwarded to retread shops within five days of removal.

New bus rear tires are removed and replaced with retreads and saved for steering axle installation across the fleet. We advise that this practice distorts vehicle operating cost data and creates potential losses, as the new tires are not properly accounted for. Buses should be specified with appropriate tire treads and be placed in service as delivered.

81 non-mounted tires were piled outside the tire repair bay; their inner-liners exposed to damaging rain and ultra-violet light. An additional 73 tires were found in the tire bay. Maintaining a tire inventory of this level consumes capital and encourages obsolescence.

We were particularly troubled to discover many tires under-inflated or with insufficient tread on in-service buses. For example, the above-mentioned weekend inspection detected over 50 unsafe tires. There is **no** rational explanation for finding dozens of under-inflated and insufficiently treaded tires on in-service buses just days prior to school start. Many of these buses had recently been maintenanced and inspected. Supervision was again **surprised** at the fleets' tire condition.

Each mechanic and supervisor should be scheduled for basic tire maintenance and repair classes.

Drivers and their supervisors should also receive basic training in tire defect recognition and reporting procedures.

Replacement Parts

Locally purchased replacement batteries do not appear to provide acceptable life expectations and also appear to cause some of the corrosion found on many bus battery terminals. Records indicate that original batteries provide three years or more service while replacements last only slightly more than one year. Some buses receive two or three batteries per year.

This situation had not been researched, but supervision already knew that the current batteries were not of original equipment quality. When TCI inquired as to why they would continue using this product, we were informed that "low bid" suppliers were selected in most agreements.

The garage mechanics "rebuild" many components in house. These parts are not warrantied, costs are questionable, and locally rebuilt parts will never include current manufacturers' updates and improvements. Local mechanic labor would be much better utilized with a strong preventative maintenance program.

Other Comments

Management and supervision have elected to install an after market diesel fuel apparatus on many of the buses at a parts and labor cost approaching $800 per bus, an amount that would require significant fuel savings to recover the

investment. Supervision focused on the cost savings of this device, but failed to consider very important aspects and associated liabilities of **tampering with or modifying** delicately tuned fuel and emission systems.

Much effort and capital expense has improved the maintenance garage interior. Walls have been painted and new overhead doors have been installed, for example. This effort was well received by the staff. The previous management had allowed the facility to become poorly maintained.

A similar effort is required with the garage exterior and grounds. Old drums, engines, trash, and other junk should be discarded. The closed truck wash area in particular has become unsightly and dangerous with debris and junk. The perimeter fence line should be trimmed and maintained for appearance and security purposes.

In addition to the environmental and safety issues outside the facility, several safety violations present in the shop area require continuing attention. The service pits should always be chained off to prevent someone falling into them when not covered by a bus or other vehicle. The shop bench grinder should be adjusted and fitted with new shielding, and buses should not be elevated on home made ramps.

The MGT report stressed the need for emphasis on training and certification of the staff. TCI agrees that this should be done.

In addition, three mechanics are performing jobs that are administrative or non-mechanical in nature. The administrative jobs being performed are service writer, budget and reporting, and fueling operations.

(13)	**Current Situation:**	**Personnel In Mechanic Pay Grades Performing Other Jobs**
	Finding:	Several staff members are paid as mechanics, but are performing non-mechanic functions.
	Recommendation:	Reclassify these employees into appropriate job titles.
	Cost Implications:	None

(14) **Current Situation:** **Marshalling and Exterior Areas Not Tidy**

Finding: The old wash area, the outside tire storage area, and other outside areas contain junk and scrapped items.

Recommendation: Clean up the outside areas.

Cost Implications: None. This may actually provide some revenue from scrap metal dealers.

(15) **Current Situation:** **PM Process Ineffective**

Finding: The PM process presently in use is not ensuring that reliable and safe buses are in service.

Recommendation: Totally revamp and reemphasize this process. Assign the best mechanics and team leaders to inspections. Train all mechanics, and monitor performance. Monitor inspections for quality, completion, and correct record keeping.

Cost Implications: The longer-term solution is to hire a qualified fleet manager, which is addressed above.

(16) **Current Situation:** **Operators Not Aware of Bus Checklists and Safety Ramifications**

Finding: Bus operators are not aware of the need to check their buses on a daily basis, and to return buses for correction.

Recommendation: Work with operations supervisors to train operators. Have supervisors spend time inspecting buses with the drivers.

Cost Implications: None. The bus drivers are paid for 8 hours per day and should have time to perform the checklist in that time period.

(17) Current Situation: **Bus Garage Not Performing Efficiently**

Finding: The bus garage is not effective in servicing buses. In addition, morale is poor.

Recommendation: Assign extra management resources to address this problem. Consider hiring a Fleet Manager or using outside support. If this situation cannot be improved, consider outsourcing the maintenance function.

Cost Implications: The expected savings through the reduction of staff and material purchases will more than recover the cost of a fleet manager.

(18) Current Situation: **Inferior Parts Being Purchased, Rebuilt and Used**

Finding: Some parts are being purchased on a low bid basis. Others are being rebuilt with the MNPS garage.

Recommendation: The emphasis should be on high quality, not cost. OEM (Original Equipment Manufacturer) quality and equivalent parts should be bought. The garage should eliminate rebuilding.

Cost Implications: Although not readily quantifiable, in the long run parts costs will be reduced. Parts life will be significantly improved.

(19) Current Situation: **MNPS Has Purchased After Market Devices to Enhance Engine Performance**

Finding: MNPS has purchased after market devices to enhance engine performance. No contact was made of the engine manufacturer as to the advisability of the devise, or the impact on warranty.

Recommendation: Do not continue to install these devices until more data is obtained.

Cost Implications: Unknown at present.

(20) **Current Situation:** **Safety Violations Present in the Garage**

Finding: TCI observed several safety violations within the MNPS garage.

Recommendation: Management should conduct safety inspections with safety resources available within Metro, then correct all identified safety hazards.

Cost Indications: The items observed by TCI could be solved by the use of existing labor and less than $2,000 in proper safety equipment and guards.

(21) **Current Situation:** **Tire Program**

Finding: MNPS carries a tire inventory that is too large. The existing tire program is not performing well.

Recommendation: Consider contracting with an outside service to provide in house and road service, perhaps in conjunction with other Metro departments.

Cost Indications: Although not readily quantifiable, meaningful savings should result.

(22) **Current Situation:** **Mechanic Pay**

Finding: MNPS mechanic pay looks low compared to market, other Metro mechanics and the Nashville market.

Recommendation: Review mechanics starting pay rate and growth potential to ensure competitive pay.

Cost Indications: Unclear at this point.

1.10 Photographs

Public Schools

This example illustrates the poor battery and electrical system maintenance resulting in excess road calls and cost.

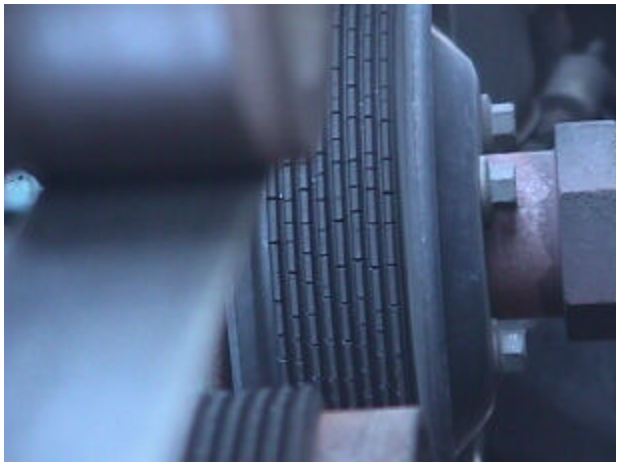
Note the dirty terminals on this recently inspected bus.

Many batteries are not properly secured in their trays. In a roll over or heavy impact accident the cables could be shorted causing a fire or explosion.

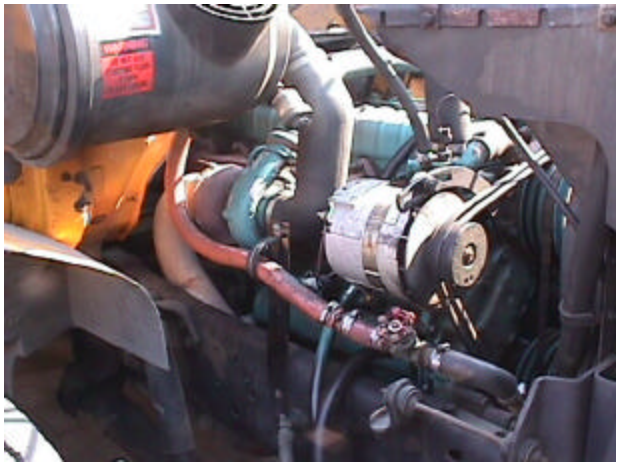
Several in service busses were found with insufficient tire tread. This condition not only causes road calls, but is unsafe and requires immediate attention.

Wheels are not always cleaned or painted with tire replacements. Bus appearance is negatively affected with lack of attention to wheels, bumpers, etc.

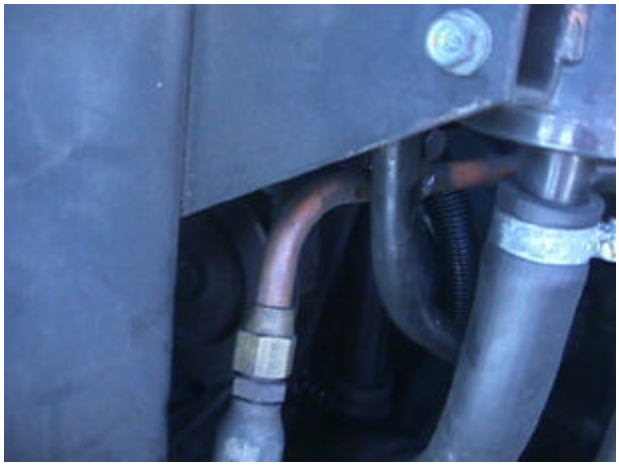
This example of a defective belt illustrates less than acceptable maintenance and pre-trip inspections



The heater hose on this bus was next to the turbo charge exhaust. It would have soon melted and caused a road call with engine damage. This is an example of the typical poor quality of workmanship found within the fleet.



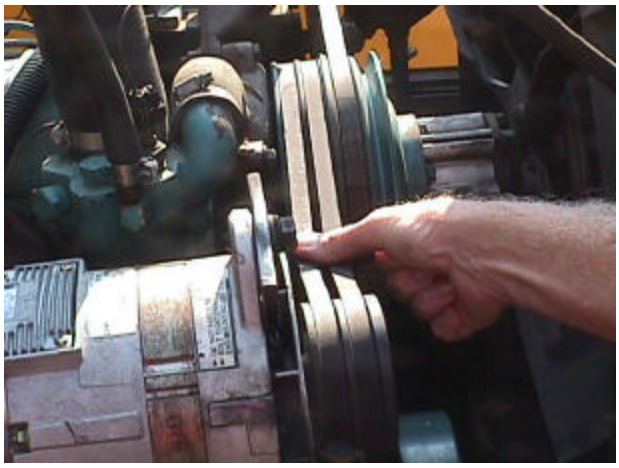
The current PM inspection routine fails to identify small problems such as the air compressor discharge line abrasion, pictured here, before they become large costly problems.



This hood damage resulted from improper adjustment of the hood support.

The broken air filter minder gauge allows unfiltered dirt to enter the engine.

This alternator, on a "ready to go" bus, was loose and allowing too much belt travel. We found many such examples of poor workmanship.



Tire maintenance and management is less than acceptable. Tires are "everywhere" with no procedures or control in place.

The scrap tires should be inspected and recorded to begin an analysis of tire usage, failures, and product life cycles. After inspection they should be discarded. These tires, many partially filled with rainwater, provide mosquito breeding grounds.

New tires were removed from the rear axles of new busses and replaced with retreads. We discourage this practice.

More tires!

Yet even more tires!

The garage yard and grounds area should be cleaned and all junk and debris removed.

The drums should be discarded or identified and properly stored.

Even more outside storage drums.

The old wash bay has become a dumping area for trash, old drums, and miscellaneous junk. This area should be cleaned up and secured.

The fence line is over grown reflecting a lack of attention to grounds and appearance.

Shop fluids are maintained in this unkempt, dangerous, and fire hazard area. We recommend that these fluids be maintained in a separate area in bulk storage.

The fleet uses two mobile service trucks to chase road calls.

We recommend that this old wrecker be sold due to its age, appearance and condition.

This clunker of a wrecker should also be retired.

These components are examples of in house rebuilt parts that should be outsourced at lower costs and improved warranties.

The purchase and usage of these fuel system components is discussed in detail in report text.

The spacious garage is equipped with two drive over pits. Pits should be chained off or covered to prevent persons from falling into them. Neither pit was protected during our visit.

This grinder is not in safety compliance due to the cracked shield and incorrectly adjusted tool rest.

Junk batteries should be stored under cover and picked up more frequently by the local vendor.

NASHVILLE ELECTRIC SERVICE FLEET MANAGEMENT

Introduction

The Nashville Electric Service (NES) fleet management and maintenance program currently employs thirty-two full time equivalent employees (FTEs). These individuals maintain 539 equipment items, ranging from sedans to heavy trucks.

Organizationally, NES fleet management and maintenance is part of the NES Department of Procurement and Administrative Services. The NES fleet management and maintenance facility is part of the NES central campus. Operations are housed in a separate garage to the rear of the administration building and at two other shop locations.

The NES budget for the 2001-2002 fiscal year related to fleet management and maintenance is slightly over $3,000,000.

Executive Summary

In general, we found the Nashville Electric Service fleet management program to be the best in the Metro Nashville Government. Management was responsive to and supportive of TCI's visit. The items listed below will be commented on in the body of the report.

More specifically:

- The Fleet Manager is a thorough professional, as evidenced by his past presidency of a fleet managers group.
- The organization has a strategy, targets, and a tracking mechanism. Goals and job tasks are defined for all positions.
- NES has developed an innovative tire program that is providing significant savings and better service.
- TCI believes that an active preventative maintenance (PM) program is the key to good fleet management. NES maintains such a program.
- In spite of the pro-active PM program, maintenance of the fleet was inconsistent among the three shop locations. It is our judgment that the Donelson center does a more thorough job of maintaining their fleet. A detailed inspection of 21 vehicles revealed some safety and operating defects. TCI noted 49 operating defects and 5 safety defects. The vehicle condition at Donelson was better than the Central and West centers.

- TCI calculated several key measures or metrics. While overall results were satisfactory, the measures that track productivity show room for improvement. For example, TCI believes that an appropriate target for cost per vehicle would be $4,500. NES is currently spending $5,627 per equivalent maintenance unit.

- Overall, the performance of the parts area is satisfactory. On the other hand TCI's opinion is that this area is overstaffed. The reporting relationship of parts room personnel is shared between Procurement and Materials Management, but not Fleet Management. This contributes to the inefficiency.

- According to management, the shop foremen are tied to the computer doing too much data entry. Their time could be better utilized if those responsibilities were transferred to parts employees, who have available time.

- NES runs a motor pool for the use of staff personnel that do not have assigned vehicles. This pool is well organized and well used.

- Reports are prepared and posted in prominent locations. These reports track the goals of the organization. TCI recommends that only the key, "critical few" goals be tracked.

- NES has an aggressive and creative approach to fleet replacement. They are open to trying different vehicle life strategies, and making changes if the strategy does not work.

- NES fleet management and maintenance uses FLEETMAINT to process its work orders. This is a server-based system that interfaces with the NES mainframe systems. Solid progress has been made in developing management reports.

Summary of Financial Implications:

Listed below are some potential annual savings:

- Better utilization of parts personnel – ½ person saved $25,000

- Reduction of administrative person $40,000

- Gradual reduction of mechanic staff .....up to $80,000

Management should strive to identify other cost savings through additional performance measures and improved parts management.

1.1 Overview of Nashville Electric Service Fleet Management

As previously mentioned, the NES fleet management and maintenance group is headquartered behind the main NES administration building. This facility supports the Central operating center. Two garages are located at the other NES operating centers – West and Donelson.

The space used for repair operations at the Central center consists of 8,000 square feet. This area includes 10 bays and overhead doors. The adjacent building contains space for offices, parts storage, a training room, lockers, overflow repair bays, and a paint bay. The West and Donelson centers have one to two bay facilities.

NES fleet management and maintenance operates five days per week. Maintenance operations commence at 6:00am and end at 12:00pm. These hours are designed to allow maintenance to take place while certain vehicles are not operating. This is helpful from the users' standpoint.

The fleet inventory totals 539, and the median age for equipment is 1997. Assets range from a large light vehicle fleet to heavy trucks. Also included are 127 pieces of wheeled equipment, such as trailers, which have complicated attachments. Equipment inventory will be further discussed in **Section 1.7, Fleet Assets and Replacement.**

The equipment maintenance shop is currently staffed with 18 mechanics, four helpers and four working foremen.

1.2 Management Issues/Policies and Procedures

TCI finds that NES Fleet Management is well managed and had impressive programs to ensure good fleet utilization. We would consider this a management "Best Practice". In addition the fleet has a low (less than 2%) downtime rating.

The Fleet Manager has a good grasp of the concepts of fleet management. The organization is goal driven, and results are measured in detail.

NES Fleet Management recently instituted a tire management program with a supplier. This program has shown excellent savings and a probable improvement in response time.

The organization is dedicated to managing the operation using a computerized information system. They are utilizing FLEETMAINT effectively. The NES fleet management group operates a motor pool for the use of NES staff. The pool of 30-35 cars is well run, and data is kept to ensure that the pool is well used.

NES Fleet Management is interested in continuing to improve their performance. They were open and ready to share both information and opportunities for improvement. As TCI pointed out areas for improvement, management responded quickly.

TCI queried NES management about the possibility of combining meter-reading functions with other utilities. NES management felt that they were going in the right direction of new technologies. These new technologies will eliminate the manual reading of a meter. NES indicated that they would be happy to work with other agencies on this type of technological solution.

NES fleet management is very active in targeting and measuring results. Information is prepared, tracked and shared within the organization. TCI applauds this practice, but believes that the reports and targets should be targeted to the most critical factors.

(1) Current Situation: **Precision of Management Reporting, Goals and Targets**

Finding: NES Fleet Management has a good grasp on the goal setting and reporting process. TCI suggests that the list of goals should be prioritized and reduced.

Recommendation: Using this report, NES goals, and their experience, management should determine the critical areas for measurement. Some key measures captured by larger fleet operations include:

Downtime:
The number of vehicles **out of service** at a given point in time divided by the number of vehicles in the fleet, expressed in percentage format. A goal would be 6-8%.

Utilization (labor):
The amount of direct, billable time recorded by service employees compared to the total amount of time available for work expressed in a percentage format. A reasonable target is 75%.

Turn-around Time:
The elapsed time beginning when a vehicle (or equivalent) is delivered to a maintenance facility for repairs or servicing and ending when the repairs or servicing is completed and the user is notified that repairs are completed (typically expressed as <8 hours; > 24 hours; 24 to 48 hours; and > 48 hours). TCI expects to see 70% of the repairs complete within 2 days.

Repeats/Come-backs:
Instances where repairs to vehicles, machinery or equipment were not made in a satisfactory manner, necessitating a second request for repairs for a similar labor code.

Preventative Maintenance (PM) vs. Corrective Maintenance:
The ratio of job orders for vehicles, machinery or Equipment that are written for scheduled maintenance as opposed to job orders that are written for corrective or unscheduled repairs, divided by the total repairs and expressed as a percentage. A percent in excess of 50% indicates that the PM program is effective and reducing unexpected and untimely breakdowns.

Preventative Maintenance Compliance:
The percentage of on-time arrivals for scheduled preventative maintenance (PM), expressed as within 3 days or 500 miles of the scheduled maintenance date or mileage interval.

Cost Per Piece of Equipment:
Annual department costs divided by the number of vehicles. A reasonable goal for the NES fleet would be $4,500 per vehicle. This goal reflects the impact of the complexity of the NES equipment.

Vehicles per Mechanic:
The number of mechanics should be divided into total equipment. A reasonable goal for the NES fleet would be 33 vehicles per mechanic.

Cost Implications: None. Systems are in place to provide this data. NES currently measures PM compliance very well. TCI recommends that measures be added for average cost per piece of equipment, as well as measures of PM and repair quality.

1.3 Maintenance Metrics

As mentioned in the previous section, a key element in responsive fleet management and maintenance is the use of management reports and metrics to measure performance. Over the years, TCI has developed certain metrics and standards that are useful benchmarks. It is useful to track these measures on a historical basis.

TCI examined the work orders contained in the FLEETMAINT system for the year to date. The fleet management staff is well versed in extracting the data from the system and its database. They were very supportive.

We obtained the following results.

In terms of **downtime,** the NES group performs very well. The system calculation is 2%. This is much better than the expected norm of 6-8%. In addition most of the PM's are performed overnight. This means that many of the vehicles undergoing preventative maintenance have zero downtime.

TCI's calculation for **utilization** of mechanics resulted in 66 percent. Time for the helpers or foremen was not included. Helpers, we are told, **do not** record time on mechanic work orders. NES should strive to increase utilization to a 75% level. In terms of **throughput**, the shop averages 27 work orders per day. There are 18 individuals performing full-time duties on a day-to-day basis, a ratio of less than two work orders per mechanic. Both of these measures indicate that labor utilization could be improved.

The NES maintenance group does not measure **turnaround**, or other measures of service time. All observations indicate that performance in this area would be excellent.

TCI did not find precise data to allow us to measure **repeat service calls.** This measure and other types of service history analysis would help detect parts unreliability and help detect parts warranty claims.

Our review of **preventative versus corrective maintenance** showed that 38% of the work orders generated were for preventative maintenance. TCI would expect to see at least 50% of maintenance effort directed towards the preventative side. As the quality of PM inspections improve, this percent should increase.

Section 1.6, Financial Information lists the costs for the maintenance function. The **cost per vehicle** calculation is shown in the following table. Note that units have been added to the 539 vehicles to give consideration to the other 120 on-board attachments maintained by NES.

Table 1: NES Fleet Management
Cost Per Vehicle Calculations

Budgeted Fleet Costs less fuel	Number of Vehicles and Attachments	Cost Per Unit
$3,033,000	539	$5,627

In our opinion this cost is high. The fleet is relatively stable and conditions of operation are consistent. Over 50% of the equipment is light vehicles and trailers. TCI would set a short-term goal of $4,500, and would expect this cost per unit to continue to drop.

The NES equipment inventory contains 539 items plus the 120 on-board attachments. This inventory is further defined in **Section 1.7, Fleet Assets and Replacement**.

The shop utilizes 18 individuals who perform mechanical functions on a full time basis. The staff also includes four helpers and four working foremen. The helpers spend very little time working directly on vehicles. The working foreman spend 25% of their time working directly on vehicles.

TCI considers the equipment item to mechanic ratio to be an important measure of productivity. Table 2 estimates a target for mechanic staffing at NES. The table yields a target for mechanics of 16. Once NES implements the recommendations of this report, the number of mechanics could be reduced through attrition.

Table 2: NES Fleet Management
NES Mechanic Staffing Estimate

Type of Equipment	Number of Items	Ratio Items to Mechanics	Number of Mechanics Estimated
Light vehicles	260	70 to one	4
Trucks and cranes	152	16 to one	10
Other items	127	75 to one	2
Total	**539**	**33**	**16**

(2) Current Situation: **No Measures of Repeat Service or Service History**

Finding: NES does not measure repeat repairs or review service history by type of repair.

Recommendation: Monitor service history and repeat repairs.

Cost Implications: No cost to implement. Systems are already in place. Savings will be obtained in the future from improved parts usage, reduced downtime, and warranty recovery.

(3) Current Situation: **No Measures of Service Time or Throughput**

Finding: NES does not measure throughput.

Recommendation: Monitor and report shop throughput.

Cost Implications: No cost to implement. Systems are already in place.

(4) Current Situation: **Potential Overstaffing**

Finding: Measures of cost, utilization and vehicles per mechanic indicate that NES Fleet Management is overstaffed.

Recommendation: Freeze all hiring. Evaluate workload of all administrative jobs. Free up shop foremen to spend more time on the garage floor.

Cost Implications: This will reduce cost. Each personnel reduction should save $40,000 per year in salary and benefits. TCI believes that eventual annual savings in the administrative and shop floor areas could be approximately $80,000.

1.4 Information System

Timely and accurate management and maintenance information is an essential ingredient in successful fleet management and maintenance. Today's best fleet management and maintenance information packages provide barcode data entry on a real time basis and allow quick access to both current and historical data that is needed by technicians and management for proper decision-making.

NES is employing the FLEETMAINT software to monitor maintenance and to produce work orders. TCI has worked with this system before and has found it to be a reasonable alternative. The management and staff have done an excellent job of developing reports that augment the reports included in this package.

FLEETMAINT is a server-based system. NES operates most of its software in a mainframe environment. While there are interfaces between the systems, some duplication of data entry is required. This is most true between the parts system and FLEETMAINT. The NES systems groups are working on improving the interface.

As TCI builds the requirements for a Metro-wide system solution, NES needs should be considered so that NES could use the new software package if they choose.

(5) Current Situation: **Systems Interface Improvements**

Finding: Data entry must be duplicated when parts are issued. A systems project is underway to improve this.

Recommendation: Continue efforts to integrate existing systems.

Cost Implications: None.

1.5 Inventory Management

The parts area in NES fleet maintenance is located adjacent to the garage area. The space, lighting, and shelving are appropriate for this parts function.

The NES parts organization that supports Fleet Management is unusual in terms of organization. The parts group serves fleet management but reports to two different organizations – Materials Management and Procurement. Both of these organizations use this parts room as a training ground.

The overall parts operation does not report typical performance measures to Fleet Management. Some of the measures calculated by TCI look favorable. For example, the inventory averages $135,000, and consists of 950 items. This compares favorably to parts purchases of $706,000, and indicates that inventory turns five times. TCI also calculated a parts fill rate, based on the information available. The fill rate was 80%, indicating that a part was available 80% of the time that a mechanic requested one. This is above average performance considering the mixed fleet.

On the other hand three employees are dedicated to the operation on a full time basis. The mixed reporting relationship creates some inefficiency from a labor standpoint. For example, the buyer located in the parts area only buys seven items per day. The stock keepers process less than three transactions per hour. Given the size and dollar values of the transactions, TCI suggests that these individuals could be given added duties. Greater labor utilization might occur if Fleet Management were to supervise this area.

In addition, this unusual reporting relationship has inherent inefficiencies and an associated lapse of control that defeats the purpose of assigning this work across three functions. Each involved department tends to work separately therefore losing any benefit that could be gained through streamlining the processes of part request, part dispensing, and part repair order posting.

Shop foremen dedicate much time (two-four hours per man per day) opening, posting, and processing repair work orders. Much of this work could be seamlessly incorporated into the parts room operation.

Contracts are often not utilized. In their place the buyer calls three authorized sources for prices. Again, this process may not be effective from a labor utilization standpoint.

(6)	**Current Situation:**	**Parts Operation Inefficient**
	Finding:	The current method of operating, while strong in some areas, is not efficient in terms of labor utilization.
	Recommendation:	Review the process. Redesign the reporting relationships so that work can be shared. Consider some type of matrix organization if necessary.
	Cost Implications:	The opportunity exists to save at least ½ of a full time equivalent position.

NES maintains their own fuel network, providing fuel at all three centers. Because of their responsibilities as a power supplier, they are implementing the use of bio-diesel and ethanol as required by the federal government.

NES is in the process of installing the Petro-Vend system that automatically captures vehicle number and mileage. According to users, this has made the re-fueling process faster.

When salvaging vehicles and parts, the NES participates in the Tennessee Valley Authority (TVA) auction. The new on line salvage process used by Metro may provide a faster turnaround.

(7)	**Current Situation:**	**Use of TVA Salvage Process**
	Finding:	NES is currently using the TVA auction.
	Recommendation:	Investigate the Metro on line surplus property auction process. Consider moving the light equipment to this option as a starting point.
	Cost Implications:	This should improve cash flow and reduce salvage cost.

1.6 Financial Information

For the fiscal year ended June 30, 2001, NES Fleet Management had actual expenses of $3,033,000. This does not include $559,000 spent for fuel, and capital spending of $3,130,000.

The annual budget includes components as follows:

- Labor Related Expenditures $1,510,000
- Wrecker Service 15,000
- Outside Repair 758,000
- Automotive Parts.....706,000
- Other 44,000

One significant impact on the last fiscal year's expense was a sharp increase in fuel costs. Annual fuel costs rose from $380,000 to $560,000, because of price increases.

1.7 Fleet Assets and Replacement

TCI reviewed the equipment inventory. Table three shows the age of the fleet:

Table 3: NES Equipment Aging

Type of Equipment	Number of Items	Median Age
Light vehicles	260	1997 (4)
Trucks and cranes	152	1995 (6)
Other items	127	1996 (5)
Total	**539**	

NES management has done an excellent job in fully utilizing their fleet. The very low downtime percent previously mentioned verifies this.

The practice of maintaining a manual log of unused equipment has been useful in keeping the fleet at an efficient level, and the timely preventative maintenance practices help keep the fleet operating.

NES is also to be commended for their continual evaluation of replacement thresholds. They continually try different approaches to replacement, based on actual repair experience.

1.8 Maintenance Operations

Management and supervision of this fleet are cognizant of accepted modern maintenance practices and procedures. Supervision demonstrated a hands on approach and also immediately addressed identified exceptions. Our recommendations and suggestions were properly discussed, challenged, and appreciated.

Supervision had not audited completed repairs frequently enough to hold mechanics accountable to the highest quality workmanship. Our mechanical audit results **surprised** supervision and management, but they initiated a series of **positive** action steps. TCI inspected 21 vehicles in conjunction with the shop supervisors. On the 21 vehicles, we observed 5 safety defects and 49 operating defects.

Preventative Maintenance

Preventative maintenance schedules are well developed and in compliance. Preventative maintenance formats are custom designed for each vehicle type, and these formats are generally followed. Preventative maintenance quality and documentation are not good for all mechanics. TCI found too many inconsistencies between PM sheet documentation and actual vehicle audits.

Essential PM checkpoints have been ignored resulting in excessive road calls, jump-starts, and cost. Supervision held immediate mechanic training and instruction meetings with all mechanics as a result of these findings. Our sense of the situation was that those meetings were successful and timely. We firmly recommend that supervision schedule several preventative maintenance inspection audits per week to ensure quality compliance.

Vehicle Condition

Vehicles maintained by each of the three garages were audited for safety, repair quality, and readiness. We identified many exceptions that should have been corrected on past inspections or recent driver pre-trip or post-trip inspections. Battery terminals are not properly serviced, we found oil leaks, drive belts are not changed timely and small repairs are allowed to become larger. TCI found one vehicle with a defective and leaking air brake hose. One vehicle was even shorting out, causing sparks to fly across a garage floor covered with oil and other fluid spills.

The situation can be quickly improved by combining mechanic accountability and driver training in recognizing and reporting defects. Several vehicles are dispatched with visible accident damage. We recommend that all accident repairs be completed prior to dispatch whenever possible. Detailed lists of vehicle defects were left with management, and the appended photographs illustrate examples of vehicle condition.

Replacement Parts and Supplies

TCI learned that replacement parts quality was sometimes poor. We reviewed examples of successive repeat repairs due to premature parts failure. Repeat repairs are costly and severely interrupt field operations. Repeat labor costs are not recovered from the poor quality parts suppliers. We could not ascertain whether warranties were honored for actual parts cost.

Further questioning revealed that fleet management had not taken all necessary steps to remove various under performing vendors from the approved lists due to the paperwork involved. This is a result of the previously mentioned problem with the parts function organization.

The use of original (OEM) replacement parts would provide greater vehicle reliability. In the long run, costs would also be decreased. Parts purchasing must reflect the total costs of parts life and down time.

The nature and mission of the NES fleet is such that only the highest quality repair parts should be used. Anything less compromises the vehicle and brings associated safety and productivity concerns into the fleet operation.

We were advised that component outside repair costs are averaged. For example, if three radiators are repaired at an outside shop the total invoice is divided equally among the radiators regardless of each amount. This practice leads to inaccurate unit cost reporting. We also learned that vehicle batteries were expensed more than once if they were reissued after being recharged.

NES began outsourcing its tire service and replacement programs twenty months ago. An outside vendor is handling all tire problems. The program has provided significant cost reductions. NES estimates of the cost savings are shown below.

Table 4: NES Tire Program
Cost Savings
December 1, 1999-August 8, 2001

Cost Item	Estimated Costs if NES Services Tires	Actual Costs with Tires Outsourced	Savings
Labor	$180,227	$74,442 *	$105,785
Vehicle	28,545	(Vendor supplies vehicle)	28,545
Tire Inventory	18,894	(Tire inventory sold to supplier)	18,894
Total	**$227,666**	**$74,442**	**$153,224**

* Actual vendor bills

The vehicle and inventory costs listed above are one time savings. Related ongoing savings could be determined by calculating the cost of capital savings, rather than just the capital costs of the vehicle and the tire inventory. Labor cost savings are recurring.

(8) Current Situation: **No Checking of PM Inspections**

Finding: The shop supervisor or working foremen do not review inspections on a regular basis. When TCI and the shop supervisor inspected vehicles, a number of defects were detected.

Recommendation: Develop a quality control program to check performance. Ensure that reasonable and valid sampling occurs.

Cost Implications: None.

(9) Current Situation: **Poor Parts Quality and Cost Tracking**

Finding: The emphasis on low bid cost causes NES to purchase poor quality parts. This in turn creates added repair costs and equipment failure. Costs are not correctly tracked and analyzed.

Recommendation: Mark and track replacement parts. Correctly quantify parts costs and labor related to parts replacement. Pursue all warranty opportunities. Delete poor quality vendors and parts from the list of vendors. Purchase OEM parts whenever possible.

Cost Implications: Although not readily quantifiable, this will eventually reduce repair and operating costs.

(10) Current Situation: **Vehicles Operating With Appearance and Repair Defects**

Finding: Vehicles are operating with obvious body damage. Operator inspection and checklist usage is not prevalent.

Recommendation: Stress operator responsibilities with user management. Review operator checklists and training.

Cost Implications: None.

(11) Current Situation: **Inconsistent Repair Quality Process**

Finding: While repair and PM work is generally good, performance is not consistent.

Recommendation: Free up shop foremen to do more inspection. Use the existing checklists for re-training and inspection. Have mechanics review the checklist to insure relevance and understanding. Set mechanic goals for PM quality performance.

Cost Implications: Should reduce costs by eliminating road calls and corrective repairs.

(12) Current Situation: **Working Foremen Too Involved in Entering Data**

Finding: NES working foremen spend several hours each day entering work order data.

Recommendation: The minimum entry requirements would be simply to initiate the work order. Other data could be entered by others on the staff. A project is underway to pass parts information from the materials system to FLEETMAINT. The importance of this improvement needs to be stressed.

Cost Implications: Costs should be reduced. The working foremen are probably the least efficient choice of positions to be entering this data. It is not in their core competency. Parts or administrative personnel should have better skills in data entry and fewer interruptions. If this results in reducing mechanic staff, the results will be significant.

1.9 Mechanic and User Feedback

TCI held discussions with users of NES vehicles and shop mechanics. The users were generally satisfied with the fleet and the service provided by Fleet Management. Users were pleased with the recent outsourcing of tire repair, and believed that this was providing better service.

Since the preventative maintenance inspections generally take place at night, there were no barriers involved in providing vehicles for PM's as mentioned previously. The users also observed that the fueling system had speeded up dispensing significantly.

The user group was generally pleased with the age and condition of the fleet. They understood the reasons for a review of new equipment requests and had no problem with replacement planning. One user did suggest that he would like more input into the specifications for new equipment.

Our discussions with a sub set of the mechanics indicated a generally good level of satisfaction. The mechanics believe that their organization was improving each year. They were pleased by the recent improvements in the facility and in shop tools. Management had recently approved a tool allowance that was appreciated. The biggest complaint was parts management. They felt that the parts room should be under the control of fleet management, and felt that the current arrangement caused too much turnover of personnel.

The mechanics would be interested in ASE certifications, if NES would provide more financial recognition for the certifications. During our audit the garage was undergoing a vendor training session. This was well received by the group, but the mechanics would like more training**.**

(13) Current Situation: **User and Staff Feedback**

Finding: No organized process appeared to be in place to obtain feedback from staff or users.

Recommendation: Develop some type of feedback process. Monthly meetings with staff and quarterly meetings with users are one possible solution. Key staff members should be involved in the user meetings.

Cost Implications: None.

(14) Current Situation: **Training for Mechanics**

Finding: Mechanics appreciate the current training opportunities, but feel that more vendor training should be offered.

Recommendation: Allocate 40 hours per year to mechanic training. Develop a formal plan. Discuss plans with vendors and mechanics.

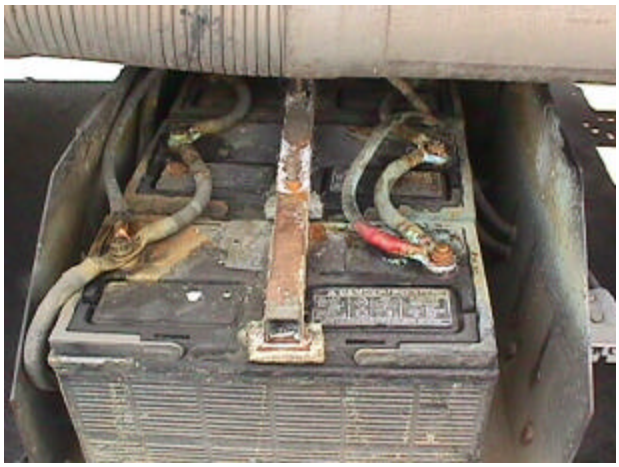
Cost Implications: None.

1.10 Photographs

Nashville Electric Services Photos

This dry-rotted front air brake hose was leaking brake application air. This defect should have been identified during the last PM inspection and during recent driver pre & post trip inspections.

A basic tenant of preventive maintenance is battery, cable, terminal, and bracket cleanliness. The corrosion pictured here decreases component life and leads to costly no start service calls.



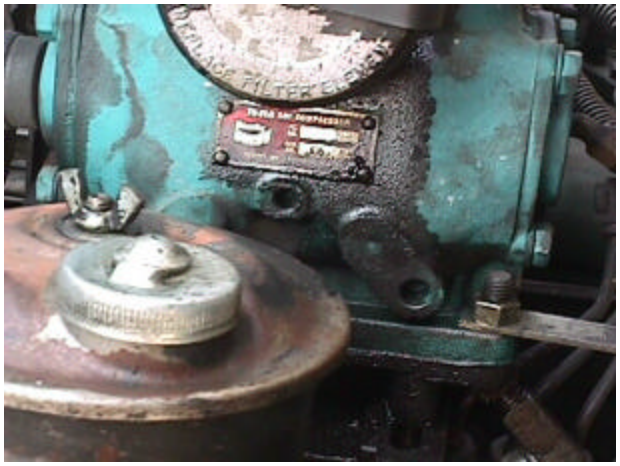
Yet another example of poor battery and starting system care.

Another example of less than acceptable battery system maintenance.

Van and auto battery trays require more thorough service to avoid costly replacement.

Several vehicles have unsightly, un-repaired accident damage. Many vehicles need their wheels painted.

This air compressor is pumping oil. It should be replaced.

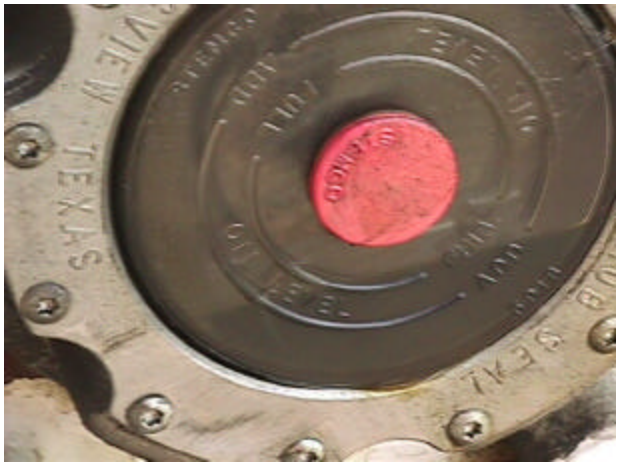


This vehicle has an exhaust leak in the after market flex pipe connection.

This Ford truck will incur hood damage if the defective hood pad is not replaced.

Several vehicles are missing tire valve stem caps.

This over filled hub will eventually leak or cause the wheel seal to fail.



This vehicle has an obvious radiator leak. This should have been caught in previous inspections.

This 277 volt electrical outlet was "hot" and presented a serious safety issue. Facility inspection routines should be developed and implemented to promptly identify and repair safety violations.

The fleet is being equipped with the fuel sensor data collector that downloads vehicle data at each fuel refill.

METROPOLITAN TRANSIT AUTHORITY
FLEET MANAGEMENT

Introduction

The Metropolitan Transit Authority's (MTA) mission is, "to provide safe, reliable, efficient, customer friendly public transit and alternatives to driving alone". To execute this mission, they operate a fleet of approximately 200 transit and maintenance vehicles. This equipment will be detailed later in this report. A staff of 86 maintenance personnel is employed to support MTA operations.

The MTA fleet management and maintenance facility is located adjacent to their headquarters area. MTA is located in a 170,000 square foot building in an industrial area east of downtown Nashville. The annual budget for vehicle maintenance is approximately $4,897,000.

The MTA recently underwent a performance audit that was a helpful starting point for our review. TCI's role was to examine the fleet maintenance issues and opportunities not addressed in the previous audit and to determine if there are other opportunities for operational enhancements.

Executive Summary

In general, we found the MTA fleet maintenance group to be showing mixed results. The last three years have been spent improving a maintenance situation that was acknowledged to be quite poor. It appears from the MTA performance audit report and MTA financial information that $4,000,000 – $6,000,000 was spent on bringing the fleet's mechanical maintenance level to an acceptable level.

Management was responsive to TCI's visit and to any suggestions that we had. The items listed below will be commented on in the body of the report.

More specifically:

- As noted in the MTA performance audit report, the fleet is older than peer transit fleets.
- The fleet has not been replaced at a normal or planned replacement rate.
- Maintenance costs remain at a high level. The pre-audited results for FY 2001 indicate that cost per active transit vehicle (buses, trolleys, and "ACCESSRIDE" vehicles) was $27,482, assuming light vehicle maintenance of $60,000, or $3,000

per vehicle. This compares to the peer group target, as quoted in the MTA performance audit report, of $25,000.

- The organization does almost all of its repair and component rebuild work internally. This is a key issue in the union contract.

- The organization is using the Turley maintenance software package. Utilization of the system is relatively complete. However, the MTA maintenance organization is not using certain key features – notably inventory replenishment, targets and reports.

- Preventative maintenance (PM's), as a percent of labor hours spent, is not accurately captured by the Turley system. A retrieval from the Turley system indicated that less than 9% of labor hours are spent on PM's. This calculation does not reflect an accurate assessment of labor hours.

- Fleet management reporting needs improvement.

- The parts inventory is large. In spite of recent reductions, the inventory remains large and turns less than once per year.

- In spite of the large inventory, parts availability is still a complaint for the mechanics.

- An outdated process hampers the procurement activity. As pointed out in the MTA performance audit report, more use should be made of Metro contracts or contracts established by MTA. A Metro purchasing person is assigned to MTA, but there is not much interface between MTA purchasing and Metro Finance.

- The maintenance facility being used is relatively well equipped. While the building is larger than required, the parking and marshalling areas are tight.

- The maintenance staff was expanded in recent years to reduce the previously mentioned maintenance backlog. TCI believes that staffing should be examined in light of current and future fleet and service requirements.

- The MTA operates with a lean administrative staff. This point was clearly made in the MTA performance audit report and confirmed by TCI. The organization needs to devote more resources to improving the systems and support to maintenance and parts procurement.

- MTA currently uses 93-octane level fuel for gasoline powered vehicles. TCI suggests converting to 87-octane.

- The MTA uses miles per average road call as a key measure. TCI agrees that this is an excellent measure. Road calls create both high costs and poor service. During recent months MTA has experienced a high number of road calls within certain sub fleets. Although the MTA performance audit concluded that road calls were within acceptable industry standards, TCI believes a process review of road call causes and solutions would help reduce this average.

- TCI recommends that the MTA consider taking fuller advantage of Metro-wide programs. Examples would include the on-line surplus property sale operation, the procurement card process, and, in the long term, the fuel purchase program.

Summary of Financial Implications:

Listed below are some of the potential annual savings:

Conversion to 87 grade unleaded gasoline $10,000

Continued reduction of parts inventory $25,000
(potential reduction in capital carrying costs)

Reduction of maintenance labor .....$40,000 per position

Reduction of parts purchased as bus fleet is fully.....$268,000
maintained, standardized and replaced on a consistent basis

1.1 Overview of MTA Fleet Management and Maintenance

As previously mentioned, the MTA fleet management and maintenance group is located in the same building as their headquarters.

The building is a former airframe manufacturing plant. The maintenance operation has access to most of the 170,000 square feet. The location is well configured for the task with suitable egress, ventilation, and overhead space. MTA fleet maintenance operates seven days per week, 24 hours per day. The majority of activity takes place during the normal workday. Maintenance activity is monitored by the Turley system.

The fleet consists of fixed route transit buses, trolleys, "ACCESSRIDE" wheel chair accessible buses, and a light service fleet. The equipment inventory, consisting of approximately 200 vehicles, will be discussed more in **Section 1.7, Fleet Assets and Replacement.**

1.2 Management Issues/Policies and Procedures

MTA fleet management and maintenance has made substantial progress in reducing their maintenance backlog, and upgrading the fleet. In addition, the use of the Turley system provides solid capabilities for managing operations. Considerable effort has been expended in implementing this system.

- However, management improvement opportunities remain. Primarily, management reports are not fully developed or deployed.
- The information system is not fully implemented or utilized.

Below are recommendations relative to management reporting:

(1) Current Situation: **Lack of maintenance reporting**

Finding: The monthly report now in use by maintenance management does not, in our opinion, contain sufficient information. For example, one report lists all parts in inventory item by item. Normally, summary reports, such as turnover, fill rate, and total value, would be used to track inventory.

Recommendation: Using the guidelines below, management should determine the critical areas for measurement. Support should be given to MTA maintenance in developing reports and collecting information. The expectations and reports should be shared across the board, including users, staff and appropriate members of MTA management. Some key measures captured by larger fleet operations include:

Downtime:
The number of vehicles, machinery or Equipment **out of service** at a given point in time divided by the number of vehicles in the fleet, expressed in percentage format. A norm for MTA would be 6-8%.

Utilization (labor):
The amount of direct, billable time recorded by service employees compared to the total amount of time available for work expressed in a percentage format. A norm for MTA would be 75%.

Turn-around Time:
The elapsed time beginning when a vehicle (or equivalent) is delivered to a maintenance facility for repairs or servicing and ending when the repairs or servicing is completed and the user is notified that repairs are completed. A norm for MTA would be 70% within two days.

Repeats/Come-backs:
Instances where repairs to vehicles, machinery or equipment were not made in a satisfactory manner; necessitating a second request for repairs for a similar labor code.

Preventive Maintenance (PM) vs. Corrective Maintenance:
The ratio of job orders for vehicles, machinery or equipment that are written for scheduled maintenance as opposed to job orders that are written for corrective or unscheduled repairs, divided by the total repairs and expressed as a percentage. A norm for MTA would be 50%.

Preventive Maintenance Compliance:
The percentage of on-time arrivals for scheduled preventive maintenance (PM), expressed as within 3 days or 500 miles of the scheduled maintenance date or mileage interval.

Cost Per Piece of Equipment:
Annual department costs divided by the number of vehicles.

Vehicles per Mechanic:
The number of mechanics divided by the total equipment. Norms for MTA would be three fixed route buses per mechanic, 68 light vehicles per mechanic, and 7 ACCESSRIDE or trolleys per mechanic.

In the case of the MTA maintenance effort, we would suggest starting with the measurements that are easy to obtain and understand. Our suggestions would include cost per equipment item, PM compliance, and a status report that shows equipment out of service and turnaround time. TCI also concurs with the MTA performance audit report that average miles per road call is a valuable measure for transit operations.

1.3 Maintenance Metrics

As mentioned in the previous section, a key element in responsive fleet management and maintenance is the use of management reports and metrics to measure performance. Over the years, TCI has developed certain metrics and standards that are useful benchmarks. It is useful to track these measures on a historical basis.

The Facilities and Purchasing Manager is the resident expert on the Turley system. He was very helpful to TCI and provided many reports and retrievals. The information provided allowed us to verify data in the MTA performance audit report, and to make the observations in this section.

The Turley system provided a calculation for labor utilization. For the period of our review, the system was being developed and could not be relied upon to produce accurate information.

During the TCI visit, the Trolley fleet was not fully utilized. At no time were more than ten trolleys in service. This would indicate a trolley fleet size of 12, utilizing a spares ratio of 20% per FTA guidelines. As staffing and productivity levels are analyzed, the fleet size must be considered.

The table below estimates **mechanic staffing** requirements, based on TCI norms and the most effective fleet level. These staffing targets are for personnel who support the fleet, including mechanics and other personnel who maintain the vehicles on a daily basis.

Table 4: MTA Fleet Management Group
Vehicle/Mechanic Ratios

Vehicle Type	Number of Active Vehicles	Units Per Mechanic	Estimated Number of Mechanics and Helpers: Active Fleet
Light	20	68	1
Fixed route buses	128	3	43
ACCESSRIDE and trolleys	48	7	7
Total	**196**	**3.8**	**51**

A review of July work orders indicated that on a typical day the shop completed 65 work orders. This indicates that mechanics are completing slightly more than one work order per day. This is another indicator that efficiency could be improved.

Another important metric measures cost per vehicle. This analyzes the effectiveness of the organization in dollars, rather than manpower.

The **cost per vehicle** calculation poses difficulty. The MTA transit fleet, as previously stated, consists of three types of vehicles and is relatively old, and the reserve fleet receives relatively low usage.

The following table provides an estimated target cost per vehicle:

Table 7: MTA Fleet Management Group
Cost Per Vehicle Target Calculation

Type	Industry Maintenance Cost/Vehicle	Vehicles in Active Use	Targeted Annual Cost-Active Use Vehicles
Fixed Route	$25,000	128	$3,200,000
ACCESSRIDE	10,000	36	360,000
Trolley	10,000	12	120,000
Light Vehicles	1,200	20	24,000
Total		**196**	**$3,704,000**

Recent annual expenditures for maintenance have ranged from $4,900,000 to $5,200,000. The table above shows room for substantial cost reductions. The MTA performance audit

report indicated that these costs should be coming down, given that the previous two years included catching up on a lot of deferred maintenance. In addition, the MTA performance audit identified extremely high material expenses (252.8% of peer average) per vehicle.

As noted in the MTA performance audit, the metrics mentioned above all indicate an opportunity for cost and labor reductions. Because we were not able to assess the actual roles of staff assigned to vehicle maintenance in order to determine an accurate count of the number of personnel that would be classified as "mechanics" for federal reporting purposes, we are not making specific recommendations with regard to target staffing levels.

(2) Current Situation: Vehicle Maintenance Staffing

Finding: Both the TCI and MTA performance audit maintenance cost analyses indicate that a reduction in maintenance staffing levels is possible.

Recommendation: Consider staff reductions. Also, target for review all functional areas that will help reduce requirements for staff. Examples are hours and shifts, amount of work sent outside, parts fill rates, reduction in road calls, age and complexity of the fleet, etc.

Cost Implications: Each reduction in maintenance staff should create at least $40,000 in savings per position.

(3) Current Situation: Excess Vehicle Inventory

Finding: The fixed route bus, trolley and light vehicle fleets need a utilization review for downsizing. TCI was given a vehicle inventory, which apparently contained buses in the salvage process.

Recommendation: Reduce and salvage, unless there are plans to expand service in the near future. Follow the FTA guidelines that suggest a maximum reserve fleet of 20%. Work with Metro Finance to utilize the on-line surplus property auction capabilities, and to move vehicles off site when salvaged.

Cost Implications: Cash should be obtained for each item salvaged. Valuable marshalling and parking space will be released.

(4) Current Situation: **Potential Cost Reductions**

Finding: The MTA has invested $4,900,000 to $5,200,000 per year in maintenance expenses in over the last three years. This appropriate expense was dictated by a backlog of maintenance. The fleet is now in better condition, and maintenance budgets and actuals should be reduced.

Recommendation: Set goals over the next three years to reduce spending in both labor and parts. Use the TCI report and the MTA performance audit to set appropriate goals.

Cost Implications: If parts spending alone was reduced to the peer level reported in the performance audit ($8,000 per vehicle) the savings would be $268,000.

TCI used system information to calculate the **work order turnaround time.** The table below summarizes that calculation:

Metropolitan Transit Authority
Work Order Turnaround
May 1-August 6, 2001

	Number of Work Orders	Per Cent
Less than 2 days	3,020	55.5%
2 days and over	2,419	44.5%
Total	5,439	100%

TCI norms suggest that 70% of all work orders should be complete in 2 days (day of receipt plus one day).

The Turley system was also used to calculate the relationship between preventative (PM) and corrective maintenance. When we compared the labor hours spent on these two functions, we found that only 8.8% of the maintenance effort was directed towards preventative action. MTA management points out that their PM and inspection process is closely monitored by the Federal Transit

Administration (FTA) and found to be in full compliance. Furthermore, it was management's position that the system was not tracking all work orders generated by inspections. TCI experience dictates that at least 50% of shop effort should be focused on **preventive maintenance**. The MTA PM program will be further discussed in **Section 1.8, Maintenance Operations.**

1.5 Information System

Timely and accurate management and maintenance information is an essential ingredient in successful fleet management and maintenance. Today's best fleet management and maintenance information packages provide barcode data entry on a real time basis and allow quick access to both current and historical data that is needed by technicians and management for proper decision-making.

MTA is employing the Turley system as their maintenance operating system. TCI has observed this system during other audits. We find it to be satisfactory as a maintenance system.

The MTA is not utilizing all aspects of the system and is still growing in the utilization of the system. We support this ongoing effort, and will comment on specific areas for growth in other sections of this report. MTA management should ensure that resources are devoted to this continued growth.

(5)	**Current Situation:**	**Maintenance System and Reporting Still in Development**
	Finding:	The Turley system needs further deployment and refinement, particularly in the inventory and reporting areas, including accurate tracking of PM labor.
	Recommendation:	MTA management needs to provide the technical resources to implement these improvements.
	Cost Implications:	Minor. This can be done with existing staff.

1.5 Inventory Management

The Facilities and Purchasing Manager supervises the parts function of MTA fleet maintenance. It is located inside the garage area, and occupies several fenced areas and rooms. The parts are stored in well-utilized bins and are appropriately labeled.

The Turley system is used to inventory and charge out parts. In addition, the parts area has started to bar code the various stock locations.

Since receipt of the MTA performance audit report, efforts have been made to consolidate and secure the inventory. Efforts are also under way to reduce inventory and to salvage any obsolete parts. In fact, the inventory has been reduced by $500,000.

Much work in the inventory area remains to be done. The value of inventory is approximately $1,850,000, and includes over 12,000 line items. Purchases for the last fiscal year totaled approximately $1,600,000. The inventory turns **less than once a year.**

While we did not perform a detailed study, TCI attributes the high inventory level to obsolete parts, the number of different bus models in the fleet, the lack of proper reorder points within the Turley system, and the lack of aggressive targets. In addition, there is no detailed management reporting that measures inventory management performance progress.

TCI consultants spoke with several mechanics during our audit. One of their complaints was the lack of parts. So, we find clear and compelling symptoms – slow turning inventory, complaints about fill rates, and a lack of detailed reporting.

TCI also reviewed the procurement area. We found this to be cumbersome. We agree with the MTA performance audit report and its recommendations relative to purchasing. TCI observed the purchasing agent securing quotes on many items that should have been bought on contract. Use of contracts and purchase cards would simplify the process tremendously. Turnaround time on parts would be much faster.

TCI agrees with the decision to defer implementing the MTA performance audit recommendation that parts be outsourced.

The MTA is purchasing 93-octane non-leaded gasoline. This is not needed for the vehicles in their fleet.

TCI reviewed recent inventory reports, as well as the results of the recent physical inventory. The reports form the basis for solid inventory management, and the post-audit inventory adjustments were reasonable for the size of the inventory.

(6) Current Situation: **Inventory Too High and Turning Too Slow**

Finding: The inventory is turning less than once per year. Information is not available on fill rate for parts. The Turley system is not fully utilized for inventory control.

Recommendation: Continue to salvage all unneeded or not usable parts. Implement reorder points within the Turley system. Measure fill rate on parts requests. Report information and set targets.

Cost Implications: Reducing the inventory by an additional $500,000 would reduce capital carrying costs by $25,000 per year (assuming a cost of capital of 5%).

(7) Current Situation: **Purchase of 93-Octane Unleaded Fuel**

Finding: 87-octane is sufficient for the fleet.

Recommendation: Convert to the purchase of 87-octane.

Cost Implications: This should save the MTA over $10,000 per year with no impact on performance or repairs.

(8) Current Situation: **Purchasing Process is Cumbersome**

Finding: The purchasing process relies too heavily on purchase orders, obtains too many quotes and takes too long.

Recommendation: Use Metro contracts, develop MTA contracts, and implement purchase cards.

Cost Implications: Although not readily quantifiable, this would improve labor utilization in the parts, procurement and maintenance areas.

1.6 Financial Information

The pre-audited expenses relating to vehicular maintenance for the fiscal year ended June 30, 2001 total $4,897,000. They can be separated into major components as follows:

- Labor Related Expenditures.....$3,106,000
- Tires $52,000
- Outside Repair.....$40,000
- Automotive Parts.....$1,624,000
- Shop Supplies.....$75,000

Some costs normally seen in a fleet maintenance budget are not included in the MTA budget. Most noticeably, building and utility costs are not included.

1.7 Fleet Assets and Replacement

As mentioned TCI reviewed the equipment inventory information contained in the MTA performance audit report, as well as MTA fixed asset and maintenance records. Table one shows the age and mix of the fleet:

Table 1: MTA Equipment Aging

	Equipment Units	Median Age
Fixed Route Buses	148	1997
ACCESSRIDE	36	1995
Trolleys	16	1988
Light Vehicles	20	1991
Total	**220**	

As pointed out by the MTA performance audit report, the MTA is in the process of updating the ACCESSRIDE fleet. In fact, seventeen new vehicles have recently been placed in service.

The fixed route fleet has a bi-modal distribution. While the median age is 1997, a detailed review of the inventory indicates that there are no buses in the fleet from the model years 1992-95. Over 50% of the fleet is model year 1991 or older. TCI supports MTA management in their efforts to modernize and standardize the fleet.

The light vehicle fleet is quite old. A review of this fleet might indicate needs for salvage or replacement. Additionally, based on TCI's current observations over a ten-day period, the trolley fleet rarely uses more than ten trolleys at the peak. MTA management is reviewing trolley usage and the size of the fleet for proper utilization.

TCI observed that MTA was not utilizing Metro's on-line surplus property sale operation. The Metro system is available on an ongoing basis to process surplus property. This eliminates the need for surplus property to age for months and to remain as assets, while awaiting the next auction.

(9) Current Situation: **Fleet Replenishment**

Finding: Over 50% of the fixed route fleet is relatively old. No detailed replacement plan has been formally adopted yet. The light vehicle fleet **averages** 10 years of age.

Recommendation: Fund capital replacements on an annual basis consistent with industry standards.

Cost Implications: To be developed with a capital replacement plan.

(1) Current Situation: **Delay in Salvage Operations**

Finding: Metro on-line surplus property auction process is not currently in use by MTA.

Recommendation: Utilize the Metro surplus process.

Cost Implications: Although not readily quantifiable, faster sales and less deterioration of equipment between auctions will produce positive financial results.

1.8 Maintenance Operations

Fleet Condition and Reliability

One reliable measure of fleet maintenance readiness is the frequency of breakdowns or service calls. We reviewed the breakdown history and found a large number of breakdowns associated with braking systems. The MTA should continue to track, analyze and reduce road calls.

Each breakdown should be researched as to reason, and action steps should be implemented to address identified problems. Mechanics ***and*** drivers must become more accountable to preventing costly and disruptive breakdowns.

Fleet appearance diminishes as inadequate attention and efforts are directed to minor body touch up and repair. Buses are dispatched with peeled paint, scratches, and unpainted wheels. Painted, ready-to-install wheel and tire combinations should be maintained in inventory. Minor touch up work should be incorporated into the preventative maintenance program. Fuel and wash supervisors should monitor and report new damage daily. Clean, damage-free buses will instill stronger pride in drivers and mechanics, as well as better representing the Transit Authority to Metro customers, visitors and residents.

(2) Current Situation: **Enhance Fleet Appearance**

Finding: Buses are dispatched daily with appearance defects.

Recommendation: Develop a new process and checklist to improve appearance. Set targets to rotate buses out of service and to complete minor appearance repairs. Consider combining this with the scheduled, deep cleaning process. Photographs should be used to establish and communicate minimum appearance standards.

Cost Implications: Some minor costs for supplies will be incurred, but with low labor utilization, no extra labor costs should be incurred.

Maintenance Facility

The maintenance garage space is adequate for the assigned fleet; however, the facility and grounds are not well maintained. Trash is allowed to linger in and near work areas. Walls need cleaning and painting. Old parts and materials are not properly stored. Several work area fans are in use without required belt guards. We recommend that cleaning and reorganizing the garage would have a positive impact on morale and productivity.

(3) Current Situation: **Work Area Fans Without Guards**

Finding: Fans should be guarded.

Recommendation: Put guards in place.

Cost Implications: Minor, less than $1,000.

(4) Current Situation: Garage and Parking Areas Not Cleaned Up

Finding: The garage floor and marshalling areas are not well organized and have too many items sitting around.

Recommendation: Clean up and re-organize on a scheduled basis.

Cost Implications: None.

Replacement and Rebuilt Parts

The parts and supplies acquisition, management, and inventory procedures are not efficient or economical, and do not meet the day-to-day fleet needs. Several issues contribute to the current situation.

Few, if any, annual contracts are currently in use. Filters, belts, and other routine service parts are bid too frequently, resulting in excessive administrative time and effort. Contracts should be established for routine and repeat maintenance parts.

Due to union agreements, the parts room must accept and dispense components rebuilt in house. These parts are without warranties and, in many instances, are much more expensive than exchange programs with reputable outside sources. Also, parts staff must devote time, energy, and space to locate and acquire many small sub-components required for in-house rebuilding rather than simply exchanging complete components. The garage should acquire and use more outside components.

Fleet maintenance software is not utilized to manage order points, automatically reorder, track warranties, or control inventory balances. The TURLEY software is in place, but is not fully utilized in a comprehensive, well-designed and user-friendly parts management system that is fully integrated with the repair order process and with management reporting. Parts personnel should be retrained with the software and given a schedule to implement the processes available.

(5) Current Situation: Rebuilding Too Many Components

Finding: Too much labor and inventory is invested in rebuilt components.

Recommendation: Set a target to begin purchasing more components. Additionally, opportunities for performance based outsourcing should be identified and implemented.

Cost Implications: Although not readily quantifiable, this would reduce labor and inventory costs. Purchased component parts would have the added benefit of a warranty.

End of Shift Refueling

The end of shift refueling process is slow, inefficient, and subject to frequent data errors. A manual system of notation is used to record bus fuel and mileage data. Much time is wasted, and a single illegible notation or incorrect keystroke renders reports and analysis useless. MTA management has recently experimented with automating entry of fuel dispensed. Unfortunately, the trial did not work.

At the time of our site visit one of two fuel dispensers was discharging less than nine gallons of fuel per minute and was causing a considerable backup in the fuel lane. This problem had existed for several days but was not resolved.

Buses are cleaned nightly and deep cleaned every 35 days. The schedule is consistent with typical practice and seems reasonable.

In the past MTA used upholstered seats, rather than plastic. This has a significant impact on maintenance costs. TCI supports their decision to specify plastic seats on new purchases.

1.10 Photographs

Transit Authority

Battery care and maintenance is not well managed. Road calls and frequent "jump-starts" are a result.

Another example of poor battery maintenance. Costly damage has occurred to the cables, tray, and hold down bracket.

This bus had received a new battery only days prior to this photograph. Note that neither cables or brackets were serviced as part of the replacement.

The shop rebuilds many small components that should be more economically outsourced, exchanged with remanufactured or purchase new. "In-house" rebuilt components do not provide warranty and it is exceedingly difficult to stay current with manufacturers technological updates for older components.

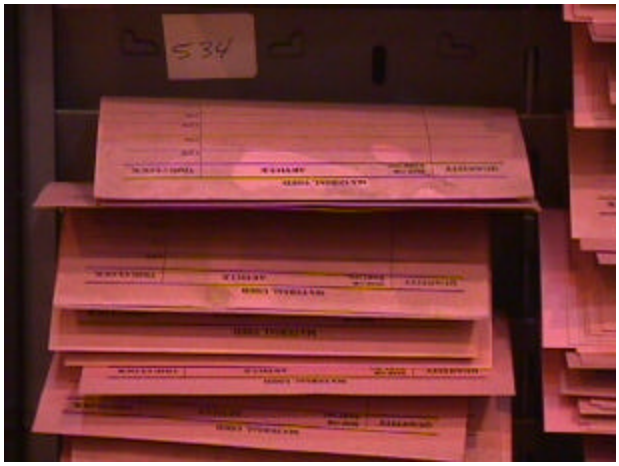
Used parts and supplies should be inventoried, tagged, and secured.

These locally relined brakes were not on exactly the same shoes but appeared as a set. Only exact matches should be used for shoe and friction sets.

The support fleet appearance requires attention. Note the peeled hood paint.

Many busses have wheels in need of paint. A little effort in this area would enhance overall fleet appearance.

Hundreds of open work tickets appear "open" dating back to December 1998. One supervisor stated that these were no longer in use. Another supervisor stated that they were.



The end of shift fueling process is slow and subject to errors as manual systems are. An automated system should be installed.

The large shop is in need of paint and a thorough cleaning. Trash and debris should be removed each day.

The shop has several portable fans that are not properly equipped with belt guards. These should be repaired or removed from service.

METROPOLITAN DEVELOPMENT AND HOUSING AUTHORITY FLEET MANAGEMENT AND MAINTENANCE

Introduction

The Metropolitan Development and Housing Authority (MDHA) fleet management and maintenance program (MDHA fleet management and maintenance) currently employs three full time equivalent employees (FTEs). These individuals maintain 135 equipment units. This equipment will be defined later in this report.

Organizationally, MDHA fleet management and maintenance is part of the Maintenance section of the Operations group. The MDHA fleet management and maintenance facility is located close to the MDHA headquarters area. Space is shared with other maintenance groups. The facility is close to users and housing developments as well.

The MDHA fleet management and maintenance group operates at an annual cost of $239,000. On a fiscal year to date basis, the group is projected to spend less than the budget, which is $402,000.

Executive Summary

In general, we found the MDHA fleet management and maintenance program to be performing well in many ways. The organization was interested in performing at a high level. Management was responsive to TCI's visit and to any suggestions that we had. Corrective action started immediately following our visit, and many items were completed before report issuance.

The items listed below will be detailed in the body of the report.

More specifically:

- Based on our observations, maintenance of the fleet was above average. The mechanics were well trained, certified and motivated to perform good service.
- Conditions of use have created a fleet that is old but relatively low in miles.
- The fleet was not being replaced at a normal or planned replacement rate. MDHA has since put a plan in place.
- Good communications existed between MDHA fleet management and maintenance and users. Generally, users were pleased with the service and

respected the maintenance program. Interviews did indicate, however, that users would appreciate the use of a loaner while their vehicle was being serviced.

- Record keeping was incomplete and undisciplined. No meaningful data is being collected.

- Preventative maintenance (PM) is currently scheduled on an interval of 6 months. TCI suggests that this be done every four months.

- MDHA fleet management and maintenance uses the MDHA work order system to process its work orders. While the system is designed for maintenance of housing units, the system could be better utilized to give more information to support the MDHA fleet management and maintenance program.

- There is a need to enhance written policies and procedures in the maintenance operation.

- Fleet management reporting of any type is not in place.

- TCI normally calculates a cost per vehicle to measure efficiency. The cost per unit for MDHA fleet management and maintenance without the inclusion of grounds equipment is $3,144. TCI would normally expect to see a cost per piece of equipment of approximately $3,000, which means that MDHA's overall maintenance program is cost effective.

- Staff indicated to us that much of the current parts inventory consists of very slow moving or obsolete items. Parts procurement is now being handled through NAPA. TCI concurs with the decision to reduce inventory and to buy directly against work orders for most parts.

- The current maintenance facility is relatively new and well equipped. TCI has a few suggestions later in this report to effectuate minor enhancements.

- The current budget calls for three mechanics. At present only two are on staff. TCI believes that the operation could function efficiently with the current staff. Outsourcing could be used to handle any unusual peaks or time consuming repairs.

- MDHA currently uses 89-octane level fuel. TCI suggests converting to 87-grade.

- TCI recommends that the MDHA consider taking advantage of certain Metro-wide programs. Examples would include the ongoing, on-line surplus property operation, the purchase card process, and, in the long term, the fuel purchase program.

- MDHA's equipment inventory contains a sewer truck. MDHA should consider removing this from inventory and finding other ways to meet the needs for this equipment.

1.1 Overview of MDHA Fleet Management and Maintenance

As previously mentioned, the MDHA fleet management and maintenance group is located close to their headquarters. This area contains a number of MDHA operations. The maintenance group moved to this site approximately four years ago.

The space used for repair operations consists of 4,500 square feet. The area includes six bays and four overhead doors. MDHA fleet management and maintenance operates five days per week, ending operations at 4:00pm.

The equipment inventory consists of 135 items. Seventy-six of these items are vehicles. The median age for vehicles is 1995. This is quite old for a mixed fleet. The remaining items are primarily grounds equipment, such as riding mowers. The equipment inventory will be discussed more in **Section 1.7, Fleet Assets and Replacement.**

The equipment maintenance shop is currently staffed with two mechanics and a working supervisor. The budget for the current fiscal year calls for an additional mechanic and MDHA management is trying to operate with the existing staff. TCI supports this effort and suggests that out-sourcing be used to handle any peak times or unusual situations.

1.2 Management Issues/Policies and Procedures

TCI found that MDHA fleet management and maintenance keeps their equipment in good working order. In addition, good communications and relationships are maintained with their users.

The staff appears to be well trained and motivated. The shop supervisor is interested in improving operations and reacted promptly to suggestions. However, certain key components of a solid, well-functioning organization are not in place. These components fall in the areas of record keeping, procedures and reporting. These changes and opportunities are detailed below:

- Fleet policy and procedures are not clearly and consistently documented.

- Management reports are not fully developed or deployed.
- The information system is incomplete and inaccurate.
- Metrics are not routinely employed.
- Work order accuracy and filing is not a high priority.

Below are some recommendations that we will make relative to management issues.

(1) Current Situation: **Absence of written procedures**

Finding: There is a lack of consistent and complete written policies and procedures.

Recommendation: Identify the critical areas where procedures are required. Obtain administrative support to help articulate and then write the procedures with input from key staff. Develop a simple book of procedures so that the information is kept in one place and available for all employees.

Cost Implications: None. Existing staff should be able to document policies and procedures.

(2) Current Situation: **Lack of maintenance reporting**

Finding: Little MDHA fleet management and maintenance reporting exists.

Recommendation: Using the below, management should determine the critical areas for measurement. Support should be given to MDHA maintenance in developing reports and collecting information. The expectations and reports should be shared across the board, including users, staff and appropriate members of MDHA management. Some key measures captured by larger fleet operations include:

Downtime:

The number of vehicles, machinery or Equipment **out of service** at a given point in time divided by the number of vehicles in the fleet, expressed in percentage format. A norm for MDHA would be 6-8%.

Utilization (labor):
The amount of direct, billable time recorded by service employees compared to the total amount of time available for work expressed in a percentage format. A norm for MDHA would be 75%

Turn-around Time:
The elapsed time beginning when a vehicle (or equivalent) is delivered to a maintenance facility for repairs or servicing and ending when the repairs or servicing is completed and the user is notified that repairs are completed (typically expressed as <8 hours; > 24 hours; 24 to 48 hours; and > 48 hours). A norm would be 90% in 48 hours or less.

Repeats/Come-backs:
Instances where repairs to vehicles, machinery or equipment were not made in a satisfactory manner, necessitating a second request for repairs for a similar labor code.

Preventive Maintenance (PM) vs. Corrective Maintenance:
The ratio of job orders for vehicles, machinery or Equipment that are written for scheduled maintenance as opposed to job orders that are written for corrective or unscheduled repairs, divided by the total repairs and expressed as a percentage. Well run garages have PM ratios that exceed 50%.

Preventive Maintenance Compliance:
The percentage of on-time arrivals for scheduled preventive maintenance (PM), expressed as within 3 days or 500 miles of the scheduled maintenance date or mileage interval.

Cost Per Piece of Equipment:
Annual department costs divided by the number of vehicles. A norm for MDHA would be $3,000.

Vehicles per Mechanic:
Total equipment should be divided by the number of mechanics. A norm for MDHA would be 70 to 1.

In the case of the MDHA maintenance effort, we would suggest starting with the measurements that are easy to obtain and understand. Our suggestions would include cost per equipment item, PM compliance, and a status report that shows equipment out of service and turnaround time.

1.3 Maintenance Metrics

As mentioned in the previous section, a key element in responsive fleet management and maintenance is the use of management reports and metrics to measure performance. Over the years, TCI has developed certain metrics and standards that are useful benchmarks. It is useful to track these measures on a historical basis.

Because of lack of accurate information and history and the lack of any reporting within the organization, TCI can only provide very limited feedback on metrics.

The MDHA Equipment inventory contains 135 items. This list is further defined in **Section 1.7, Fleet Assets and Replacement**. The following table uses that equipment count to estimate **mechanic staffing** requirements:

Table 1: MDHA Fleet Management and Maintenance Vehicle/Mechanic Ratios

Vehicle Type	# of Vehicles	Units Per Mechanic	Required Number of Mechanics
Vehicles	76	50	1.5
Grounds Equipment	59	90	.7
Total	**135**		**2.2**

Since the shop is staffed by two mechanics, plus a working supervisor, TCI finds that the current budget contains enough resources to properly maintain the existing fleet. Peak periods and unusual requirements can be handled by outsourcing.

The **cost per vehicle** calculation poses difficulty, since the MDHA fleet contains both vehicles and grounds equipment. Accordingly, TCI has calculated a range of results, shown on the table below:

Table 2: MDHA Fleet Management and Maintenance Cost Per Vehicle Calculations

Category	Budgeted Amount	Actual Amount
Fleet Costs Less Fuel	$350,000	$239,000
Number of Vehicles	76	76
Cost Per Unit, Vehicles Only	$4,600	$3,144
Total of Vehicles and Grounds Equipment	135	135
Cost per Unit for both Vehicles and Grounds Equipment	$2,600	$1,770

In our opinion this range is reasonable from a cost standpoint.

Again, because of the lack of available data, we could not calculate any other metrics.

As previously recommended, TCI strongly recommends that MDHA should begin recording and tracking report data.

1.4 Information System

Timely and accurate management and maintenance information is an essential ingredient in successful fleet management and maintenance. Today's best fleet management and maintenance information packages provide barcode data entry on a real time basis and allow quick access to both current and historical data that is needed by technicians and management for proper decision-making.

MDHA is employing the system used to process tenant repair requests to track fleet maintenance activity. This makes some sense in the current environment. However, much work needs to be done to make the information useful.

For example, work orders are not fully or correctly filled out, information is not processed in a timely fashion, and there are no procedures in place to insure consistency. In addition, no apparent thought has been given as to how the data should be entered to allow MDHA fleet management to capture and report meaningful information.

As TCI builds the requirements for a Metro-wide system solution, MDHA needs will be considered.

(3) Current Situation: **Work Order Data Not Captured and Reported**

Finding: While some data is being captured, no system approach is in place to allow consistent capture and reporting.

Recommendation: Assign resources to define data needs and reports. Document a process that will allow management to track progress in the maintenance area. Consider using the Metro-wide fleet management system once it is implemented.

Cost Implications: None. Resources exist within the organization to accomplish this.

1.5 Inventory Management

The parts area in MDHA fleet maintenance is located adjacent to the garage area. Parts are stored on two levels and the square footage totals 900. The space is appropriate for a small parts area.

The parts inventory contains many obsolete items. With a small staff and no dedicated parts person, a parts inventory and ordering process was deemed to be impractical. The staff has converted to a just in time system supported by NAPA.

1.6 Financial Information

The annual budget can be separated into major components as follows:

- Labor Related Expenditures $106,000
- Fuel.....52,000
- Outside Repair.....33,000
- Automotive Parts.....100,000

The above represents estimated actual final expenses. As previously mentioned, MDHA fleet maintenance expects to have a positive budget variance.

Some costs normally seen in a fleet maintenance budget are not included in the MDHA budget. Some administrative costs are included in other areas of the Operations Department budget. In addition, building and utility costs are not included.

1.7 Fleet Assets and Replacement

TCI reviewed the equipment inventory. Table 3 shows the age of the fleet:

Table 3: MDHA
Equipment Aging

	Equipment Units	Median Age
Grounds Equipment	59	1998
Vehicles	76	1995

The median age for vehicles was 1995. This fleet is older than expected when compared to normal standards. The capital dollars allocated for vehicles over the last several years has averaged $120,000. TCI is concerned that there is no fleet replacement plan in evidence. For example, if we expect the fleet to be replaced on a seven-year cycle, the median age would be 3.5 years not 6 years. There apparently is very stringent control over replacement vehicles. A good replacement plan will provide guidelines for both age and mileage

MDHA's equipment inventory contains a sewer truck that is seldom used.

(4) Current Situation: **Specialty Trucks**

Finding: The fleet contains an under utilized, sewer truck. Repair costs are high, since operators do not use the equipment on a regular basis, and since the vehicles sit idle for days at a time.

Recommendation: MDHA should consider finding other ways to meet the needs for this type of equipment. Sub-contracting, renting, or borrowing equipment from other Metro agencies would be cost effective alternatives.

Cost Implications: A change in policy would free up capital dollars and reduce repair costs.

(5) Current Situation: **Fleet Replenishment**

Finding: The fleet is relatively old. No replacement plan is in place.

Recommendation: Fund capital replacements on an annual basis. Appropriate enough funds to replace the equipment over its useful life. Develop an industry standard replacement plan as a guideline. For most vehicles we would recommend 7 years or 100,000 miles which ever comes first.

Cost Implications: Not determinable until a replacement plan is in place.

1.8 Maintenance Operations

As mentioned, one lead mechanic/ supervisor and two mechanics staff the shop. The lead working mechanic demonstrates adequate knowledge, strives to maintain a clean productive shop, and is well respected by the mechanics.

The lead working mechanic lacks training on the use of computers. PM inspection schedules, parts inventories, and work orders are not computerized partly as a result of this lack of computer training. TCI implemented a simple spreadsheet solution to assist in PM inspection scheduling.

The lead working mechanic **immediately** addressed all exceptions and recommendations resulting from our brief maintenance review.

TCI spent "on the job" time observing each mechanic in their daily routine. Each is exceptionally knowledgeable and demonstrates pride in work quality and productivity.

The mechanics coordinate daily workload requirements well and complement each other's efforts. Given the fleet size and relatively thin ratios, each mechanic must remain productive to prevent backlogs of repair work.

Maintenance repairs are completed with strong emphasis on quality and prevention. This small shop deserves recognition for achieving high throughput and presenting a strong work ethic. Overall shop performance ranks high.

Shop administrative procedures lack accuracy, discipline, and accountability. On the other hand, while much shop work is completed, the repair order documentation process fails to capture that effort. Relatively little mower and equipment repair is recorded at all. We recommend that all repairs should be properly documented as completed. The lead working mechanic should compare each days repair order totals to paid hours to ensure accuracy. As mentioned elsewhere in this report, there are opportunities to improve the paper trail and systems.

Replacement parts are expensed; "just in time" parts delivery is utilized via the local NAPA parts distributor. TCI understands the rationale and value for this "just in time" service. While NAPA parts are competitive, we recommend that original manufacturers' replacement parts should be compared in pricing, warranty, and service life. During our visit, we saw evidence of failed warranty parts not being returned for credit.

MDHA currently uses 89-octane level fuel. With modern engines, 89-octane is not needed. Removed vehicle tires were stacked along the fence line outside the shop. Removed tires should be stored inside till retrieved by the scrap tire pick up service. When left outside, they collect water that becomes a prime breeding ground for disease spreading mosquitoes.

Mud flaps on the large sewer vacuum vehicle display the NAPA vendor logo. Reversal of the flaps would avoid advertising vendor products on government vehicles.

The fuel tanks are placed in a location that creates poor traffic flow. Fuel tank venting for the under ground storage tanks is close to the overhead shop doors. Our concern is that gasoline vapors spread into the garage roof area and may be ignited by the overhead fuel fired heaters.

TCI observed three problems with the building. First, there is only one drive through bay. This causes problems in moving and marshalling vehicles for repair. Second, the wash area was not properly completed, limiting its use. Third, a temporary storage building has been placed behind the garage. This complicates access to the garage and limits turning radii. In our wrap up discussion, management assured us that the temporary storage building would be moved shortly.

Preventative maintenance (PM's) is currently scheduled on an interval of 6 months. Vehicle maintenance could be improved by performing this inspection every four months.

(6) **Current Situation:** **Failure to Complete Work Orders for all Repairs**

Finding: Work orders are not being completed on all repairs, especially small equipment.

Recommendation: Fully complete work orders on all repairs.

Cost Implications: None.

(7) **Current Situation:** **Lack of Computer Expertise**

Finding: Lack of computer training hinders the capture of work order information and the development of reports.

Recommendation: Provide a series of computer orientation, Word, and Excel classes.

Cost Implications: One or two day classes on Word and Excel are approximately $75 to $130 per person.

(8) Current Situation: **Retention of Old Tires**

Finding: TCI observed old tires stored outside the garage. This is unsightly and a health hazard.

Recommendation: Have old tires removed on a regular basis.

Cost Implications: Minor, less than $1,000 per year.

(9) Current Situation: **Incorrect Placement and Venting of Fuel Tanks**

Finding: The gas fueling tanks are located in an area that creates access problems and allows the tanks to vent in such a way that the fumes can be drawn into the garage. This is a safety hazard, since a gas heater is located nearby.

Recommendation: Consider utilizing another Metro fueling site, implementing a fuel card program, or moving the tanks. If the tanks stay where they are, the vent pipes need to be raised to provide sufficient clearance.

Cost Implications: Unknown – depending on the alternative selected.

(10) Current Situation: **Lack of Drive Through Bays**

Finding: The garage only has one drive through bay, although the original building plans called for two.

Recommendation: Install the second door per the original plan.

Cost Implications: The cost to do this door would be $10,000 - $20,000. This would be offset by operating efficiencies over the life of the garage.

(11) Current Situation: **Limited Wash Area**

Finding: The wash area was not completed in line with the original building design.

Recommendation: Complete the wash area. This will extend the usefulness of the area, especially in the winter months.

Cost Implications: This is budgeted for $10,000

(12)	**Current Situation:**	**No Tracking of Parts Under Warranty**
	Finding:	Replacement parts' warranties are not tracked consistently.
	Recommendation:	All replacement batteries, alternators, starters, etc. should be paint pencil marked with warranty expiration dates. This procedure will assist in warranty recovery, as warranty dates will be readily identified for removed parts.
	Cost Implications:	Parts warranty recovery is estimated to be approximately 3 – 4% of the asset value over the life of the asset. The actual savings to MDHA would vary according to the fleet replacement schedule.
(13)	**Current Situation:**	**Purchase of 89-octane Fuel**
	Finding:	87-octane is sufficient for the fleet.
	Recommendation:	Convert to the purchase of 87-octane.
	Cost Implications:	The annual savings would be approximately $1,800.
(14)	**Current Situation:**	**PM Frequency**
	Finding:	PM's are performed every six months.
	Recommendation:	PM's should be scheduled in four-month intervals. This can be accomplished with existing staff, and will provide higher reliability for the MDHA fleet.
	Cost Implications:	An improvement in PM policy of this type should actually reduce maintenance costs over the long run.

1.9 User Feedback

Our consultants talked to users within the MDHA. Generally, comments were favorable as to service performed and as to communications. Typical comments praised the shop supervisor and the mechanics. However, no formal process exists (such as quarterly meetings) to collect user feedback.
The need for loaners was mentioned. In most cases, the housing developments only have one vehicle. When it is in the shop, they sometimes choose to use their own vehicle. TCI asked if it was normal to be reimbursed for mileage, if an employee vehicle was being used. The response implied that some people did not want to bother with reimbursement.

(15)	**Current Situation:**	**User Communication**
	Finding:	There is no scheduled or routine process to obtain user feedback.
	Recommendation:	Develop a process to obtain feedback from key users. Quarterly user meetings are recommended.
	Cost Implications:	None
(16)	**Current Situation:**	**Use of Loaners**
	Finding:	Users are left without a vehicle when one is in the shop. In some cases they use personal vehicles.
	Recommendation:	Increase the loaner fleet using some of the older, high mileage, pick up trucks. If personal vehicles are used, ensure that employees receive mileage reimbursement.
	Cost Implications:	Minor. Vehicles can be obtained by retaining some of the older pickup trucks instead of salvaging them.

1.10 Photographs

Housing Authority

We suggest that non-logo mud flaps should be used rather than advertise for local suppliers.

This is the area that could house the needed industrial pressure washer.

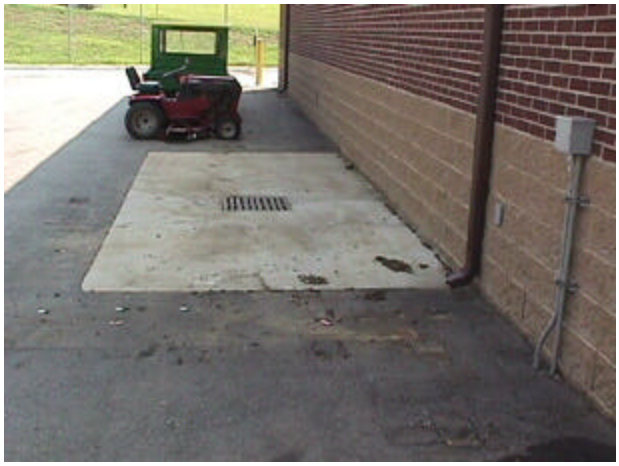
We found a clean air system. This represents an acceptable level of driver pre-trip and PM process.

This damaged cargo door was ordered for replacement.

The fuel tank vents are close to the garage bay door. We are concerned that possible conditions could allow vapors to waft into the garage ceilings where gas fired heaters operate.

Both mechanics are well trained and rightfully proud of their expertise.

An oil water separator was constructed into the buildings plan. This area could make an excellent work bay.



The large storage container hampers vehicle access into and out of the garage.

Tires left outside collect rain water that provides mosquito breeding areas. They also detract from an otherwise orderly garage area.

This vehicle appears too small for the attached load. It may not handle safely in an emergency stop.

Fleet appearance is well maintained. This accident which occurred on a Thursday was estimated for repair on Monday and scheduled for immediate repair.