Mn/DOT / NATSRL Report Template

First: Save this .dot template file as a .doc file with a new name.

[This template is offered as an example. Please refer to the ORS website for the latest guidelines on submitting reports for publication. Directions and information in brackets should be removed before final submission.]

[Front cover: here.
Front cover will be created by Mn/DOT and will contain official Report Number and logos of sponsoring agencies.]

University of Minnesota Duluth

Department of Mechanical and Industrial Engineering
105 Voss Kovach Hall
1305 Ordean Court
Duluth, MN 55812
USA

Technical Report Documentation Page

1. Report No.	2.	3. Recipients Accession No.	
4. Title and Subtitle Benchmarking Fleet Management		5. Report Date July 14, 2003 6.	
7. Author(s) David A. Wyrick and Brandon J. Storhaug		8. Performing Organization Report No. UMDMIE-FR-2003DW01	
9. Performing Organization Name and Address Northland Advanced Transportation Systems Research Laboratories. 291 Marshall W. Alworth Hall University of Minnesota Duluth Duluth, MN 55812		10. Project/Task/Work Unit No. 11. Contract (C) or Grant (G) No.	
12. Sponsoring Organization Name and Address Minnesota Department of Transportation 395 John Ireland Boulevard Mail Stop 330 St. Paul, Minnesota 55155		13. Type of Report and Period Covered Final Report FY 2003 14. Sponsoring Agency Code	
15. Supplementary Notes			

16. Abstract (Limit: 200 words)

Benchmarking is used to assess the best practices in fleet management for MnDOT. Phase I was a regional study that focused on organizational structure, performance measures and targets, policies, and maintenance in a variety of public and private organizations. Phase II was a national assessment focusing on performance measurements that are most useful in state transportation departments. Thirty-five states participated in the Phase II survey and seven benchmarking interviews were conducted (Arizona, Maine, Michigan, New Hampshire, New York, Oregon, Pennsylvania) to assess the number, types, and effectiveness of performance measures used in leading state transportation departments. Analysis of data from both phases identified best practices and gaps that MnDOT should consider. Minnesota is assessed to have one of the better fleet management approaches, but many opportunities for improvement are possible. Recommended performance measures are given for the state, district, and shop levels, with appropriate reporting periods (monthly, quarterly, annually). Recommendations are presented regarding control limits, organizational performance indices, strategic planning, predictive maintenance, purchasing standards, cost/benefit analysis, fleet asset centralization, internal rental rates, bar coding, asset replacement, pursuing the Malcolm Baldrige National Quality Award, and review committee makeup. Possible future benchmarking work includes costing, utilization, and asset life cycle analysis.

17. Document Analysis/Descriptors		18. Availability Statement	
Fleet Management, Asset Management, Benchmarking, Performance Measures, Performance Metrics, DOTs, Department of Transportation		No restrictions. Document available from: National Technical Information Services, Springfield, Virginia 22161	
19. Security Class (this report) Unclassified	20. Security Class (this page) Unclassified	21. No. of Pages 149	22. Price

UNIVERSITY OF MINNESOTA DULUTH

DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING

105 Voss Kovach Hall 1305 Ordean Court Duluth, MN 55812 USA

Project Report

Benchmarking Fleet Management

David A. Wyrick, Ph.D., P.E.
Brandon Storhaug, MSEM

Final Research Report for
Northland Advanced Transportation Systems Research Laboratories
and
Minnesota Department of Transportation

Published by the Center for Transportation Studies at the University of Minnesota

July 2003

Acknowledgements

The authors would like to acknowledge the contributions from the members of the MnDOT benchmarking team, Jim Lilly, John Howard, Bob Ellingsworth, Kelvin Smith and John Peters. Without their help this project would not have been as successful as it was. Jim Lilly helped with the overall organization and coordination with people at MnDOT and provided important information about how MnDOT's fleet is operating. John Howard also provided valuable information on MnDOT's fleet operations. Bob Ellingsworth helped obtain needed data on MnDOT's fleet performance. Kelvin Smith helped arrange and lead many of benchmarking interviews for Phase I. Also, John Peters contributed with the benchmarking interviews of Phase I. In addition, Roberta Dwyer helped arrange the MnDOT ITV room for several meetings, which saved us the six hour drive from Duluth to St. Paul. For general questions on procedures, funding requests and project constraints, Carol Wolosz and Jeannie Hartwick with NATSRL at UMD were always helpful and very patient.

Also, without the collaboration and help of the private companies and DOTs, this project wouldn't have been possible. All firms and agencies were very helpful in assisting the benchmarking team with any questions that were asked of them. A special thanks to the fleet managers at Iowa, Arizona, Oregon, New York, New Hampshire, Maine, Michigan and Pennsylvania DOTs, along with Sysco Foods, Minnesota DNR and Xcel Energy for allowing MnDOT to benchmark their operations. Finally, a special thanks to NATSRL for funding this project.

Executive Summary

This research project uses benchmarking to assess the best practices in fleet management which can be adapted for use by the Minnesota Department of Transportation. By adapting best practices, MnDOT can become more efficient and effective with fleet operations, thus allowing it to provide the required services to the State of Minnesota with the best use of taxpayer dollars.

Determining what the best practices are can be identified through the process of benchmarking. Benchmarking is a continuous systematic process for evaluating the products, services, and work processes of organizations that are recognized as representing best practices for the purpose of organizational improvement. In addition, it assists managers in identifying practices that can be adapted to build winning and credible strategies, and complement new initiatives to achieve the highest performance goals—namely, superior performance within fleet management. Fleet management comprises all actions needed to maintain and operate pieces of equipment throughout its life from the beginning stages of equipment acquisition to the final stages of asset disposal. Such areas include maintenance and repair, inventory control, training, and safety issues.

This research was conducted with the close cooperation of University of Minnesota researchers with the Northland Advanced Transportation Systems Research Laboratories in Duluth and with MnDOT personnel from the central maintenance organization and from the districts. Starting with recommended areas for study by MnDOT's senior management team and using quality management tools of cause and effect analysis and quality function deployment, fleet management needs were prioritized within the areas of organizational structure, performance measures and targets, policies, and maintenance.

The first phase of the benchmarking project was completed by developing a survey for attendees of the Midwest Fleet Managers Conference and for selected firms and agencies in the Twin Cities area. Based on the 25 responses to the survey, on-site benchmarking visits were made to MnDOT (internal benchmarking), the Iowa DOT, Minnesota Department of Natural Resources, Sysco Foods, and Xcel Energy. Benchmarking visits were facilitated with an interview guide and were conducted in accordance to the Benchmarking Code of Conduct.

The second phase of the project focused on performance measures used by state transportation departments. A second survey, using the "Best Fleet Management Practices and Performance Measures Manual" with permission, was sent to fleet managers in 48 states; to encourage participation, the fleet managers were personally contacted by telephone (fleet managers in Massachusetts and New Jersey could not be identified or contacted). Completed surveys were received from 35 states. After analysis of the surveys, seven states were personally visited for benchmarking interviews (Arizona, Maine, Michigan, New Hampshire, New York, Oregon, and Pennsylvania).

Results of the first survey indicated 14 fleet management practices that are frequently done in other organizations but are not done by MnDOT; these practices pertain to training, maintenance, scheduling, data tracking, organizational responsibility, and costing. Other organizations have a higher portion of maintenance being scheduled than MnDOT, and maintenance tracking is better at those organizations. Other organizations have more highly developed purchasing standards

and procedures than does MnDOT. Arizona, Pennsylvania, New Hampshire and Michigan DOTs indicated they were working toward the Malcolm Baldrige National Quality Award.

Key findings from the first benchmarking site visits established some best practices for costing, policies, organization, and maintenance. Best cost practices include: hold suborganizations responsible for all avoidable costs, establish a stable funding process for equipment renewal; and let operating organizations benefit from good practices. Best policy practices include: establish internal rental rates; provide external accountability measures; set clear, understandable, and uniform policies, measures, and targets; schedule maintenance work to minimize equipment downtime; and incorporate employee input in setting local policies. Best organizational practices include: centralize fleet purchasing, ownership, and disposal; establish formal policy development and review committee for fleet management; and have a fleet manager in charge of the organization's fleet. Seventeen best fleet maintenance practices were identified in the areas of life cycle management, inventory, information tracking and control, and performance measures.

The second survey returned a wealth of information on performance measures used by transportation departments for managing their fleets. The broad types of measures include cost control and chargeback, fleet replacement, fueling, assignment and fleet size, maintenance and repairs, fleet services delivery, parts inventory control, and motor pool. The measures are sorted by their respected types and are ranked in their frequency of use by the states. This structure helps identify which measures are mostly commonly used. Further, the measures not used by MnDOT are highlighted, which indicates common measures that MnDOT does not employ. For example, of the 32 most common fleet management measures reported in use by the DOTs, MnDOT reported they use 25 of them, but do not measure seven (including number of units to replace in the next year according to established criteria, total actual operating costs vs. budgeted costs, number of units to replace in the next year as a percentage of fleet, and fuel consumption by vehicle, among others). States' use of performance measures varies dramatically, ranging from Arkansas using a low of 22 total measures to Arizona using 130; Minnesota reports using 67.

The benchmarking visits to the state DOTs emphasized the need for good information systems that can easily produce graphical outputs to assist with decision making. Arizona, the best DOT in results, remarks that they run the fleet like a business. Performance metrics have helped DOTs improve processes, improve their fleet life cycles, monitor the conditions of the fleets, focus on personnel and equipment, justify legislative appropriations, reduce operating costs, improve efficiencies, decrease maintenance costs, increase equipment quality, reduce fleet sizes, and improve sharing between districts. Finally, two states, New York and Pennsylvania use an Organizational Performance Index to calculate an overall measure of fleet management performance, which shows the organizations drive towards quality improvement goals via the use of performance measures.

Overall, MnDOT is doing a good job with fleet management and is capitalizing on its opportunities for improvement. Fleet management is an important activity for MnDOT and the ability to be more effective and efficient is enhanced with good performance measures that can be easily used with reliable data. A significant finding was that there is very little literature on

fleet management performance metrics. The surveys proved to be invaluable in filling this void of information. Benchmarking has identified the performance metrics used by other states and can help MnDOT identify which measures to adopt rather than try to develop their own. Purchasing and maintenance are areas that could be more closely monitored with performance measures. The management information system is critical for delivering timely information to decision makers and graphical presentation of data is much more effective than text. Strategic planning, with a time frame of two to ten years, helps avoid managing by crisis. While a decentralized organization can be very flexible, an organizational structure with strong central control would allow MnDOT to be more efficient.

There are 13 specific recommendations resulting from this research.

- Establish measures at the senior (state) level, district level, and shop level (24 measures are identified with definitions/rationale and the appropriate level and time period for reporting).
- Establish upper control limits and lower control limits for appropriate measures (based on statistical quality control basics).
- Develop a Fleet Management Organizational Performance Index Chart and Shop Level Performance Index Chart. (a suggested OPI using current MnDOT data is presented).
- Develop a strategic plan that includes short term and long term goals.
- Start using MnDOT's fleet management system to predict future breakdowns and failures of equipment based on past history.
- Establish purchasing standards for each class of equipment based on MnDOT's data history.
- Conduct a cost/benefit analysis on the measures proposed and already in place.
- MnDOT needs to consider moving from a decentralized fleet to a centrally managed fleet (centralize fleet purchasing, ownership, and resale).
- If a centrally owned fleet as mentioned in the above recommendation would be adopted, a user fee and/or internal rental rate for each district would need to be established.
- Establish a bar coding system for all parts within MnDOT (for inventory control and tracking).
- Move from an appropriation to a revolving account.
- MnDOT should consider working toward the Malcolm Baldrige National Quality Award (MBNQA).
- Establish a formal fleet management review committee to oversee all fleet decisions.

Future areas for research that have been identified through this project concentrate on life cycle costing issues in fleet management. Potential projects include defining the optimum fleet size, the cost effectiveness of developing and maintaining performance measures, appropriate criteria for fleet replacement decisions, cost comparison of extending the life of old equipment compared to acquiring new equipment, inventory management and bar coding.

TABLE OF CONTENTS

List of Figures

List of Tables

Chapter 1: Introduction

Many states are experiencing budget shortfalls which have stimulated the drive to find new ways to cut costs. The Minnesota Department of Transportation (MnDOT) is no exception and has focused its attention within the area of fleet management. MnDOT currently maintains and operates more than 11,000 pieces of equipment (Leegard, 2001). In 2001, MnDOT had an audit done by Kelly Walker Associates who evaluated their fleet management practices and strongly encouraged them to start monitoring to better manage their fleet's performance. The focus areas MnDOT has selected to monitor include life cycles, scheduled vs. unscheduled repairs, and fleet size.

At the same time, the Northland Advanced Transportation Systems Research Laboratories (NATSRL, pronounced "natural") were being developed at the University of Minnesota Duluth. The mission of NATSRL is to investigate transportation issues of importance to northern climates. It is a cooperative research and educational initiative of the Minnesota Department of Transportation, the University of Minnesota Center for Transportation Studies and its Intelligent Transportation Systems Institute in Minneapolis, and the College of Science and Engineering at the University of Minnesota Duluth. Consequently, through a past project with MnDOT, Dr. Martha Wilson of UMD suggested looking into MnDOT's fleet management practices. Simultaneously the executive management team of MnDOT also directed its fleet manager to benchmark private industry. As a result, UMD and MnDOT developed this project to benchmark fleet management practices and to focus particularly on performance measures to further develop better metrics or tools for managing MnDOT's fleet.

Fleet management is concerned with all aspects of acquisition, disposal, buy/lease, maintenance, training, operation, safety, scheduling, and inventory issues associated with maintaining a fleet of vehicles within an organization. Because it covers such a wide variety of aspects and assets, an important part of the research was to focus on the most important parts for MnDOT.

Benchmarking is a quality management activity that seeks to improve one's own organization. The basic process is to first decide which process needs improvement, than work with other entities who do it better and identify how to adapt it to improve your own organization. The concept of benchmarking has been around for many years and began before such quality initiatives as Total Quality Management, Statistical Quality Control and Quality Function Deployment. However, it wasn't until Xerox started using a process of learning from its Japanese partner in the late 1970s and early 1980s that the modern concept of benchmarking gained prominence in the United States. Benchmarking has flourished in the private sector and is now progressively expanding into the public sector. The benefits of improving processes and improving operations are becoming more readily recognized.

Similar to the development of benchmarking practices, performance measures are becoming a standard practice for many fleet organizations. Managing a fleet can be a difficult task without special tools to help monitor performance. These performance measures are made possible by the development and adoption of computer generated fleet management systems. Performance measures provide business tools to monitor, control and improve every day operations and work towards long term goals. In addition, performance measures provide a basis for internal trend

analysis and for comparison between fleets by tracking and monitoring resources (inputs) and workload statistics (outputs) and measuring the degree of efficiency and effectiveness of the operation (Spectrum Consulting). The efficiency measures are used to compare inputs (costs) with outputs, where effectiveness shows the degree to which organizational goals are being met. With measures in place, benchmarking can then be used to compare performance against leading fleet organizations.

It is the purpose of the research presented in this paper to use benchmarking practices to evaluate other organizations, both public and private, to learn from their best practices, perform a gap analysis and apply them to MnDOT to help improve operations.

Project Objectives

The project began in June of 2002 and ended in June of 2003. Because of the time constraints, it was imperative to develop a timeline with specific objectives. The overall goal of this project is to help the Minnesota Department of Transportation become more effective and efficient through benchmarking. Bergoffen (1992) explains, "Equipping fleet managers with tools for efficiency, productivity, and justification is the final goal for continuous improvement in fleet management within DOTs."

The key areas which MnDOT would focus its first round of benchmarking (Phase I) included cost management, policy management, and organizational structure issues. This phase would primarily focus on the private sector. The second round of benchmarking, Phase II, would identify key performance measures among DOTs that could be used for effective fleet management. Before the benchmarking project could begin, a better understanding of how the benchmarking process works was needed, in addition to what particular process would best fit this project. Finally, the group needed to identify the main benefits of benchmarking. Once the preliminary research was complete, the following areas of Phase I would be addressed.

Cost:

- Fleet age, utilization, downtime, funding for replacement equipment

Policy:

- Uniformity throughout the organization (policies, measures and targets)
- Life cycle costing for purchasing equipment
- Fleet management accountability
- Measures and targets for downtime and scheduled vs. unscheduled activities

Organization:

- Who is responsible for fleet management
- Collaboration between operating organizations

The objectives for Phase II focused on identifying and implementing effective measures of performance:

- Report the benefits of performance measures;
- Identify what types of fleet management performance metrics DOTs are using;
- Identify which DOTs are leaders within fleet management performance measures;

- Develop a framework that DOTs can use for selecting suitable performance measures and setting performance targets for improving operations;
- Determine if MnDOT selected the right measures for managing their fleet as compared to other DOTs; and
- Provide an assessment of and recommendations for performance measures suitable for asset management within MnDOT and other DOTs.

Finally, a secondary or indirect goal was to break down barriers between other state DOTs to improve quality by enhancing collaboration and communication. Improved collaboration among DOTs will benefit all DOTs by improving operations and efficiencies and ultimately will benefit the taxpayers for years to come.

Constraints and Limitations

In the initial stages of the project, UMD's goal was to provide a set of deliverables at the end of the research in June 2003. This, however, was not possible because MnDOT's executive management team wanted initial results before the end of their term in November 2002. Consequently, the project was broken into two phases where the first phase would provide results by November 1, 2002, and the second phase would conclude in June 2003.

In addition, traveling played a critical role in the development of this project. Benchmarking can involve a lot of traveling to other companies and agencies, both in and out of the state. MnDOT, however, is restricted to travel primarily within Minnesota. Consequently, most traveling beyond these constraints would have to involve only the UMD party.

Project Approach

The project used the benchmarking process along with many quality tools such as Cause and Effect Analysis and Quality Function Deployment to prioritize MnDOT needs. In addition, using an exhaustive literature review, surveys and benchmarking interviews would assist in data analysis and gap analysis.

Report Organization

This chapter has briefly summarized why MnDOT has focused its attention within fleet management, along with the project goals and the tools that will be used to analyze the data to meet the project objectives.

Chapter 2 outlines the methodology used in this research. The chapter begins by defining the research procedure of the project which consists of dividing the research into two phases. The chapter further discusses the resources and techniques used for the data collection and data analysis.

In Chapter 3, results from the two surveys and benchmarking site visits are analyzed. MnDOT is compared with those benchmarked both from the surveys and interviews. Best practices are identified in this chapter.

Finally, Chapter 4 summarizes the research and major findings and conclusions derived from the literature review and data analysis. Recommendations for MnDOT are presented based on best

practices observed from the benchmarking study. In addition, future research areas are identified.

Appendices include relevant documentation. Appendix A is the Benchmarking Survey for Phase I. Appendix B is the Interview Guide for Phase I benchmarking visits. Appendix C is the Benchmarking Survey for Phase II. The Interview Guide for Phase II is included in Appendix D. Appendix E summarizes the interview responses from Phase I benchmarking interviews. The DOT interview response summary in Phase II is summarized in Appendix G.

Chapter 2: Methodology

Introduction

In the beginning stages of the project, the constraints and limitations mentioned in Chapter 1 immediately affected the project. The project timeline was shortened and divided. In order to accommodate this change, the project was divided into two phases where Phase I would concentrate more on some general benchmarking objectives predetermined by MnDOT's directive and the second phase would focus more on a specific area, which would be determined at the conclusion of Phase I.

Phase I—Generic Benchmarking

Benchmarking Background

Initially, with both MnDOT and UMD relatively unfamiliar with benchmarking and the benchmarking process, an exhaustive literature search of books, periodicals both scholarly and trade, and online literature was conducted. There are many documented definitions of benchmarking, but Jack Grayson who was the founder of the American Productivity & Quality Center (APQC) best summarizes what benchmarking is:

> Benchmarking is a systematic and disciplined process of examining your own processes to find out who is better or best in your industry, outside your industry, domestic or foreign, and then learning how they do it, adapting it to your organization, implementing it, and doing it continuously. (APQC website, http://www.apqc.org)

Although not mentioned in the above definition, a critical part of benchmarking involves sharing information. As a result, an organization must be willing to share information with the benchmarking partners.

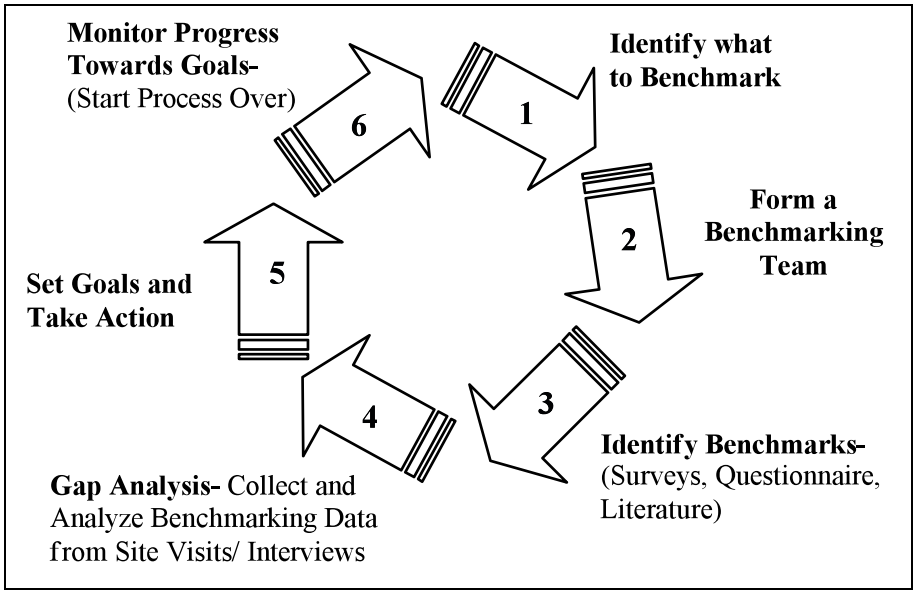
Table 1 briefly identifies some of the more common benefits to benchmarking mentioned in the literature. The table was adapted from Housley (1999) and APQC website.

Table 1. Benefits of Benchmarking

Direct	Indirect
■ Improved quality and products	■ Question prompting and dialogue stimulation
■ More efficient and effective processes	■ Communication improvement
■ It creates a better understanding of your current position (strengths and weaknesses) and overall picture of the org.	■ Team spirit instillation
■ Private sector = improve profits and reduce costs	■ Smarter people
■ Public sector = reduce costs	■ Create a sense of urgency
■ Gain a competitive advantage	■ See "outside the box"
■ Achieve breakthroughs and innovations	■ Overcome complacency or arrogance
■ It develops realistic goals and targets	■ Accelerate and manage change
■ It encourages a striving for excellence and performance improvement organization	■ Better informed and faster decision making
■ It establishes realistic action plans	
■ Understand world-class performance	

With a firm understanding of why benchmarking is done, the next step was to understand how the process works and develop a process that would best work for this project. There are many approaches to benchmarking mentioned in the literature, however, most of the processes carried a general theme. The model shown in Figure 1 was adapted from Seber Logistics Consulting, cited by Petreycik (1993) best describes the benchmarking process for this study. The Benchmarking Code of Conduct, developed by the American Productivity and Quality Council (2002), was also used to ensure efficient, effective and ethical benchmarking.

Figure 1. The Benchmarking Process



Throughout the project, there were many decisions to be made. As a result, a benchmarking team was formed with UMD researchers and key MnDOT employees as shown in Table 2. All decisions during the project would be made using this group and an overall group consensus would be used for making decisions.

Table 2. MnDOT/UMD Benchmarking Discussion Group

MnDOT	UMD
■ Jim Lilly - Facilities and Equipment Engineer ■ John Howard - Equipment Engineer ■ Kelvin Smith - Mechanic Training Coordinator ■ Bob Ellingsworth - Equipment Controller ■ John Peters - Financial Analyst ■ Mike Cirks - Shop Supervisor, Willmar ■ Gary Niemi - Area Maintenance Engineer, Baxter	■ David Wyrick - Professor, Mechanical & Industrial Engineering ■ Brandon Storhaug - Graduate Research Assistant, Engineering Management

The purpose was to meet as a general discussion group to set direction and discuss results, whereas only a select number of these members would actually perform the benchmarking interviews. Many of the members were from different districts and locations around Minnesota, so email was used as the primary means of communication. In addition, meetings often used video conferencing as a communication tool among the various MnDOT offices.

As mentioned earlier, the MnDOT executive management team had four problem areas which they wanted to address through the benchmarking process. These areas were addressed through the following problem statements:

1. Current fleet management organizational structure is ineffective
2. Policies are ineffective for optimizing fleet management and maintenance
3. Measures and targets are ineffective
4. Fleet management and maintenance are ineffective

These issues are complex and cover a fairly broad area; as a result it was important to understand what was causing the problems in these different areas. Consequently, a cause and effect analysis to help prioritize MnDOT's needs was performed.

Cause and Effect Analysis

The Cause and Effect Analysis (CEA) helps to provide a better understanding of what is causing the problems. Figures 2, 3, 4 and 5 address the four areas of concern mentioned earlier. For example, Figure 2 shows potential causes of why the current organizational structure is ineffective. This step was repeated for each of the four focus areas. Performing the CEA not only helps to identify the causes of the problems, it also helps all the participants in the discussion group to gain a better understanding of the internal processes and their relationships to the problems. These common causes became focus areas for the survey and benchmarking interviews. This type of brainstorming session proved to be of great value later in the benchmarking process when the group started to compare MnDOT with the benchmarks.

Figure 2. CEA—Current Fleet Management Organizational Structure Is Ineffective

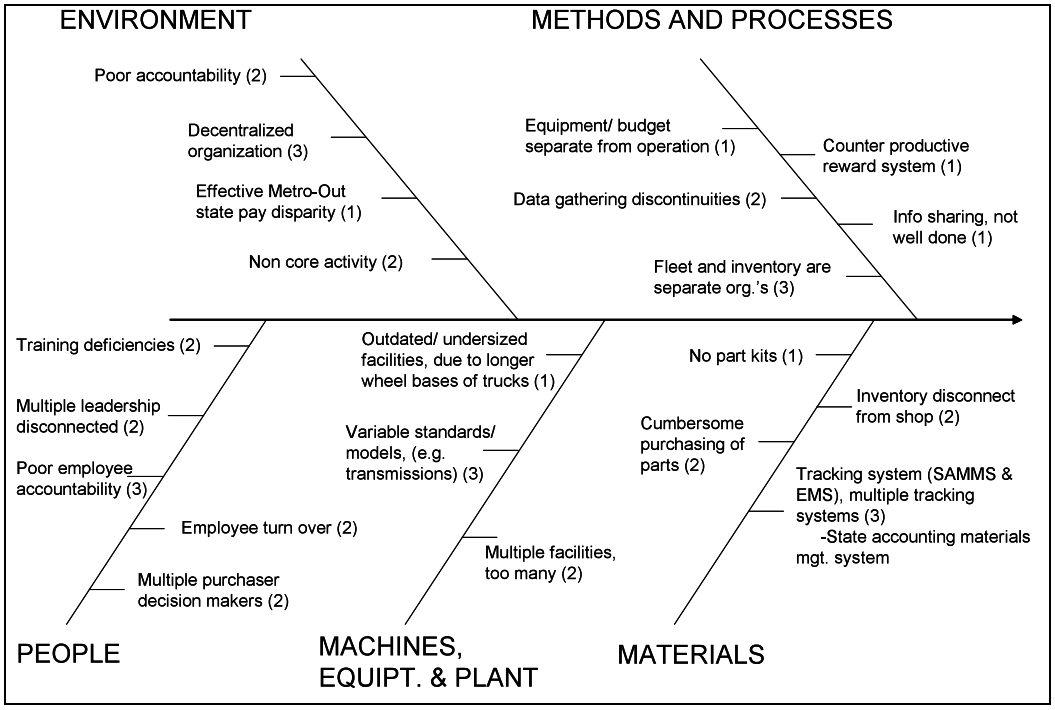


Figure 3. CEA—Measures and Targets Are Ineffective

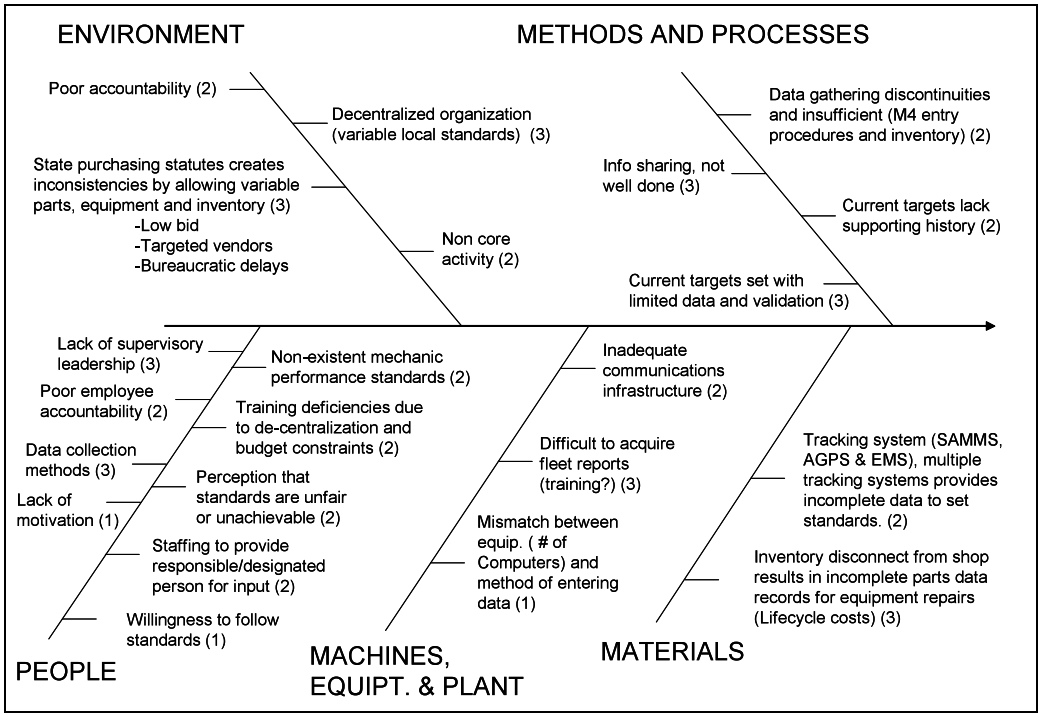


Figure 4. CEA—Policies Are Ineffective for Optimizing Fleet Management and Maintenance

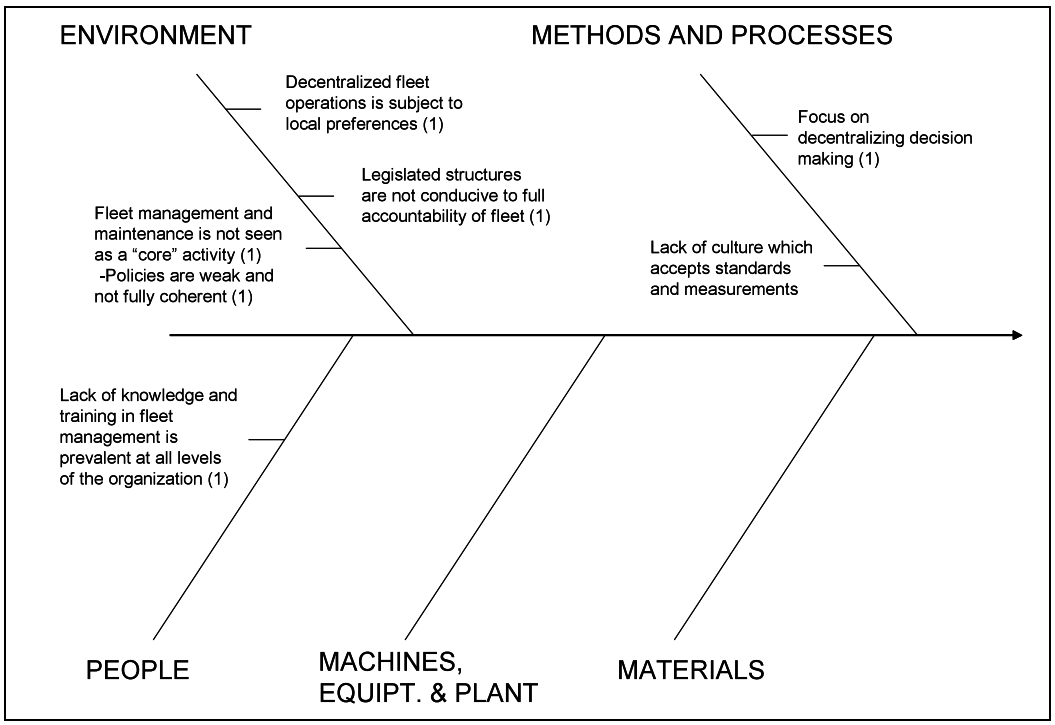
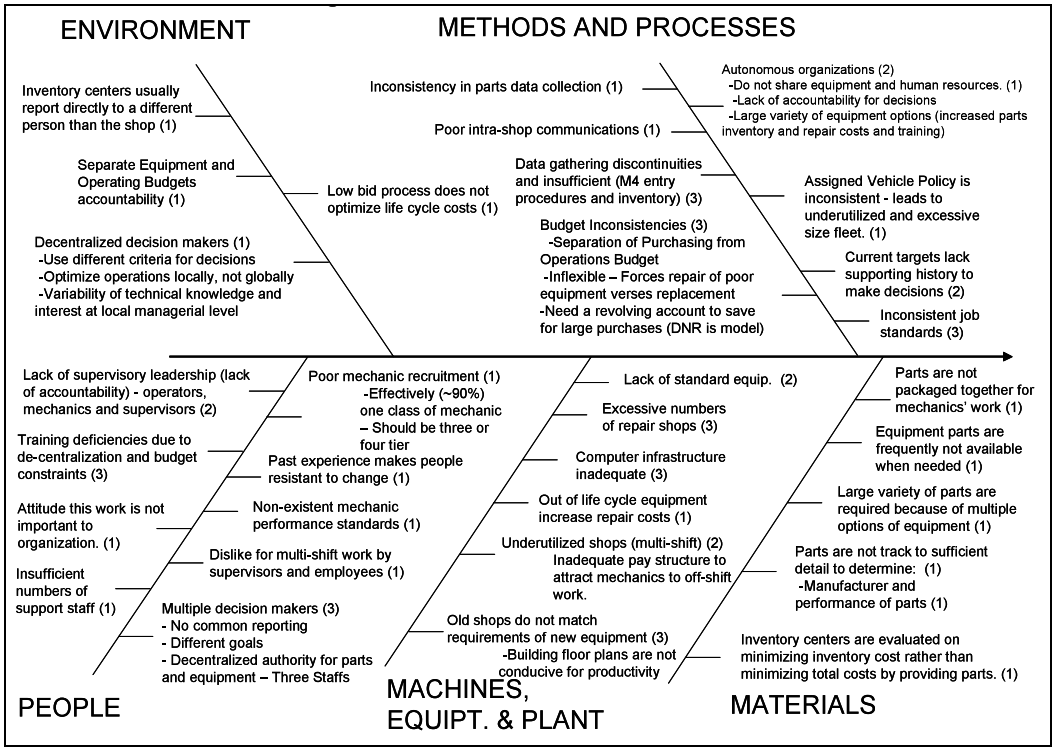


Figure 5. CEA—Fleet Management and Maintenance Are Ineffective



Survey I

As described in the previous paragraph, a survey was developed based on the problem areas and common causes developed from the CEA. The survey consisted of roughly 110 questions and was divided into 10 categories to cover all areas of interest. An example of Survey I is located in Appendix A. The survey was electronically mailed to many of the state DOT fleet managers who attend the Midwest Fleet Manager's Conference, to some city maintenance shops in the Twin Cities area, and to some private local companies. In addition to acquiring relevant information for comparison purposes, the purpose of the survey was to also identify possible partners with whom to benchmark. With a large amount of questions, prioritizing the questions and headings to pinpoint the ones that best answer certain areas of the project goals was an important task. To accomplish this, a QFD analysis was performed.

Quality Function Deployment

Quality Function Deployment (QFD) has typically been used in the industrial sector specifically with companies dealing with manufacturing. There is growing attention on customer satisfaction because of the wide gap between the customer and the manufacturer. According to the QFD Institute web page, QFD links the needs of the customer (end user) with design, development, engineering, manufacturing, and service functions. It helps organizations seek out both spoken and unspoken needs, translate these into actions and designs, and focus various business functions toward achieving this common goal. However, Kauffmann et al. (2002) further

stretched the use of QFD by using this concept to help prioritize courses within their Engineering Management Department to best identify which courses best met the objectives of their department. They had many courses that they wanted to teach, but there is not room for all the courses. As a result, Kauffmann et al. (2002) discussed how QFD was able to prioritize the courses which best met the overall department goals.

Table 3. Direct Impact of Survey Headings on Project Goals (Matrix A)

Scoring Method: 9= strong impact/ relationship 3= medium 1= small 0= no impact	Weight	Facilities	Fleet Maintenance/ Repair Operations Personnel	Mechanic Training	Types of Equip. & Vehicles	Types of Maintenance/ Repairs & Practices	Organizational Structure	Parts Management	Fleet Maintenance & Record Keeping System	Fleet Management
Organizational Structure	0.30	9	9	1	0	0	9	3	9	1
Policies	0.25	0	0	3	0	3	1	0	0	3
Measures & Targets	0.25	0	0	0	0	3	0	0	3	1
FM & Maintenance	0.20	3	0	1	9	9	1	3	9	1

This same approach would be used in this research study to prioritize which survey headings best met each of the project objectives. Table 3 examines the relationship between the survey headings and the project goals, which is also known as matrix A. Each of the survey headings was rated according to their relationship or effect on the project goals. For example, the headings titled "Facilities" has a strong relationship with that of the organizational goal, consequently it was given a score of 9. A small relationship or interaction was given a one or a zero. A medium relationship was assigned a 3. Table 3 also assigned a weight for each of the project goals. The management team's main focus was how to improve the organizational structure then in place. As a result, the organizational structure goal was assigned a .30, which was the highest of importance in comparison to the other goals. The rest followed according to their impact or importance to the project.

Table 4 follows a similar format as Table 3, however, the survey headings are interacted between each other. This identifies the relationships, or interactions, between these areas. The scoring method is the same, where 9 requires a strong relationship, 3 a medium relationship, 1 a weak relationship and 0 has no relationship.

Table 4. Initial Interaction Matrix of Survey Headings

Survey Headings	Facilities	Fleet Maintenance/ Repair Operations Personnel	Mechanic Training	Types of Equip. & Vehicles	Types of Maintenance/ Repairs & Practices	Organizational Structure	Parts Management	Fleet Maintenance & Record Keeping System	Fleet Management
Facilities		1	0	0	0	9	3	3	0
Fleet Maintenance/ Repair Operations Personnel			3	0	0	9	3	1	0
Mechanic Training				0	1	0	0	0	0
Types of Equipment and vehicles					3	0	0	0	9
Types of maintenance/repairs and practices						1	0	9	3
Organizational Structure							3	9	1
Parts Management								3	3
Fleet maintenance and record keeping system									3
Fleet Management									

A similar rating scale method as used with the project goals was used. After the initial interaction matrix in Table 4 was created, a final interaction matrix (Matrix B) was created and is shown in Table 5. Matrix B is the interaction between the survey headings. A high positive interaction between two survey headings is assigned a score of 9/(9+3+1)= 9/13= .692. A medium interaction score is .231 and a low interaction is .077. If there is no interaction a zero is applied. This rating system was based on the one used by Kauffmann et al. (2002).

Table 5. Final Interaction Matrix of Survey Headings (Matrix B)

Survey Headings:	Facilities	Fleet Maintenance/ Repair Operations Personnel	Mechanic Training	Types of Equip. & Vehicles	Types of Maintenance/ Repairs & Practices	Organizational Structure	Parts Management	Fleet Maintenance & Record Keeping System	Fleet Management
Facilities	1.000	0.077	0.000	0.000	0.000	0.692	0.231	0.231	0.000
Fleet Maintenance/ Repair Operations Personnel	0.077	1.000	0.231	0.000	0.000	0.692	0.231	0.077	0.000
Mechanic Training	0.000	0.231	1.000	0.000	0.077	0.000	0.000	0.000	0.000
Types of Equipment and vehicles	0.000	0.000	0.000	1.000	0.231	0.000	0.000	0.000	0.692
Types of maintenance/repairs and practices	0.000	0.000	0.077	0.231	1.000	0.077	0.000	0.692	0.231
Organizational Structure	0.692	0.692	0.000	0.000	0.077	1.000	0.231	0.692	0.077
Parts Management	0.231	0.231	0.000	0.000	0.000	0.231	1.000	0.231	0.231
Fleet maintenance and record keeping system	0.231	0.077	0.000	0.000	0.692	0.692	0.231	1.000	0.231
Fleet Management	0.000	0.000	0.000	0.692	0.231	0.077	0.231	0.231	1.000

The matrices shown in Table 3 and 5 can help to answer a variety of questions concerning the benchmarking survey.

1. What is the total impact of the survey headings on the project goals?
2. Which headings are the most relevant to specific goals and the overall project goals?

Crossing Matrix A from Table 3 with Matrix B from Table 5 produces Matrix C, which is shown in Table 6. The last column in Table 6 shows the normalized row totals. The first row titled "organizational structure" indicates that the impact of the survey headings is not proportional to the stated importance of this goal. The organizational structure was weighted at .30 (30 percent) in importance, but received 46.5 percent of the survey's focus. Overall, the Organizational Structure and FM & Maintenance goals were both over the weighted score, whereas, Policies and Measures & Targets were below their weighted mark. This answers the first question of what the total impact of the survey headings is on the project goals.

Table 6. Survey Headings' Impact on Project Goals (Matrix C)

Project Goals	Weight	Facilities	Fleet Maintenance/ Repair Operations Personnel	Mechanic Training	Types of Equip. & Vehicles	Types of Maintenance/ Repairs & Practices	Organizational Structure	Parts Management	Fleet Maintenance & Record Keeping System	Fleet Management	Row Total	Normalized Row Total
Organizational Structure	0.30	18.69	17.54	3.08	0.69	7.23	28.46	11.54	18.92	4.46	111	46.5%
Policies	0.25	0.69	1.38	3.23	2.77	4.00	1.46	0.92	3.46	3.77	22	9.1%
Measures & Targets	0.25	0.69	0.23	0.23	1.38	5.31	2.38	0.92	5.31	2.38	19	7.9%
FM & Maintenance	0.20	6.46	2.54	1.69	11.77	17.69	10.77	6.23	17.54	12.15	87	36.5%
Column Total		26.5	21.7	8.2	16.6	34.2	43.1	19.6	45.2	22.8	238	100.0%

The second question addresses the importance of the headings both to an individual goal and to the overall project, (Kauffmann et al. 2002). Determining which headings are the most important to the goals can be answered by normalizing matrix C shown in Table 7. For example, the survey heading "Facilities" produces 16.9 percent of the impact for addressing the project goal of organizational structure. The most important heading for this goal is the survey heading titled organizational structure with an impact of 25.7 percent.

Table 7. Normalized Impact Values from Matrix C

	Weight	Facilities	Fleet Maintenance/ Repair Operations Personnel	Mechanic Training	Types of Equip. & Vehicles	Types of Maint./ Repairs & Practices	Organizational Structure	Parts Management	Fleet Maintenance & Record Keeping System	Fleet Management
Organizational Structure	0.30	16.9%	15.9%	2.8%	0.6%	6.5%	25.7%	10.4%	17.1%	4.0%
Policies	0.25	3.2%	6.4%	14.9%	12.8%	18.4%	6.7%	4.3%	16.0%	17.4%
Measures & Targets	0.25	3.7%	1.2%	1.2%	7.3%	28.2%	12.7%	4.9%	28.2%	12.7%
FM & Maintenance	0.20	7.4%	2.9%	1.9%	13.6%	20.4%	12.4%	7.2%	20.2%	14.0%
Survey headings importance to project goal		**8.3%**	**7.2%**	**5.3%**	**7.9%**	**17.7%**	**15.0%**	**6.9%**	**20.2%**	**11.5%**

Determining which headings best answer the overall project goals are shown in the last row of Table 7. The most important heading related to the project goals is the heading "Fleet Maintenance and Record Keeping System," whereas the least important heading is "Mechanic Training." Consequently, when evaluating Survey I, the first heading to look at should be Fleet Maintenance and Record Keeping System.

Once the surveys were returned after approximately two weeks, analysis was done and the benchmarking team met to narrow the benchmarks to a few. The number of benchmarks was held to 5-7 organizations. Through data analysis of the survey results and group discussions, which is discussed in greater detail in Chapter 3, the benchmarking team selected benchmarking candidates. Once selected, these organizations were contacted and dates were arranged for site visits.

Interview Guide

Before the site visits could begin, a group of pre-arranged questions needed to be developed for the benchmarking interviews. A brainstorming session of the benchmarking team developed a list of questions they thought would be beneficial for this project. From this, a list of 69 questions were arranged into four categories: organizational structure; policies; measures and targets; and fleet management and maintenance. However, there were too many questions for a two to three hour interview. Consequently, to make the interview more focused, some questions were combined and some were eliminated because they were either similar in nature to other questions or because they were beyond the scope of the direct areas of concern. The final interview guide for Phase I is shown in Appendix B.

Initial Benchmarking Interviews

The benchmarking team that would be present at each interview consisted of:

MnDOT	UMD
■ Jim Lilly	■ Brandon Storhaug
■ John Howard	
■ Kelvin Smith	
■ John Peters	

Interviews consisted of the MnDOT/UMD benchmarking team and a representative(s) of the benchmarked organization. The benchmarks chosen for Phase I represented a mix of the private and public sectors. However, do to MnDOT's travel restrictions the benchmarks were limited to Minnesota and one adjoining state. One of the first interviews was an internal benchmark consisting of an interview from some of the MnDOT districts. The private sector included Sysco Foods and Xcel Energy. The remaining benchmarks included the Iowa DOT and the Minnesota Department of Natural Resources (DNR). Key results of the interview and survey findings will be discussed in greater detail in the Project Results and Discussion section in Chapter 3. Results of Phase I helped shape Phase II's objectives and procedure.

The site visits or interviews were taped for note taking purposes. Some of the interviews were conducted at the MnDOT training center, and others were conducted at the respected interviewee's sites. The structure of the interviews had a designated person in charger of asking questions and keeping the interview moving accordingly to the time allowed. The rest of the benchmarking team was responsibility for taking notes. All members of the benchmarking team were free to ask follow-up questions. Interviews typically lasted three hours. After all the site visits were complete, a spreadsheet was created to compare each of the benchmarks interview responses. The spreadsheet was passed to each of the members of the team in order to make sure no facts were left out from each interview. After all the meetings with the benchmarking partners had concluded, a final meeting was held to review the interview responses and determine the focus for Phase II. The analysis will be discussed in greater detail in Chapter 3 the results section of this document.

Phase II—Functional Benchmarking

Phase II was a functional benchmarking study concentrating primarily on performance measures within DOTs. The same methodology was used for Phase II as for Phase I except without the Cause and Effect Analysis and the QFD analysis. In addition, to avoid the traveling constraints of MnDOT, Brandon Storhaug would be the sole person traveling to each site to lead the benchmarking interviews. The MnDOT people participated in the interviews via telephone or video conference calls while Mr. Storhaug was on site. The benchmarking team for Phase II stayed relatively the same, including:

MnDOT	UMD
■ Jim Lilly	■ Brandon Storhaug
■ John Howard	
■ Kelvin Smith	
■ Bob Ellingsworth	

Survey II

The most critical part of Phase II was developing a survey that could help identify which state DOTs are doing a good job in the area of fleet management and performance measures. Relatively little literature is available that discusses the use of performance metrics by DOTs for fleet management purposes. With little literature available, the survey had to play the largest role in identifying and selecting the benchmarks. Similar to Phase I, the survey was created in Microsoft Word and was of the Yes/No type. A total of 186 measures were listed in this survey which is shown in Appendix C. The list of performance measures used were developed from "Best Fleet Management Practices and Performance Measures Manual" developed by Spectrum Consultants Inc. (2002) and were used under special written permission.

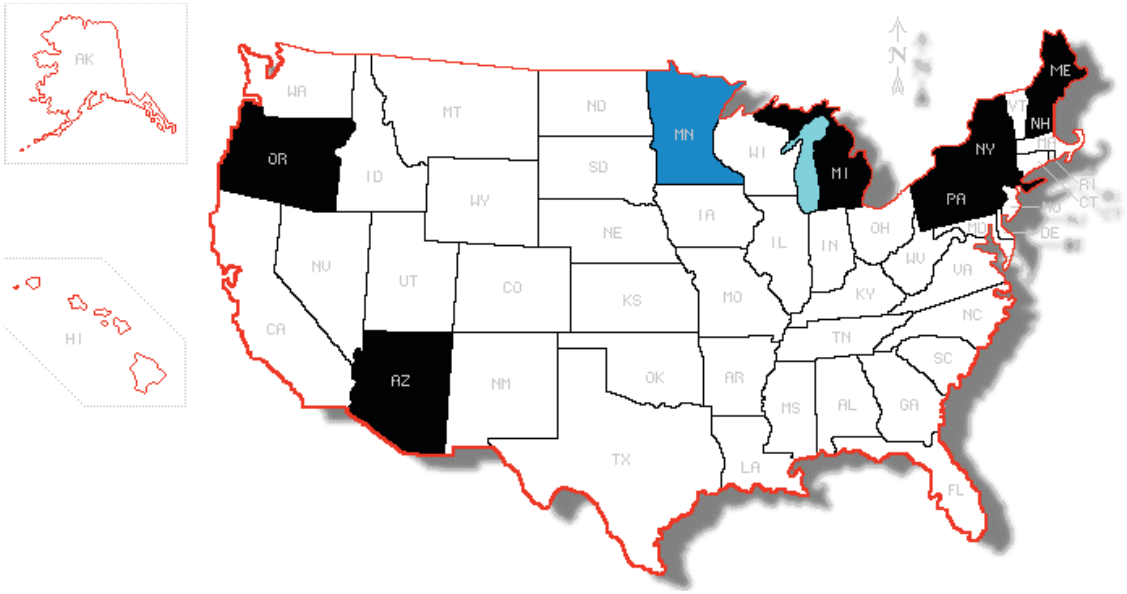
Eight different sections of measures covered within the survey included:

1. Cost control and charge-back management
2. Assignment and fleet size management
3. Fleet replacement (cycling) management
4. Fleet services delivery management
5. Maintenance and repair services
6. Parts inventory control services
7. Fueling service
8. Motor pool services

With the survey being rather lengthy it was anticipated that many fleet managers would probably not take the time to complete the survey. Consequently, a phone call was made to every state DOT fleet manager in the United States to ask them to fill this survey out. In return the results of the survey analysis would be sent to them. Of the 50 states, 48 were contacted (Massachusetts and New Jersey could not be contacted). A cover letter and the actual survey were electronically mailed directly after the phone conversation and a deadline of two weeks was set. A follow-up e-mail was sent out roughly three days before the deadline to remind everyone to return the survey. Due to the number of phone calls, it took almost a span of two weeks to personally contact every fleet manager. As a result, the whole survey process lasted roughly a month. The survey had a 73 percent response rate with 35 states completing the survey.

Once the surveys were collected, data analysis from the surveys in the form of graphs and charts were used to gain a better understanding of the different performance measures used by which states and also how MnDOT compared to other states. Chapter 3 discusses the survey findings in more detail. From the survey analysis, along with an exhaustive literature review of journals, professional and trade literature, and internet sources, the benchmarks were chosen. There are four regional AASHTO (American Association of State and Highway Transportation Officials) conferences held throughout the country. There are annual Western States, Eastern States, Midwest, and Southeast conferences. Consequently, a benchmark from each region would be ideal in order to obtain a better picture of each region of the country. However, this would not be the sole factor in selecting the benchmarks. The seven benchmarked states are shown in Figure 6, which include Arizona, Oregon, New York, New Hampshire, Maine, Michigan and Pennsylvania. The benchmarks covered various portions of the United States with the southeast region being the only area not covered because of reasons which will be discussed later. The benchmarks were contacted and interview dates and times were set.

Figure 6. Phase II Benchmarks



Interview Guide II

Again, similar to Phase I, a set of questions were developed to make the on-site interviews more productive and effective. The questionnaire consisted of 12 pages of relevant questions beginning with some background of their state and leading into the type of measures they use and why they are using them. The questionnaire concludes with some miscellaneous questions that are more generally related to fleet management. The questionnaire was slightly shorter than the Phase I questionnaire. There were fewer questions in order to allow for more discussion. The questionnaire also included a brief illustration of MnDOT's performance measures, which shows how the measures have progressed since they were established in September, 2002. The Interview Guide and MnDOT's measures are shown in Appendix D. Again, the questions were e-mailed prior to the site visits to allow fleet managers to gather any materials and reports that could be useful during the interviews. In addition, this allowed the fleet manager time to arrange for any employees that might be helpful in answering some of the questions to be present.

Phase II Benchmark Interviews

During the site visits, the interviewees varied as far as who attended. There were sometimes only one representative from the state DOT and other times there were as many as nine participants. During the site visits, materials such as examples of performance measures used were received, in addition to other miscellaneous materials. After each interview, an interview spreadsheet summary was completed, similar to Phase I, in order to compare each state's responses with the other benchmarks. The site visits started March 19 and ended April 16, 2003.

After all the benchmarking visits were finished, follow-up material was obtained from the DOTs. Next, the benchmarking team evaluated the summaries of the interviews, along with all the material obtained on the trips. From the materials available and observations from the

interviews, a gap analysis was used to determine where or what MnDOT was lacking. From this, a list of recommendations was derived.

Chapter 3: Project Results and Discussion

Introduction

This project was divided into two phases because of some project constraints as was mentioned previously in this report. Consequently, this section is split into Phase I results and Phase II results. Two sets of results were analyzed for each phase: survey results and analysis, and benchmark interviews.

Phase I—Results

Results of Survey I

As mentioned earlier, the survey was sent to attendees of the Midwest Fleet Managers Conference, which includes only state DOTs. The survey was also sent to several local municipalities, utilities and some private companies. The responses included 15 DOTs, seven private firms, two cities, and one government agency. With most of the surveys being of the Yes/No variety, it was the goal of the survey analysis to find out what MnDOT was or was not doing compared to the groups surveyed. The results, shown in Table 8, provide an extensive review for MnDOT on how they compare within their own industry and compared to the private sector. The table itemizes the activities which MnDOT is not doing, whereas most other organizations are. The right two columns show the percentage of yes responses from DOTs and private companies.

Table 8. Items MnDOT Is Not Doing Compared to Those Surveyed

Items MnDOT Is Not Doing	DOTs % of Yes responses	Private % of Yes responses
■ MnDOT is not using mechanic shifts in addition to a day shift, where 43% of private industries are	25%	43%
■ MnDOT does not have an established training program, where both private and public companies do	50%	57%
■ MnDOT does not follow the manufacturers' schedules for preventive maintenance activities	75%	71%
■ MnDOT does not adhere to a multi-level preventive maintenance schedule	88%	86%
■ MnDOT's districts do not pay equipment fees or user fees to a central account, whereas most private companies do	44%	71%
■ MnDOT's districts do not pay for vehicle and equipment PM's or repair costs, whereas the majority of respondents said their districts or divisions do pay	81%	71%
■ MnDOT does not have a definitive authority responsible for policy/standards for all vehicles and equipment maintenance shops, where most do	88%	100%
■ MnDOT does not use its fleet management system to track repair data to make "Preventive Maintenance" or fleet decisions	50%	67%
■ MnDOT does not use its fleet management system to make automated fleet decisions	56%	83%
■ MnDOT does not incorporate life cycle costing into equipment decisions	69%	100%
■ MnDOT does not utilize documented lease criteria for light duty vehicles	25%	71%
■ MnDOT does not utilize documented lease criteria for equipment	31%	57%
■ MnDOT does not use a documented vehicle/equipment purchase criteria	69%	71%
■ MnDOT does not use a documented vehicle/equipment disposal criteria	81%	57%
■ MnDOT's ratio of scheduled to nonscheduled repairs is at 50%, whereas most others are at 75%. See response summary below, in Table 9	Avg. at 50%	Avg. at 75%

Due to a lack of feedback from city and government agencies, conclusions for those groups could not be drawn. However, their data were factored into the overall view, including all groups who responded. Consequently, most of the findings were based on the responses from DOTs and private companies. Table 9 breaks down the summary of what percentage DOTs have for scheduled vs. non-scheduled repairs. The results appear to be spread out between the four options. MnDOT is currently at 50 percent, however, 36 percent of state DOTs are at 75 percent or greater for scheduled vs. nonscheduled maintenance. If MnDOT is to strive to be a leader, they must work towards the 75 percent or greater target.

Table 9. DOTs—Ratio of Scheduled vs. Non-Scheduled Repairs

Percentage of Scheduled vs. Non-Scheduled Repairs	Percent of DOTs at Each Level
■ 10%	0 %
■ 25%	29 %
■ 50%	14 % (MnDOT is in this range)
■ 75% or greater	36 %
■ Not sure of the ratio	21 %

Table 10 compares how MnDOT's purchasing practices compare to private companies and other state DOTs. There are striking differences between DOTs and private companies. The percentage of PM parts purchased by private companies and DOTs seem to be similar in percentages. However, private companies differ with DOTs as far as percentage of repair parts. Overall, it appears that MnDOT tends to buy more after market parts then original equipment manufacturer (OEM) parts as compared to the other two groups surveyed, although, MnDOT is relatively similar in percentage to other DOTs. These findings may indicate that private companies are able to afford the presumably higher prices for OEM parts then state agencies.

Table 10. Percentage of PM and Repair Parts Purchased from OEM and After Market

Percentage of PM parts purchased from…			
	MnDOT	DOTs	Private Companies
OEM	15 %	22 %	33 %
After Market	85 %	78 %	67 %
Percentage of repair parts purchased from…			
	MnDOT	DOTs	Private Companies
OEM	35 %	44 %	64 %
After Market	65 %	56 %	36 %

Table 11 summarizes standard purchasing practices. MnDOT does not have any established and documented purchasing standards for the items listed in the table. These results indicate that MnDOT should consider developing purchasing standards. For example, both DOTs and private companies have high percentages of established and documented purchasing standards for each class of equipment. With over 90 percent of both private firms and DOTs responding that they have purchasing standards for each class of equipment, it appears that MnDOT is seriously behind everyone in this area.

Table 11. Percent of DOTs and Private Companies with Established and Documented Purchasing Standards

	DOTs	Private Companies
Each class of equipment	94 %	100%
Each make model	44 %	86 %
Each engine brand	31 %	71 %
Each transmission/drive train	31 %	57 %

Finally, Table 12 mentions various methods of disposal of equipment. MnDOT appears to have comparable practices compared to both groups. DOTs main form of disposal is through auctions, while the private sector uses direct sale.

Table 12. Methods of Equipment Disposal

	MnDOT	DOTs	Private Companies
Owner auction	X	50 %	43 %
Consignment auction	X	44 %	57 %
Direct sale	X	44 %	71 %
Seal bid	X	38 %	29 %
Trade in on new purchase		25 %	43 %
Internet or E-commerce method		25 %	29 %
Other		13 %	0 %
**X denotes MnDOT's methods of asset disposal*			

Using survey data can be difficult in trying to extract relevant data to help determine which states or companies have best practices. Surveys tend to just skim the top and it is difficult to develop a good understanding of their operation. However, as shown above, surveys can provide valuable information, which can highlight areas of needed attention. Appendix E shows the entire survey results in more detail. Surveys can also discover trends or bring to the forefront concepts or practices that others might not be doing. Some other interesting facts or trends that were identified are as follows:

- Most of the private organizations have not established low priority seasons for each class of equipment for scheduled maintenance (only 29 percent responded that they do).
- 69 percent of DOTs and 86 percent of private fleet decisions are made from a centralized administration or department.
- 81 percent of DOTs and 71 percent of private fleet decisions are made at a divisional or department level.
- The average age of the respondents' current organizational structure is 12 years old, where MnDOT's is 20 years old.
- Only 44 percent of state DOTs divisions pay equipment or user fees to a central account.
- The majority of private companies' shop staff is managed from a centralized location (86 percent), as compared to 69 percent for DOTs.
- DOTs and private organizations have equipment and repair records kept on paper/hard copy; MnDOT does not

- MnDOT's fleet management system is less then 2 years old, whereas most other DOTs (75%) are older then 5 years. Private companies surveyed are between 2 to 5 years old.
- Only 57% of the 7 private companies surveyed were willing to benchmark, while 100% of the DOTs and public agencies were willing to benchmark.

In addition, the survey helped recognize practices that were not common across the surveyed group. For example, most of the agencies or companies surveyed were not working towards the Malcolm Baldrige National Quality Award (MBNQA); however, the states that were working towards the MBNQA provoked interest, namely Michigan, Ohio, and Pennsylvania. As a result, since most of the DOTs surveyed answered most of the questions similarly, the benchmarking team had to identify certain areas that could separate them from other states.

Pennsylvania and Michigan DOTs both are working toward the MBNQA so they were chosen to be two of the benchmarks. In addition, the focus of Phase I was to also benchmark some companies from the private sector. Unfortunately, several of the private companies who responded to the survey were not interested in benchmarking, thus yielding a smaller potential group of candidate organizations. Consequently, the three private companies chosen were Sysco Foods Service of Minnesota, Idaho Power, and Xcel Energy. Although it was initially agreed that Idaho DOT would be benchmarked since they were located relatively close proximity to Idaho Power, these two organizations could not be visited due to unforeseen travel and time considerations. Also because of travel and time considerations, the departments of transportation in Michigan and Pennsylvania were delayed until Phase II. The final group of benchmarks were MnDOT (internal), Minnesota DNR, Sysco Foods, Xcel Energy, and Iowa DOT.

Interview I Results

At the conclusion of every interview, each member of the benchmarking team added their comments and responses for each of the interview questions to a large response summary spreadsheet, which is located in Appendix F.

Based on the interviews, the benchmarking team identified a list of best fleet management practices within each of the focus areas of Phase I, except maintenance. The maintenance section was dropped because of time constraints. In addition, the senior management team recommended the results be evaluated in terms of three groupings: Cost, Policy, and Organizational Structure. Although the maintenance section was dropped from the scope of the project, a list of best fleet maintenance practices were also identified and documented for future considerations.

Best Fleet Management Practices Identified:

<u>Best "Cost" Practices</u>

- Make sub-organizations responsible for all avoidable costs (e.g., fuel, unscheduled maintenance, and repairs).
- Establish a stable funding process for renewing equipment
- Let operating organizations benefit from good practices (return all equipment resale proceeds or credits to operating units).

Best "Policy" Practices

- To optimize equipment utilization and replacement, establish internal rental rates to fully recover:
  - Replacement (depreciation & new equipment inflation),
  - Unavoidable operating expenses,
  - Purchasing,
  - Disposal and overhead costs.
- Provide external accountability measures (good measures and targets/goals are needed).
- Policies and procedures must be clear and understandable.
- Policies, measures, and targets must be uniform in an organization.
- Schedule maintenance work to minimize equipment downtime (scheduled vs. unscheduled).
- Elicit employee input in setting local policies.

Best "Organizational" Practices

- Centralize fleet purchasing, ownership and resale.
- Establish formal policy development and review committee to represent fleet management and operating organizations.
- Have a fleet manager in charge of the organization's fleet.

Best "Fleet Maintenance" Practices

- Use industry standards of mechanic to repair units (MRU) to set shop staffing levels.
- Use internal work standards.
- Use employee involvement is setting employee work standards.
- Management of geographically separated locations requires:
  - Weekly telephone contacts
  - Quarterly face-to-face meetings
  - Frequent use of email
  - Local lead worker/ supervisor in each shop
- Limited variations of equipment brands and models.
- Must have accurate life cycle predictions for fleet assets.
- Determine what the optimum utilization target is.
- Establishment of core and non-core equipment identification.
- User/Owner rental or lease rates finance central replacement account.
- User/Owner pay for non-preventative maintenance equipment costs.
- Identify authority for policy and procedure implementation and creation.
- Identify options to acquire equipment for emergency or peak work-load times.
- Inventory/Parts for fleet maintenance is part of shop operations.
- Need a good information system to capture all data and to maintain a good PM operation.
- Need accurate data inputs.
- Benchmark other similar organizations for setting standards on PM's.
- Need performance measures to control and monitor.

Recommendation Actions for Implementation in Phase II

At the conclusion of the benchmarking interviews and after discussions of Phase I results, the following recommendations for Phase II were developed, which were based on observations and analysis conducted in Phase I.

- Focus on performance measures and targets
- Make sure the survey and questionnaire fits the project's objective, focus and goals.
- Evaluate and assess other DOTs as potential benchmarking candidates and those missed from Phase I
- Focus benchmarking on DOTs and make site visits

Phase I had a generic benchmarking scope and helped to pave and shape the road for Phase II. Much of the first phase was a learning process for the benchmarking team. Such things as designing surveys, questionnaires and conducting benchmarking interviews were all learned. In addition, the benchmarking team learned how to use quality tools to evaluate survey results along with reviewing available literature and personal contacts to identify benchmarks. Identifying benchmarks was one of the most difficult tasks of this project, yet probably the most important task. Not picking an organization that does something better, is a waste of time for both sides. Some of the key success factors the team identified are listed below.

- Must have a team leader.
- The project needs to be well organized and planned out, especially for allowing time for surveys to be returned, data analysis to be conducted and site visits to be arranged.
- Need to understand internal constraints in the beginning of the project (traveling, time, etc.).
- If QFD is going to be used, use it prior to sending the survey out. It would have been best to have performed the QFD analysis prior to finalizing the survey. Had this been done, a more focused survey could have been conducted and optimum candidates more easily identified.
- Must have a focused objective, the broader the scope, the more difficult benchmarking can be for maintaining focus.

Learning from the following success factors helped Phase II run smoother and more efficiently. Although Phase I was very beneficial in providing useful comparison data, it was probably a little too broad in scope. Consequently, Phase II would focus primarily on performance measures and be constrained to benchmark only other state DOTs.

Phase II—Results

Results of Survey II

The survey for Phase II was sent to 48 of the 50 states across the United States. Thanks to calling each of the fleet managers prior to sending the survey, 35 states responded creating a 73 percent response rate. As mentioned in the methodology section, the objective of this second survey was to gain a better understanding of what fleet management performance measures are used by other state DOTs. The high response rate allowed the results to show a more general picture of what DOTs are using, as compared to as if only ten states responded.

The histogram shown in Figure 7 shows the 32 most common types of fleet management measures being used based on the results identified through Survey II. Not surprisingly, cost control measures are the most common type of measure used. Table 13 uses the results from Figure 7 to determine the most common types of performance measures being used. The last three types of measures, fleet services, parts inventory, and motor pool services had no measures in the top 32.

Figure 7. Most Commonly Used Fleet Management Measures among State DOTs

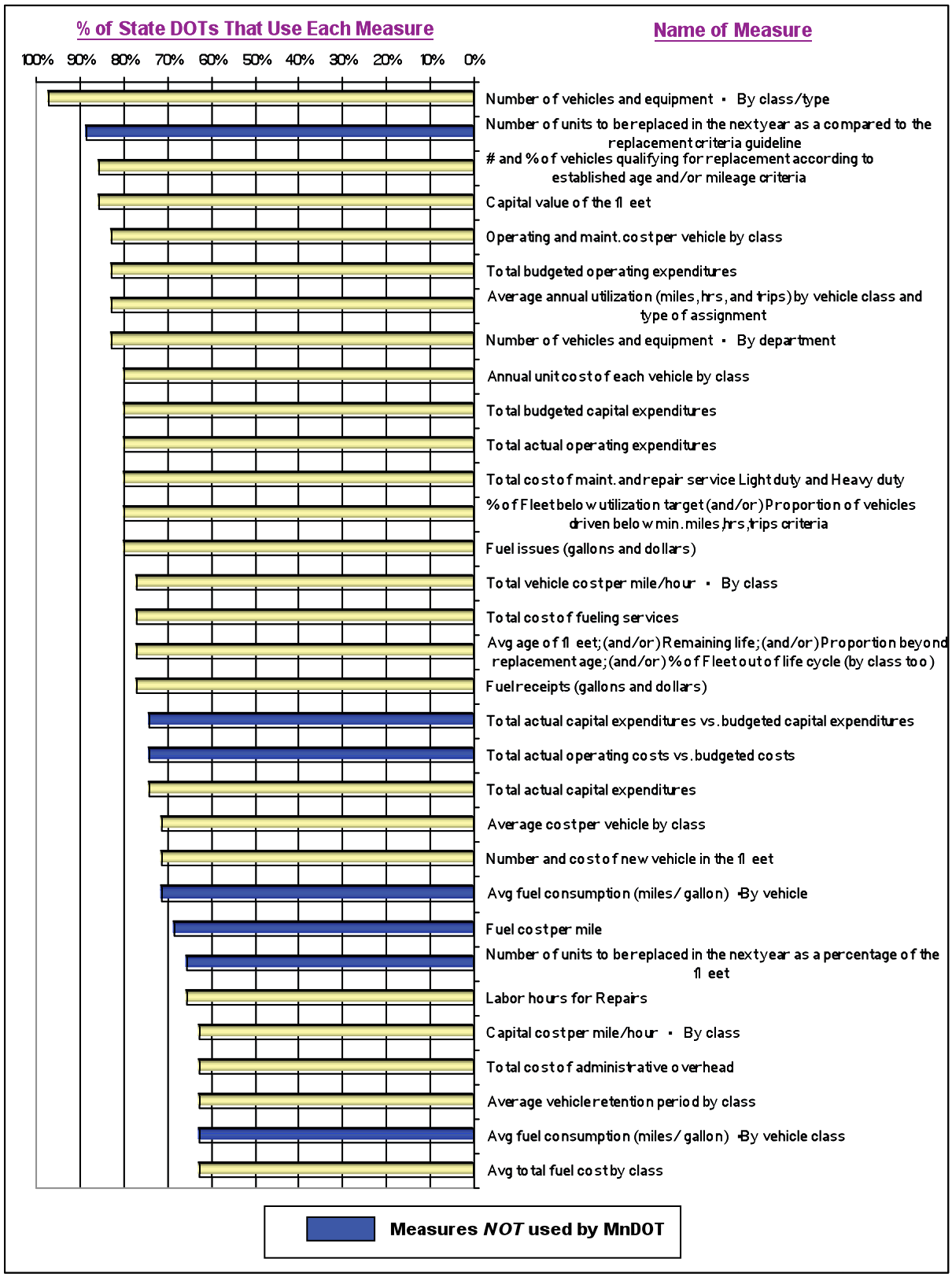


Table 13. Breakdown of the 32 Most Common Types of Measures by Category (from Figure 7)

Type of Measure	Number of Measures
Cost Control & Charge-back Measures	13
Fleet Replacement Measures	8
Fueling Service Measures	6
Assignment & Fleet Size Measures	4
Maintenance & Repair Services Measures	1
Fleet Services Delivery Measures	0
Parts Inventory Control Services Measures	0
Motor Pool Services Measures	0

The shaded bars in Figure 7 highlight the measures that MnDOT is not using. With relatively no communication between state DOTs, this type of visual perspective enables MnDOT to compare themselves with what other state DOTs are doing. This analysis will be customized and sent to each of the states that completed the survey. Each graph will be adjusted for each state and will note which measures their respective state is not using, similar to that shown for MnDOT. Of the 32 most commonly used measures, MnDOT is using 25 of them with the exception of the following measures listed below. The percentage of DOTs using that measure is also listed.

- Number of units to be replaced in the next year as a compared to the replacement criteria guideline (89% use this measure)
- Total actual capital expenditures vs. budgeted capital expenditures (74%)
- Total actual operating costs vs. budgeted costs (74%)
- Average fuel consumption (miles/ gallon) · By vehicle (71%)
- Fuel cost per mile (69%)
- Number of units to be replaced in the next year as a percentage of the fleet (66%)
- Average fuel consumption (miles/ gallon) · By vehicle class (63%)

Three of the seven measures MnDOT is not using are related to fuel consumption. In addition, fleet replacement and budget related measures are also lacking.

Conversely, the least common measures are shown in Figure 8. Many of these measures are of the maintenance type, which can be misleading because there were many more maintenance measures in the survey as compared to other types. Consequently, with so many potential maintenance measures possible, the chances of them all being used at a high percentage is small. According to Figure 8, MnDOT is not using any of the 33 measures. Table 14 breaks down the least common types of measures.

Table 14. Breakdown of the Least Common Types of Measures by Category (from Figure 8)

Type of Measure	Number of Measures
Maintenance & Repair Services Measures	20
Motor Pool Services Measures	6
Fleet Replacement Measures	3
Cost Control & Charge-back Measures	1
Parts Inventory Control Services Measures	1
Fueling Service Measures	1
Assignment & Fleet Size Measures	1
Fleet Services Delivery Measures	0

Figure 8. Least Commonly Used Fleet Management Measures among State DOTs

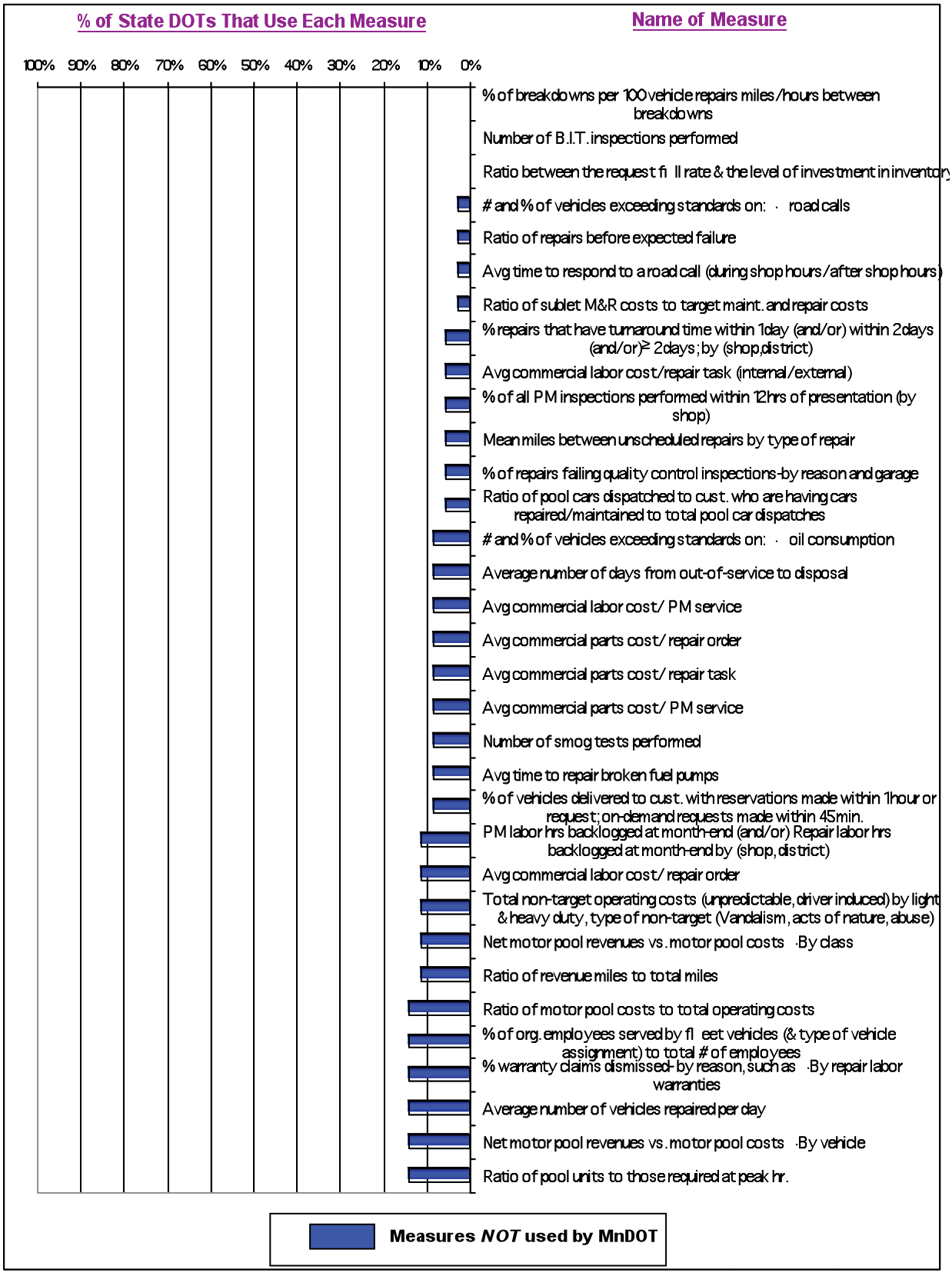


Figure 9 illustrates the number of measures each of the 35 state DOTs that responded are using. The number of measures used does not necessarily indicate a high performing state, however, this analysis can play a small role when identifying potential benchmarks. The benchmarks which MnDOT chose are highlighted in the figure. Further analysis of why these states were chosen will be discussed later in the report. Out of 184 fleet management performance measures listed on the survey, the average number of measures used by each state is 71. The state with the largest number of measures is Arizona with 130, Minnesota had approximately 67, and the least by any state responding to the survey, is 22 measures. The benchmarking team noted that it would be interesting to find out if the number of measures used by each state has any correlation with leadership in fleet management.

Finally, a similar graph can be used for breaking down the measures by category. The histogram shown in Figure10 ranks from the most popular to the least popular measures in the category of "Cost Control and Charge-back Measures." This graph format was repeated for each of the eight sections from the survey.

The following list briefly mentions all measures that are used by more then 50 percent of the state DOTs which MnDOT does not use. In addition, each section states the number of measures MnDOT uses of the total possible measures in that section.

Cost Control and Charge-back Management—Figure 10 (17 of 34)

- MnDOT is comparable to what other states are using, except for:
  - → Total actual capital expenditures vs. budgeted capital expenditures
  - → Total actual operating costs vs. budgeted costs
  - → Total vehicle cost per mile/hour · By fleet

Assignment and Fleet Size Management—Figure 11 (4 of 10)

Assignment measures are used to allocate equipment based on statistical data to improve utilization and lower the fleet size. There are ten assignment and fleet size measures listed in the survey. Looking at Figure 11, there are roughly 4 highly used measures and then the remaining measures drop off dramatically in use. MnDOT uses the more popular ones except for:

- Number and percentage of vehicles by total lifetime mileage grouping (to review age of fleet in miles/hrs); (and/or) percentage of lightly, heavily-used vehicles

Fleet Replacement (Cycling) Management—Figure 12 (11 of 23)

The objective of these measures are to select equipment in a logical and cost-effective manner based on historical data. They also help in the disposal of equipment to maximize resale value and to minimize overall lifecycle costs (Spectrum Consulting). MnDOT is using a variety of fleet replacement measures, including the popular ones, except for the single most common measure (*) and the following:

- *Number of units to be replaced in the next year as a compared to the replacement criteria guideline
- Number of units to be replaced in the next year as a percentage of the fleet
- Number of qualifying vehicles that have planned replacement funding

Figure 9. Number of Fleet Management Measures Used by Each State DOT

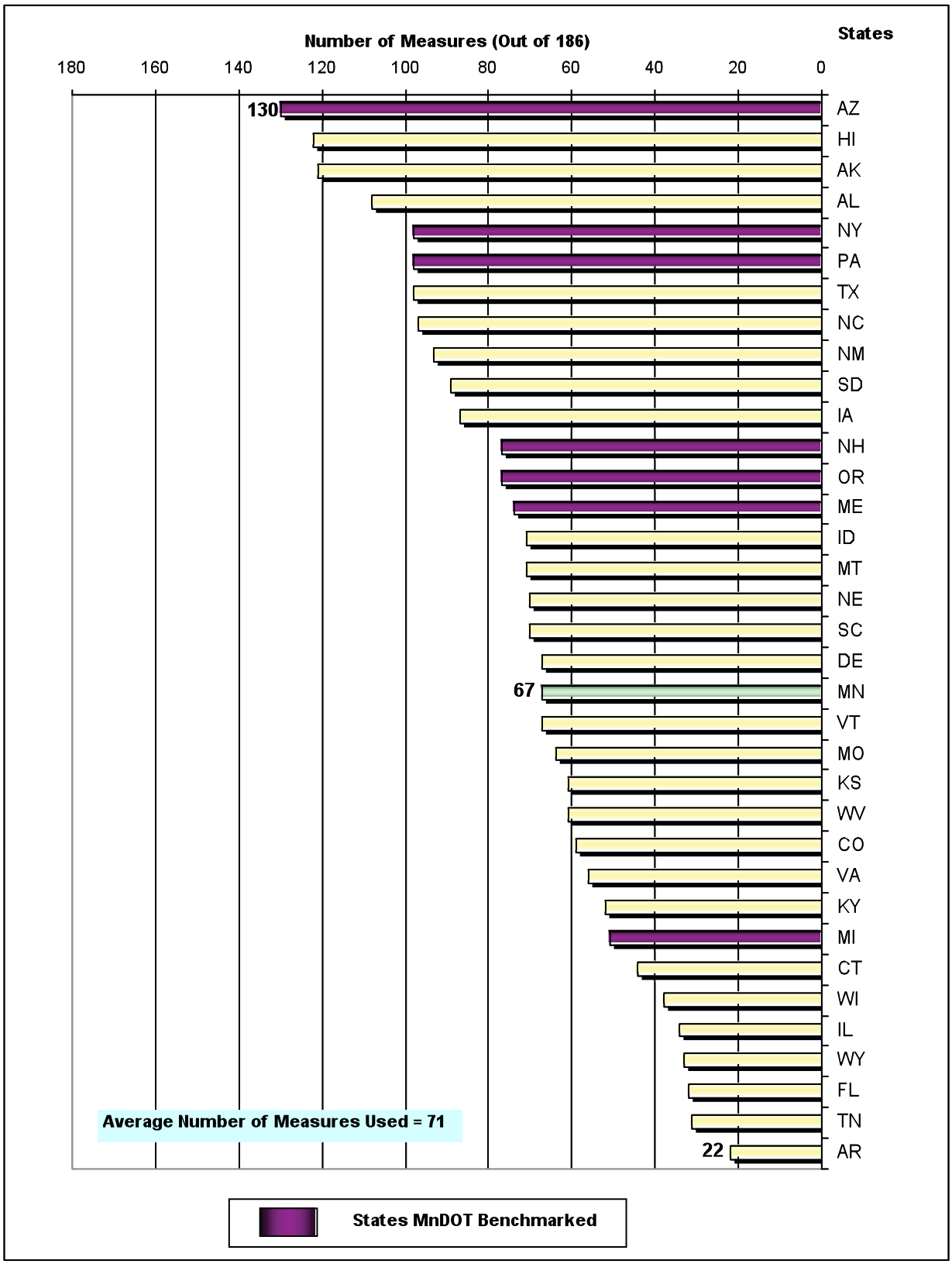


Figure 10. Cost Control and Charge-back Management Measures

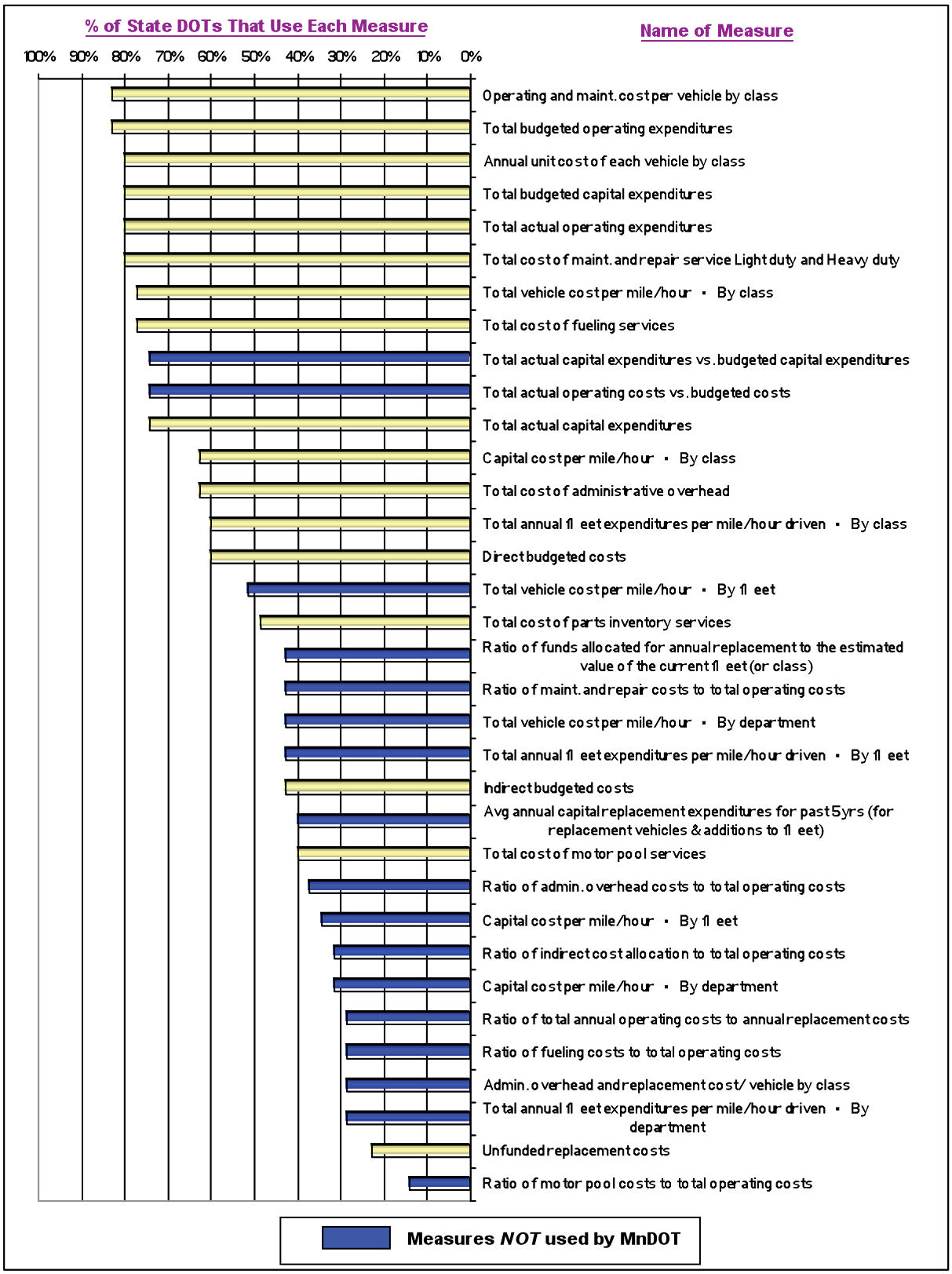


Figure 11. Assignment and Fleet Size Management Measures

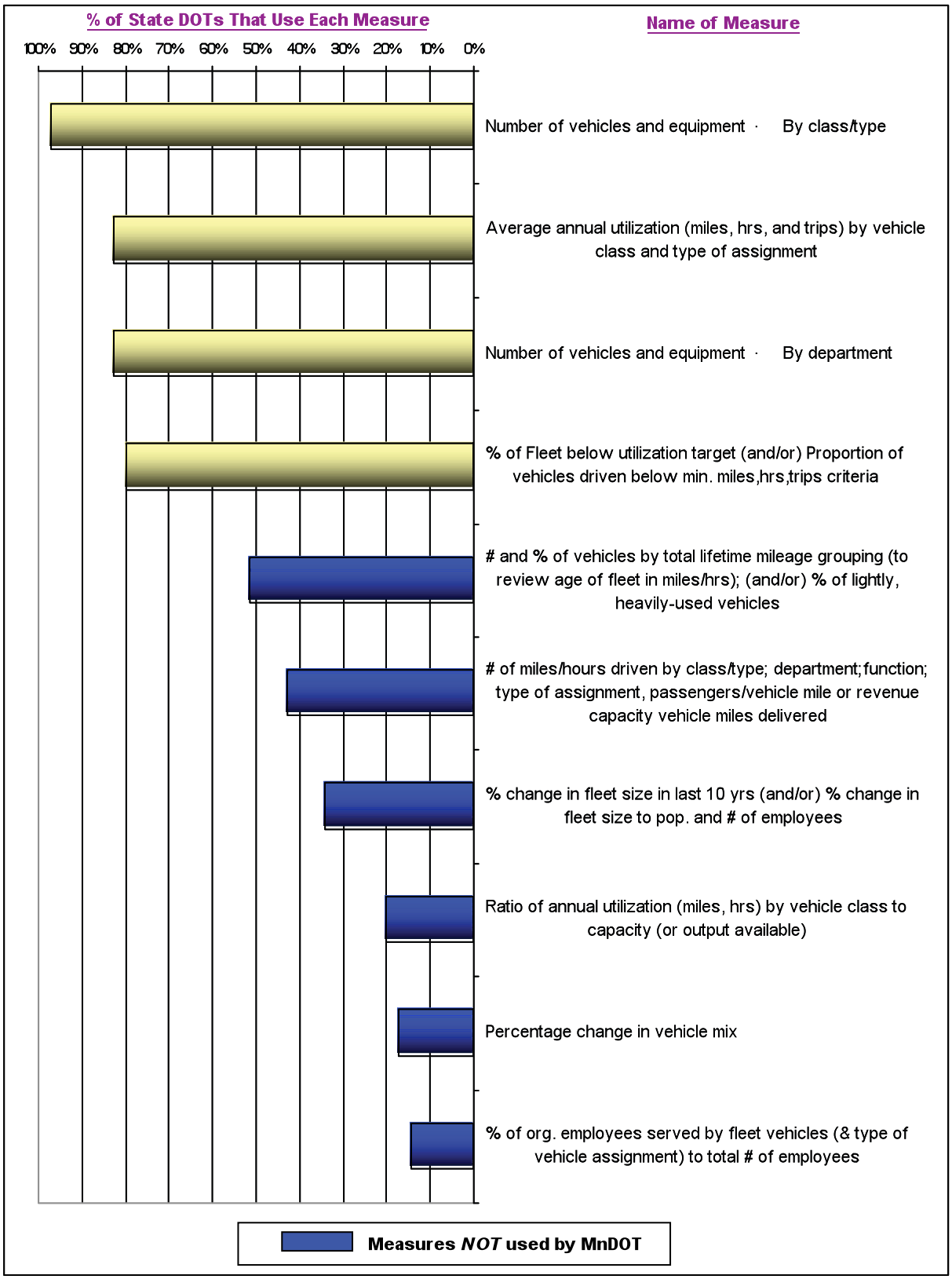
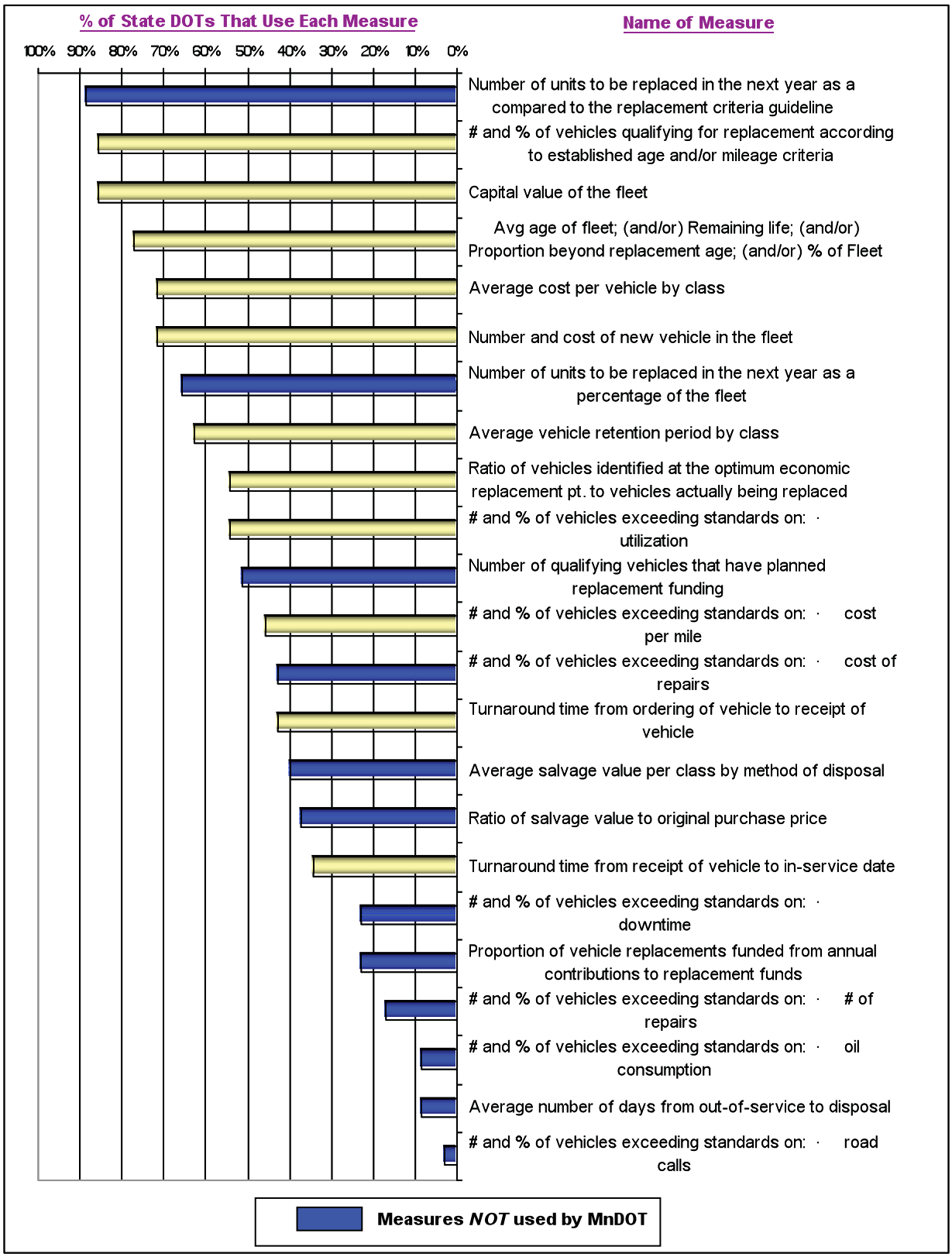


Figure 12. Fleet Replacement (Cycling) Management Measures



Fleet Services Delivery Management—Figure 13 (3 of 9)
Fleet services concentrates on the cost of the service, which in turn can be benchmarked against industry standards and other companies outside of the department of transportation. MnDOT is not monitoring many of the measures as compared to other DOTs. There are three relatively highly used measures which focus on fully burdened labor rates and MnDOT does not use any of them. The measures MnDOT should look concentrate on are:

- Fully burdened labor rate · Light duty
- Fully burdened labor rate · Heavy duty
- Fully burdened labor rate · Miscellaneous equipment

Maintenance and Repair Services—Figure 14 and 15 (16 of 65)
The maintenance section metrics cover many areas in order to allow for equipment to be safe, reliable, and function effectively (Spectrum Consulting). The focus of these measures is to assure high productivity with timely and efficient repairs. There are many measures listed in this section, however, only 18 percent (9 measures) of the total 65 maintenance measures are used by more then 50% of the states. MnDOT is lacking in this section and needs to address these measures.

- Average maintenance and repair cost per vehicle by (class, shop, district);(and/or) Average maintenance cost per vehicle/mile by (class, shop, district)
- Average annual number of maintenance hrs charged to repair orders by in-house personnel by class, shop, district

Other important measures that are used by less then 50 percent of the DOTs, which MnDOT should address include:

- Average hours per PM service
- Number of PM orders closed
- Number of productive staff hours
- Ratio of total vehicles maintained to # of technicians on staff by class of vehicle (and/or) number of repair/PM hrs by class of vehicle
- Ratio of direct labor hrs to indirect labor hrs by shop
- Average hours per repair and repair task
- Downtime percentage
- Average cost per PM service
- Average cost per repair and repair task

Parts Inventory Control Services—Figure 16 (8 of 14)
MnDOT is using 8 of the 14 possible inventory control measures. However, they should think about adding "the number of vehicle hrs (or days) lost waiting for parts" because it is a great measure for evaluating how much downtime is caused from waiting for parts.

Figure 13. Fleet Services Delivery Management Measures

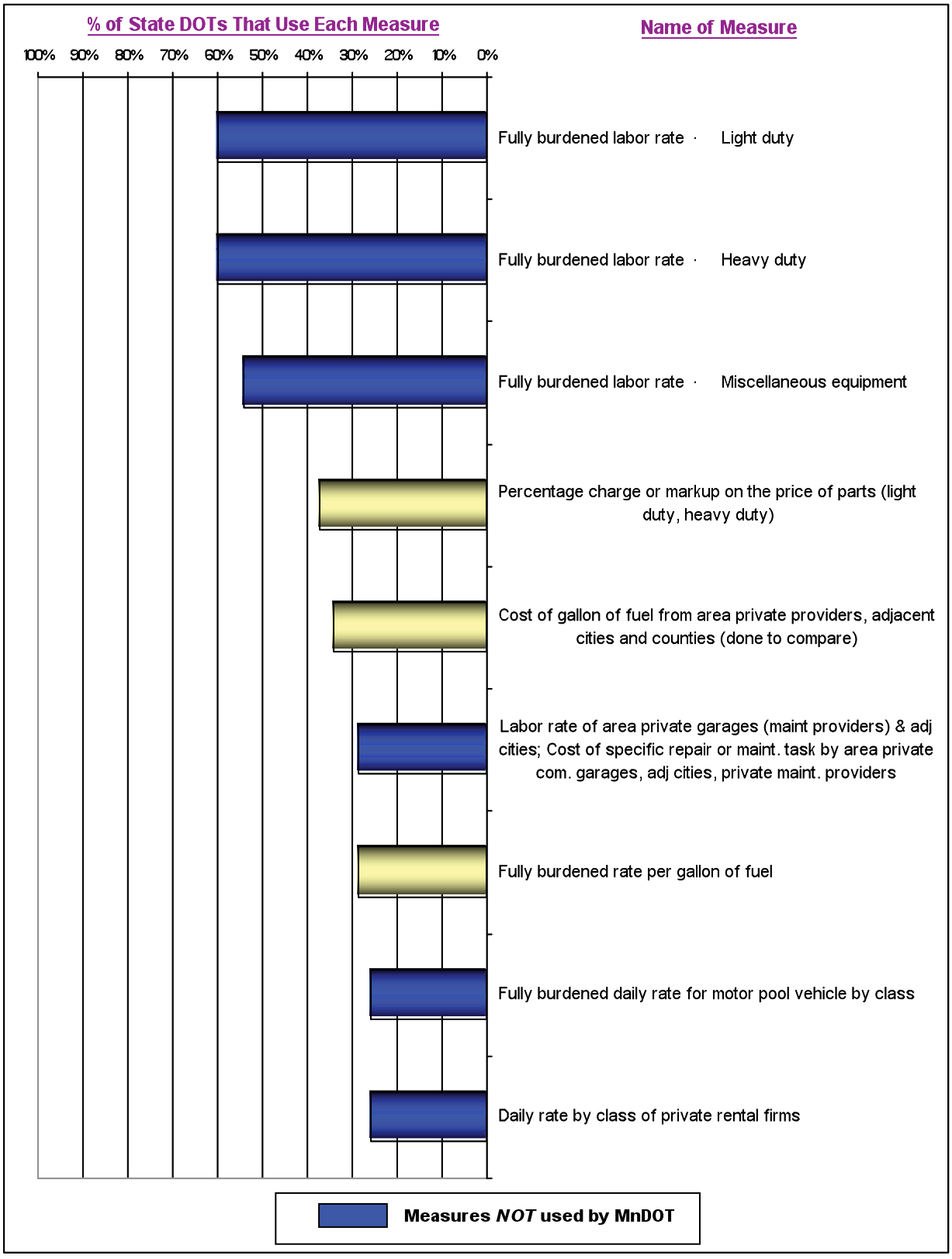


Figure 14. Maintenance and Repair Services Measures

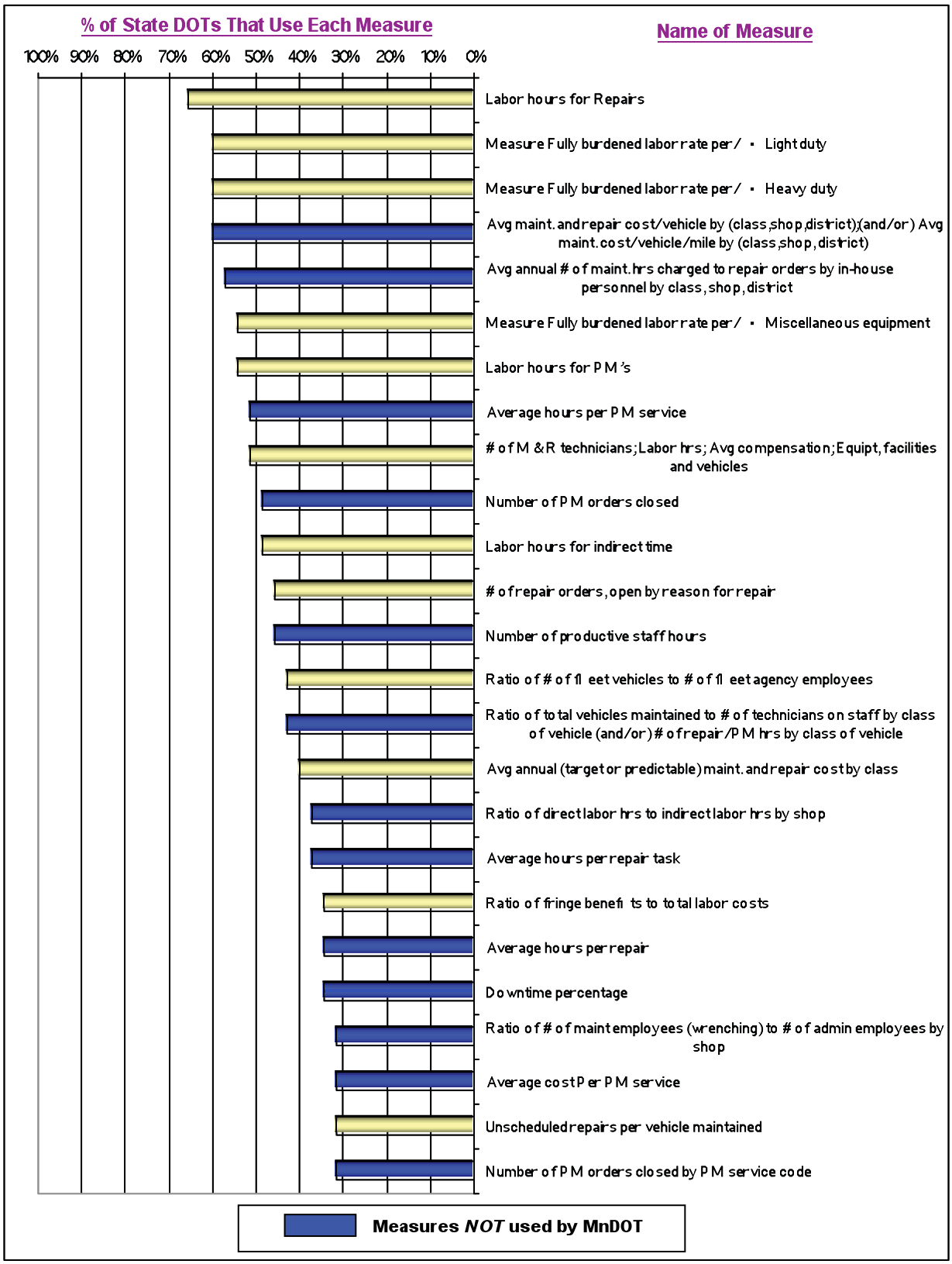


Figure 15. Maintenance and Repair Services Measures (Continued)

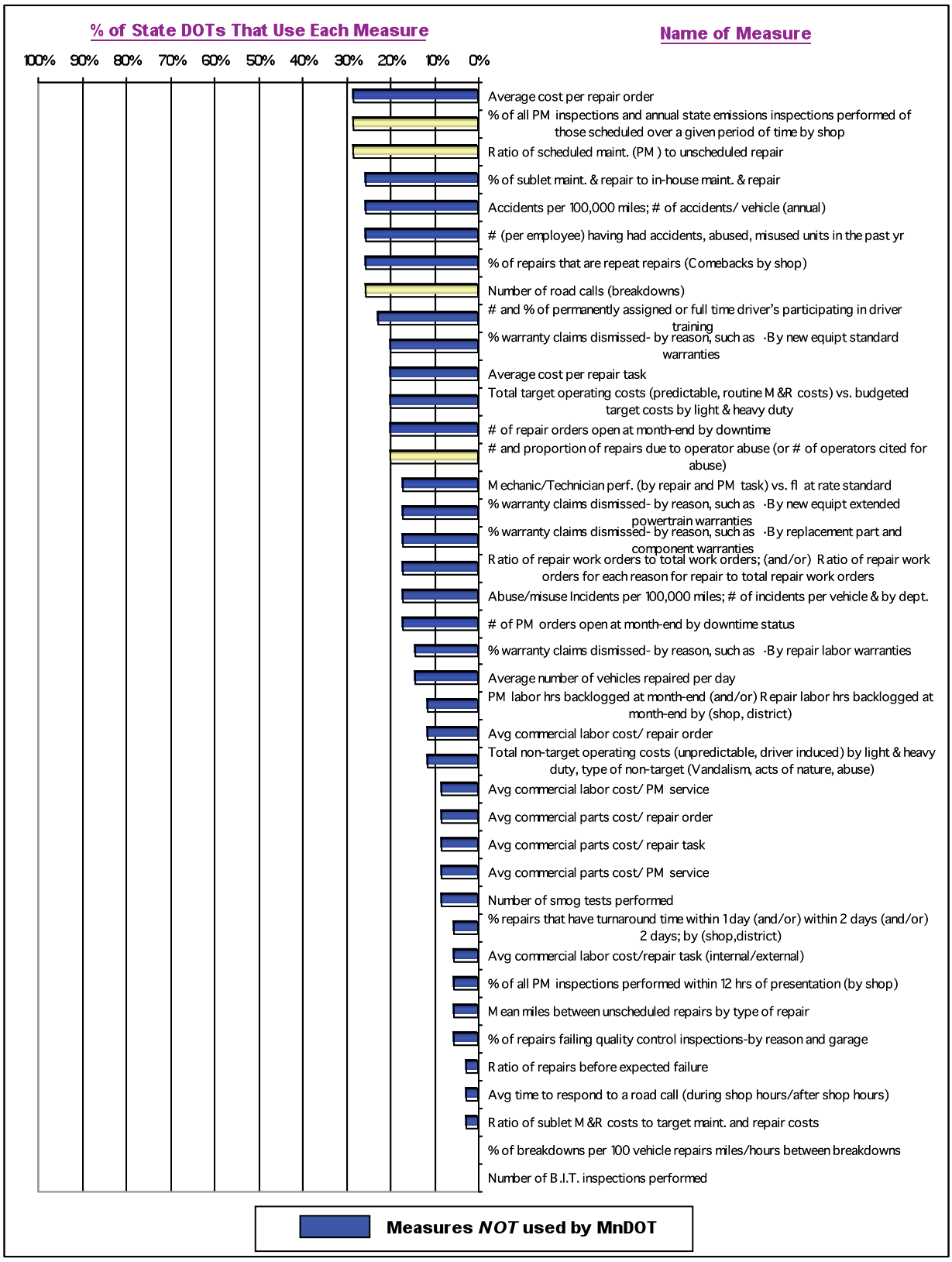
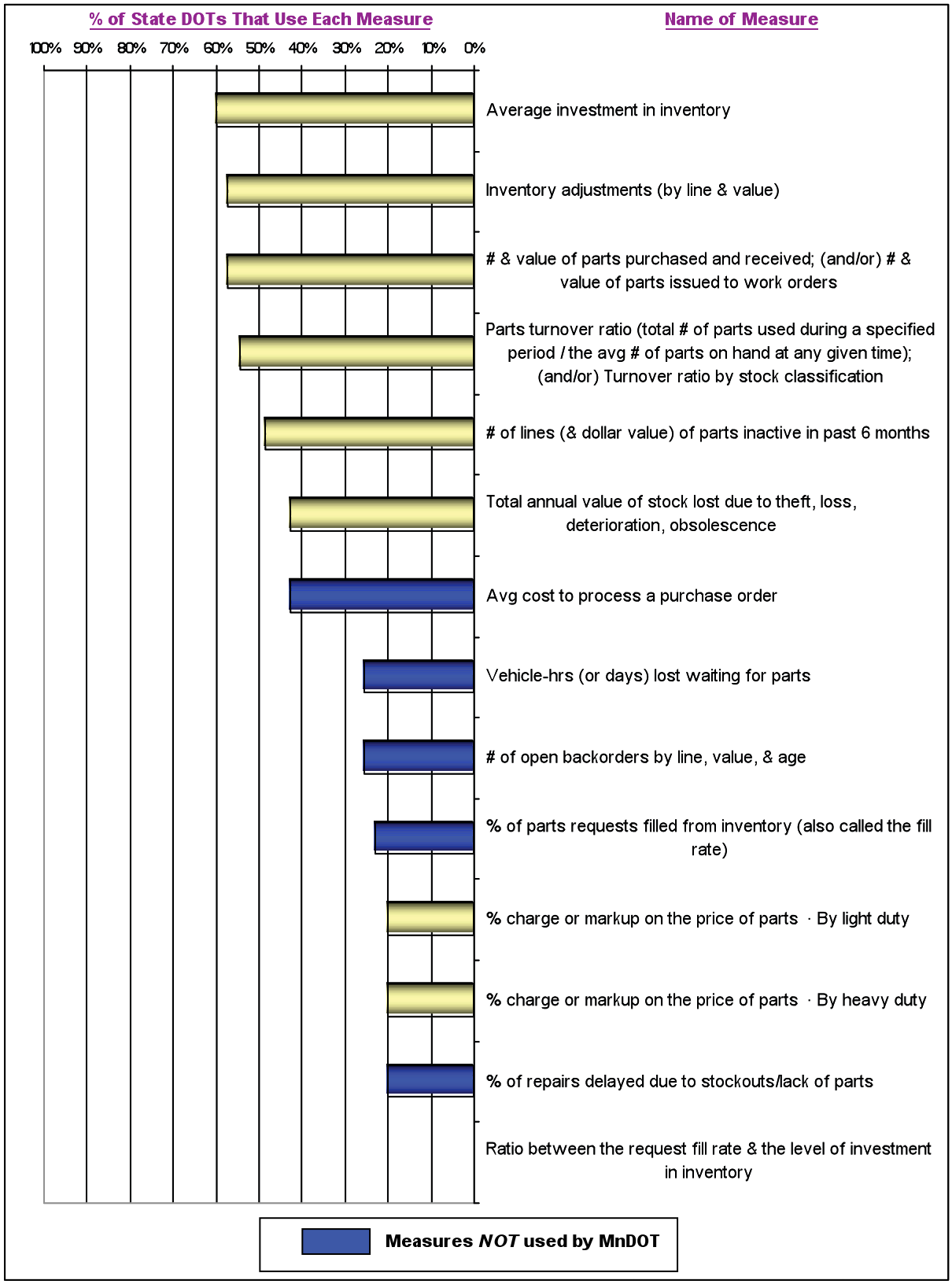


Figure 16. Parts Inventory Control Services Measures



Fueling Service—Figure 17 (6 of 15)
Fueling services measures listed in this section concentrate on providing clean, safe and reliable fueling facilities and help identifying appropriate locations for fueling sites. In addition, many of the fueling measures focus on managing, controlling, and monitoring all fuel and oil consumption. Overall, MnDOT is missing a number of fueling service measures as compared to what other DOTs are using to manage their fueling services. The following measures are not used my MnDOT.

- Average fuel consumption (miles per gallon) · By vehicle
- Fuel cost per mile
- Average fuel consumption (miles per gallon) · By vehicle class
- Average fuel consumption (miles per gallon) · By equipment

Motor Pool Services—Figure 18 (4 of 16)

- MnDOT expects to increase its centralized motor pool, but this areas is not yet considered of high importance.

The final graph presented in Figure 19 shows four miscellaneous fleet management questions. Surprisingly, roughly 50 percent of the 35 states use benchmarking to some degree as a means to set performance targets. In addition, only 4 states are working towards the Malcolm Baldrige National Quality Award (Pennsylvania, Arizona, New Hampshire, and Wyoming). The MBNQA is an annual award sponsored by the United States Department of Commerce and private industry to organizations which excel at a customer driven approach to quality management. The remaining two questions focused on the maintenance sector, where 100 percent of the state DOTs are doing preventive maintenance and only 26 percent or 9 states are doing some form of predictive maintenance.

Overall, MnDOT is using many of the common measures listed in each of the eight categories. However, fleet services are lacking in part because MnDOT does not track fully burdened labor rates, in addition to many of the measures in the maintenance section. In the discussion of the survey findings, it was noted that some of the states' fleet managers who responded might have marked yes to a particular measure if their information system could track that measure instead of marking yes to the measures that they currently use to monitor their fleet. This question would be answered during the benchmarking interviews. The survey, literature review and phone conversations with various state fleet managers assisted in choosing the benchmarks. The final benchmarks chosen were Arizona, Oregon, New York, New Hampshire, Maine, Michigan and Pennsylvania DOTs. Table 15 best describes the reasoning of why each of these states was selected.

Figure 17. Fueling Services Measures

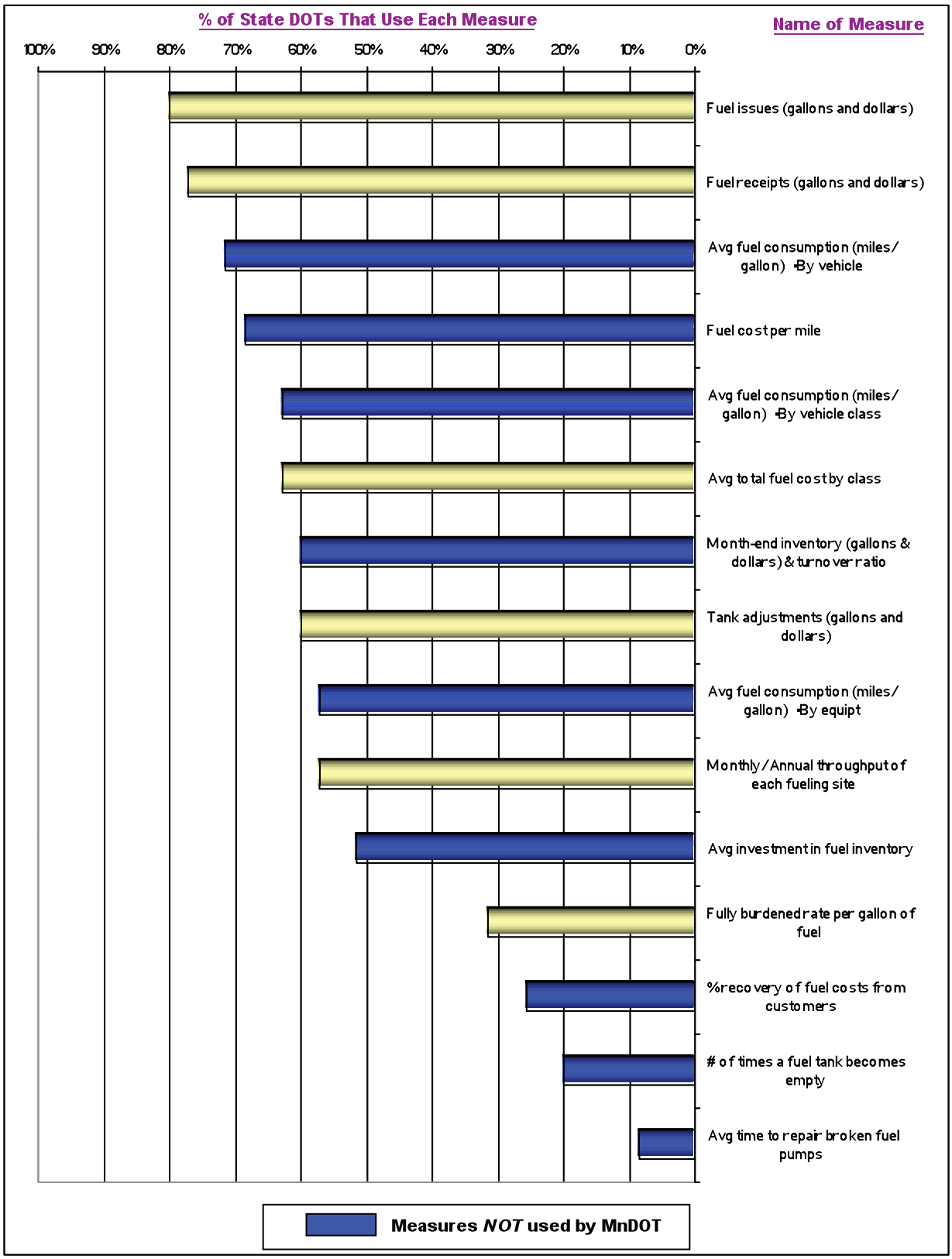


Figure 18. Motor Pool Services Measures

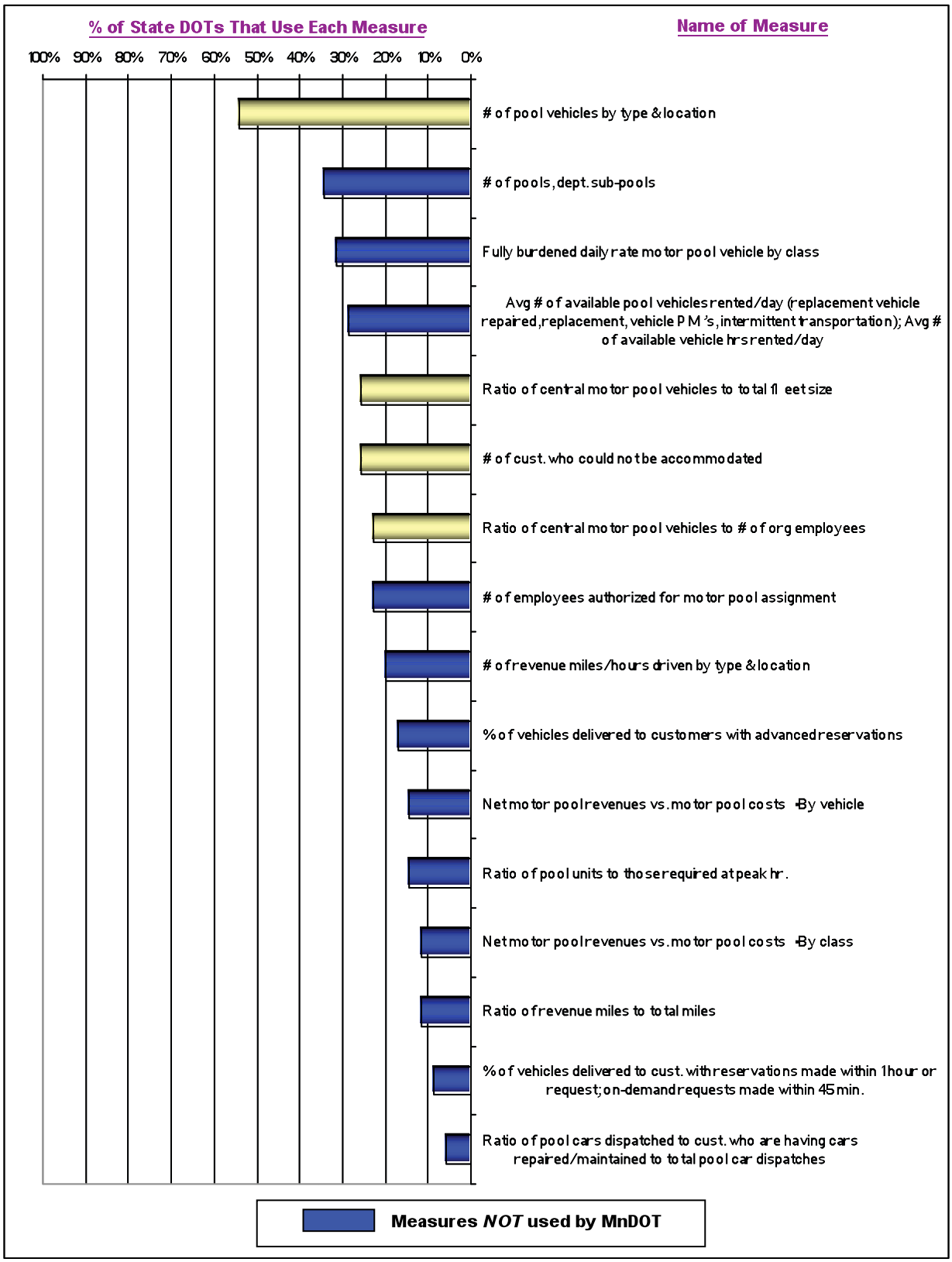


Figure 19. Miscellaneous Survey Questions

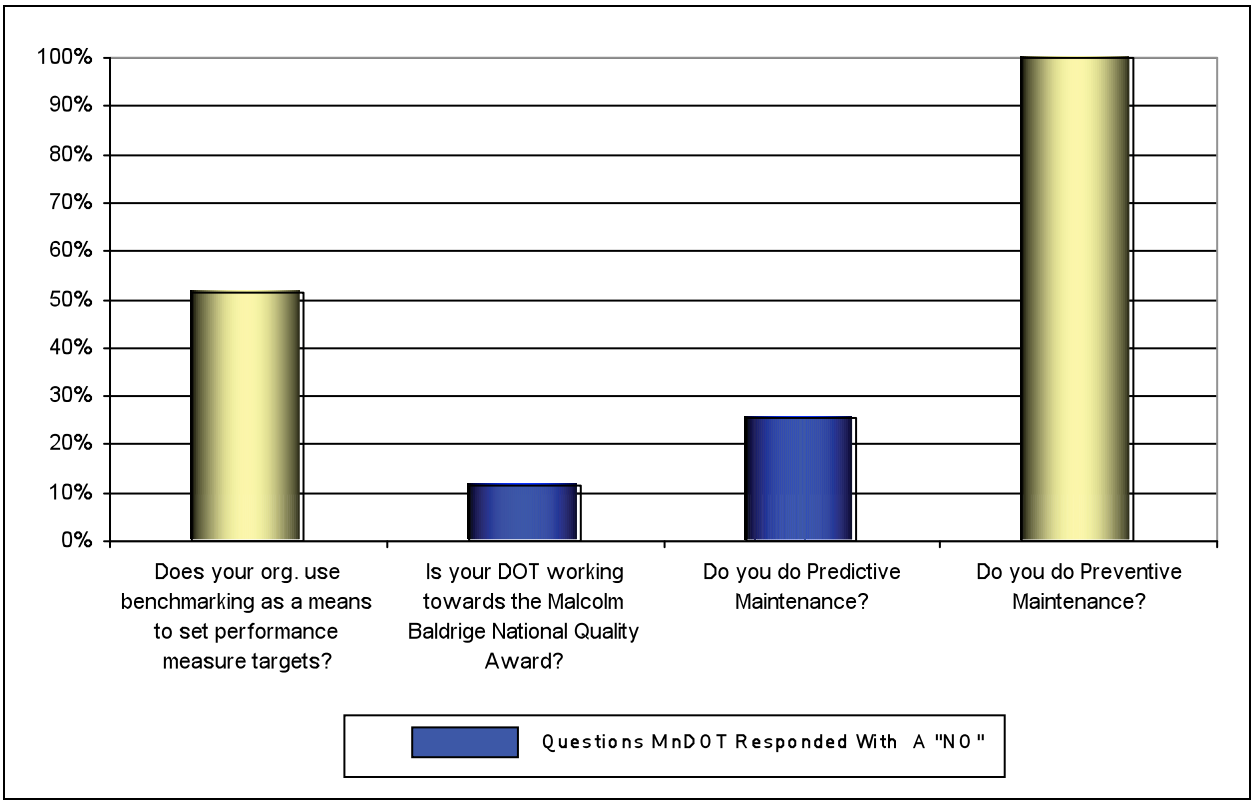


Table 15. Breakdown of Candidates for Phase II Benchmarks

State Department of Transportation	Reasoning of Why to Benchmark Each State
Arizona	■ Central location for data collection of the Western States Conference ■ Recommended by other state fleet managers ■ Uses many measures as stated by the survey ■ Working towards the MBNQA
Oregon	■ Started performance measures within DOTs ■ One of the leaders in the literature ■ Currently developing a list of higher level measures similar to MnDOT
New York	■ Mentioned many times in the literature review ■ Uses many measures as stated by the survey
New Hampshire	■ Mentioned they did a similar study ■ Close proximity to NY
Maine	■ Similar to Minnesota weather ■ Close proximity to NY
Michigan	■ Continuation from Phase I
Pennsylvania	■ Leading as far a literature review ■ Uses many measures as stated by the survey ■ Recommended by other state fleet managers ■ Continuation from Phase I ■ Working towards the MBNQA
Other Potential Benchmarks if Time Allows	
California	■ Mentioned many times in the literature review
Florida	■ Mentioned in literature a few times
Hawaii	■ Uses many measures
Alaska	■ Uses a balance sheet & income statement (rare)
North Carolina	■ To cover southeastern region of United States ■ Have many measures according to the survey
Alabama	■ Uses many measures ■ Heard by a fleet manager that could possibly have a quality operation

Notes: Based on the information available, there were no states from the southeastern region of the country that stood out as being leaders in the use of performance measures. Some potential benchmarks from this region if type allowed would be Florida, North Carolina and possibly Alabama.

Interview II Results

A benchmarking visit was made to each state by Brandon Storhaug, with MnDOT personnel participating via conference call. Similar to Phase I, an interview response summary was filled out, which is located in Appendix G. Based on the survey analysis and the completion of the site interviews, it was apparent that the number of measures has a slight impact on the quality of the organization. The states with the largest number of measures in Figure 9 who were benchmarked

tended to be doing a better job than states will relatively few measures or even in the middle of the pack. However, there was a big variance among those states in the middle or towards the bottom of the list. For example, Oregon, Maine and New Hampshire all show that they have a higher numbers of measures then MnDOT. However, when these states were benchmarked, it was apparent that MnDOT was ahead of these states as far as the quality of fleet operation being run. It was also noted that some of the states did fill the survey out according to what measures they could be monitoring with their fleet management information system, although, probably 90 percent of the measures marked were actually being used and/or was directly related to another measure that was very similar in nature. The measures listed in Table 16 compares MnDOT's senior-level measures with the common senior-level measures of the benchmarks which they are not using. MnDOT's senior-level measures are shown at the end of Phase II Interview Guide in Appendix D.

Table 16. Comparison of Senior-level Measures

MnDOT's Senior-level Measures	Other DOTs Senior-level Measures
■ Units within Lifecycle	■ # of Reportable Industrial Accidents & Injuries
■ Preventive vs. Reactionary Vehicle Maintenance	■ # of Vehicles Accident Repairs
■ Equipment Archiving Minimum Standards	■ # of Operator Abuse Repairs
■ Fleet Size	■ # of Road Call Actions
	■ Return to Service Rate
	■ % of Overdue PMs
	■ Repair Parts Fill Rate
	■ PM Parts Fill Rate
	■ Statewide Inventory Total and Costs
	■ Labor Hour Utilization
	■ Cost of Ownership & Operations per Mile and per Hour

It was also apparent that the key ingredient for managing a good fleet operation is a fleet management system that is capable of supporting the data collection necessary to produce the needed performance measures in a useful and readable format. Many of the DOTs had stacks of data outputs, which was very difficult to decipher how their fleet was performing. Whereas, the states that were using visual output (charts and graphs), could easily see how their operation was performing and progressing, proving the old adage that "Pictures are worth a thousand words."

Two of the biggest problems faced by states with sub-par fleet management systems are the quality of data available and no standardization throughout the organization. Often data are collected, but are inaccurate. The saying "garbage in equals garbage out" holds true. In addition, there were really no formal actions taken based on the outputs of the measures used. Often states were just monitoring and did not have targets or take action based on results; their main objective was to "Survive to the end of the fiscal year." The following list briefly highlights some of the problems which state DOTs are experiencing:

- Data quality problems/ inaccurate data (garbage in = garbage out)
- No standardization throughout the organization (terminology varies)
  - → Ex: defining scheduled vs. unscheduled repairs
- Can not just look at outcomes, especially with bad data
- Getting buy in from regions/districts to support the measures

- Hard to enforce universally
- Hard to manipulate data and to extract it from information system
- Building charts and graphs is difficult and time consuming
- States are tracking many items, however, don't really use the results and/ or are tracking the wrong things

The root cause of the problems with data collection is a lack of an information system that is capable of supporting their needs. Information systems at many DOTs are outdated, as discovered in Phase I and are very difficult to work with. If graphs and charts can not be produced with minimal effort, they will not be generated for long.

Throughout the interview process there were many quotes or common themes, which the fleet managers and others who participated mentioned. Many of the comments were very interesting and worth noting because they seem to hold true for many of the states feelings on how their operations are run.

- "We are consistently inconsistent"
- "We have 1 state, but it operates like 7 states within 1 state"—In reference to their decentralized districts not operating efficiently
- "The term benchmarking is relatively unknown within DOTs"
- "We have a lot of data, but is not easy to extract"
- "Manipulating data so that it is useful is the most important task of evaluating data or performance"
- "We generate a lot of reports, but nobody uses them because they are worthless"
- We run a "Hopeful replacement program"-this seems to be a trend in both the private and public sector, especially in times of budget cuts
- "Nothing drives decision making like a fiscal budget"
- "People entering the data do not understand the data"
- "Data entry people do not have ownership of the measures, which causes data quality issues"
- "Because we are decentralized, accountability is decentralized"
- "Just by looking at the measures might not show obvious changes, however, this could change the thoughts and mentality of the employees" –improves quality
- "Improvements were observed just by making districts aware of the problems"
- "If you measure it, you can improve"
- "If you do not measure, how do you know how or where to improve?"
- "IT system is critical for data manipulation"
- "We run our state like a business"--stated by Arizona, a DOT leading in performance measures

With many of the problems state DOTs are facing, there are many noted benefits or reasons for using performance metrics to help eliminate or control these problems. The following list briefly states some of the reasons why states are using metrics in their fleet operations.

- Focus efforts on personnel and equipment;
- Justify appropriations (using hard facts to go to the state legislature);

- Improve processes;
- Improve life cycles based on measures;
- Let executive management know conditions of fleet;
- Show how the DOT has evolved; and that
- Measures are a useful tool and provide a snapshot of the fleet and how it is performing.

Some of the most significant results of having performance measures cited by fleet managers are:

- More awards and certifications of shops
- Reduced operations costs
- Improved operations and efficiencies
- Improved training and more certified mechanics
- Decreased maintenance costs from increased PM's
- More replacement funding
- Reduced fleet size and age of fleet
- Improved sharing between districts
- Quality of equipment has improved

With the many benefits noted above of using performance measures, it is very surprising that there are still many DOTs which do not use metrics to control and monitor their fleet. It was apparent that there is a wide gap between those DOTs which are using measures and those that are not. Those DOTs who are using measures seem to be running an efficient fleet and have documents to back this, whereas the states with no measures really aren't sure how their fleet is performing, rather it is more an educated guess or feeling.

During the benchmarking interviews, each state was asked what their short and long term goals were. The leading states responded with many short term and some long term goals, whereas the states that were lagging behind either had only a few or tended to be marching to the quote "we are just trying to survive to the end of the fiscal year." The following is a summary of the short and long term goals complied from the MnDOT/UMD benchmarking visits and interviews. The list was derived mainly from the leading states, however, some of the states that were in the early stages of developing performance measures were also included.

Short Term Goals:

- Obtain proper funding for the fleet
- Focus on their strength (the people are what makes things run)
- Improve communication and develop mutual understanding
- Provide a comprehensive technician development program
- Maintain a culture of safety
- Try to build accountability at the lower levels
- Get the right mix of equipment and measures
- Better buying practices and justifications
- Break each measure down to determine which measures affect others
- Improve data collection
- Work on developing reports that the customers can use
- Currently look at measures for the shop level because that is where the root causes are
- Reduce fleet size

- Get new information system up and running (interface with the other areas)
- Survive to the end of the fiscal year
- Establish performance measures
- Develop strategic plan (only 1 state said this)

Long Term Goals:

- Need to compare ourselves with other DOTs and private companies
- Make sure that the legislature and taxpayers know they are getting the best bang for their buck (Put on the taxpayers hat)
- Do not operate like "crisis management"
- Determine what the optimal fleet size is (no justification, but a feeling that it is too large)

One interesting finding from the interviews was the use of an organizational performance index chart. Only two state DOTs, New York and Pennsylvania, were using this quality tool to track the development or progress of their operation towards targets and goals. This type of chart shows an overall picture of an organization's drive towards improvement. It combines any combination of measures, usually a select few viewed as critical to the organization, and weights them to their impact on the organization's drive towards improvement. Table 17 shows an example of what MnDOT's current organizational performance index could look like. The index design was adapted from Pennsylvania and New York DOTs and was modified to fit MnDOT's measures. The index value includes three performance measures that MnDOT believes are critical to operating their fleet: Units within Life Cycle, Preventive vs. Reactionary Work Orders, and Equipment within Utilization Standards, all of which are shown. PennDOT and NY DOT each had roughly 5 to 6 measures in their organizational index. Table 17 shows the weighted factors and the scoring method MnDOT could use for its index. The final outcome or product of Table 17 is an Organizational Performance Index Chart, shown in Figure 20.

Table 17. MnDOT's Fleet Management Organizational Performance Index for Sept. 2002

Services		Safe, Dependable, Economic Fleet	Dependable/ Reliable Fleet	Optimal Fleet Size
Measure of Performance		Units within Lifecycle	Preventive vs. Reactionary Work Orders	Equipment within Utilization Standards
Actual Results (Sept 2002)		58.00%	34.00%	53.00%
Targets				
Green (end of 04')		90.00%	70.00%	95.00%
Yellow (end of 03')		70.00%	50.00%	80.00%
	Score			
Potential	10	100.00%	90.00%	100.00%
	9	94.00%	83.40%	94.80%
	8	88.00%	76.80%	89.60%
	7	82.00%	70.20%	84.40%
	6	76.00%	63.60%	79.20%
	5	70.00%	57.00%	74.00%
	4	64.00%	50.40%	68.80%
	3	58.00%	43.80%	63.60%
	2	52.00%	37.20%	58.40%
	1	46.00%	30.60%	53.20%
Baseline (Worst %)	0	40.00%	24.00%	48.00%
Score		3.00	1.52	0.96
Weight		30.00%	20.00%	50.00%
Value		90	30	48
Total Index Value for Sept 2002 =	168			

Figure 20. MnDOT (Fleet Management)- Statewide Organizational Performance Index Chart

The three measures were implemented in September 2002 and were tracked every month until January 2003, when the measures began to be evaluated on a quarterly basis. This graph is a useful visual tool that shows the organization's progress towards quality improvement. By plotting a trend line and extending it into the future years, predictions can be made of when targets and goals will be met. According to Figure 20, the organizational performance index value dramatically increased within the first four months, which is shown by the line chart. If the trend line was extended until it crosses each of the target index values, the first target would be reached in October of 2003 and the final target would be reached approximately in January of 2005. Another significant aspect of this chart is that it can be used by any type of organization, not just fleet management. Since the performance measures have been implemented, there has been a reduction of 506 units since September 2002.

Chapter 4: Summary, Conclusions and Recommendations

Summary and Conclusions

Fleet management has been practiced for some time in the private sector, but it is relatively new for state departments of transportation. Spectrum Consultants, Inc. (2002), report that "Fleet managers have little definite information on industry-wide standards for mixed fleets in the public sector and many fleets showed little evidence of using performance measures or best management practices, policies and plans common to efficiently operate fleets." The growing attention on fleet management has been based on budget shortfalls which states are now experiencing. States are searching for new and innovative tools to improve operations by reducing costs and yet still meet the demands of the taxpayers and state officials. The use of performance measures helps many organizations to manage their fleets and improve to meet their customer expectations and requirements.

This research has used benchmarking to assist the Minnesota Department of Transportation to identify where to concentrate on managing its fleet assets. The project began by using quality tools such as cause and effect analysis and quality function deployment to prioritize MnDOT's needs. The first phase used benchmarking to identify best practices in the private and public sectors focusing efforts across three areas of concern, cost issues, policy practices and organizational structure. Through surveys and an exhaustive literature review, benchmarks were chosen which consisted of two private companies, Iowa DOT, the Minnesota Department of Natural Resources and finally an internal benchmark of MnDOT. The second phase was the largest part of the project consisted of an initial survey and set of benchmarking visits to identify best practices in performance measures used by state transportation departments across the United States. An exhaustive survey identified most frequently used measures and was used to compare MnDOT with the average. Benchmarking visits to seven states yielded a deeper understanding of the use of performance measures, and identified several best practices.

Overall, this benchmarking project provided a means for MnDOT to compare themselves with what the private and public sectors are doing. Some general conclusions from Phase I include:

- In previous years, the private and public sector have been viewed as complete opposites. Initial benchmarking results shows that many of the fleet management standards and practices of DOTs are relatively similar in nature to that of the private sector.
- Valuable information (practices) can be gathered from the private sector and applied to public agencies, in particular DOTs. Also, benchmarking across other DOTs can help to eliminate the concept of "reinventing the wheel."
- Setting targets and goals based on benchmarking others can be a valuable resource, however, when benchmarking it is important to adapt practices, not adopt them.
- MnDOT needs to improve its maintenance practices and policies. More measures need to be added in this area. In particular, MnDOT can work on its ratio of scheduled vs. unscheduled repairs.
- MnDOT is lacking in purchasing standards compared to other DOTs and private sector.
- Most DOTs and private companies have decisions made from a centralized location which helps things run more efficiently.

- Surprisingly, the average age of the surveyed DOTs and private firms current organizational structure is 12 years old, where MnDOT's is 20 years old.
- A growing trend seems that more and more DOTs' divisions/ districts are paying equipment and/or user fees to a central account to reduce fleet size and increase utilization.
- Most DOTs fleet management systems are older than 5 years, where MnDOT's (M4) is less then 2 years. Fleet management systems play a critical role in managing a fleet. Older systems aren't able to help monitor and control the fleet operations without added labor hours.
- Only four of the seven private companies surveyed were willing to benchmark.
- Relatively few states are working towards the Malcolm Baldrige National Quality Award. Four of the states MnDOT benchmarked were working towards the MNBQA, and two of the four were leaders in the use of performance measures within fleet management across the DOTs benchmarked.

These items mentioned above are some general conclusions or practices observed in the first phase of this project. The second phase consumed most of the project and focused on performance measures in fleet management within only state DOTs. Throughout the benchmarking interviews, each DOT was asked why their state has changed its management practices and started to focus on measuring performance. There were 5 main areas that were identified:

1. Measures help to monitor and control operations and work towards goals.
2. Measures are needed to reduce the size of the fleet because it is too large.
3. Monitoring the fleet and costs help to recognize when to replace equipment in order to better quality equipment which is newer, more reliable and safer.
4. Metrics provide justification of dollars to senior-level management.
5. Measures help support decisions because they are based on facts.

Important conclusions from this research include:

- Performance measures are increasingly being used by state transportation departments, consequently better decision making is based on facts.
- There is a large gap between the states. Either they are doing a good job using fleet management performance measures or they are not using them.
- MnDOT has selected many measures appropriate to its organization. It should add more at the shop level for better control of maintenance.
- There appears to be a weak correlation between the number of performance measures and the success of fleet management. Arizona and Pennsylvania are leaders and have more measures than MnDOT. However, MnDOT appears to be more successful than other states which use a few more measures.
- Visual measures are much easier to use for management than are tables of data.
- The organizational performance index is an excellent holistic measure. Although intended for fleet management, it can be adapted to any organization and at any level of the organization.
- Arizona and Pennsylvania are the leaders in implementation and use of performance measures in fleet management with Minnesota close behind.

- Benchmarking can provide excellent information for improving management. Identifying the best practices in other organizations and adapting them to one's own organization can provide for increased productivity and effectiveness.
- Performance measures need to be taken, but the information must be readily processed and available for decisions to be made. It is important to use the information collected and that it is accurate; otherwise it is a waste of resources.
- If there is a lack of consistency between districts or regions within states, performance measures help standardize data collection, monitoring, and decision making.
- Most DOTs do not have a formal benchmarking process. More states need to benchmark to reap the benefits and to improve operations to benefit the taxpayers.
- Accountability at all levels of the organization needs to be improved. Establishing measures is an excellent way of holding personnel accountable.
- The leading DOTs have a strategic plan which includes short and long term goals and use performance metrics to work towards these goals. Lagging DOTs need to avoid operating using "crisis management" and move from the concept of trying to "survive to the end of the fiscal year," instead they need to focus on a plan (short term and long term) to improve and become more efficient.
- The majority of state DOTs are in the early stage of either thinking about using measures or are developing them. Their fleet management system seems to be critical in how quickly their DOT progresses.
- DOTs fleet management systems generate many reports, which can be very data intensive and very labor intensive. The data requires in-depth research and calculations to figure out how the fleet is performing. The fleet management system must be able to produce useful reports and charts to better manage the fleet in an easier manner.

In summary, this benchmarking project should prove to be very valuable for MnDOT in improving their fleet management program. Using the benchmarking process was a learning event for all involved and was very beneficial for understanding both the private and public sector practices, and also internal practices and processes. Many questions focused on key areas of interest and were identified in Phase I and Phase II. This research helped to determine that MnDOT's current measures are a good foundation of core senior-level measures for managing a fleet. MnDOT ranks towards the top as far as using performance metric to manage their fleet as compared to the DOTs benchmarked. MnDOT's use of visual graphs and charts to monitor progress is the main reason for their advancement and success. However, there are still some areas where continued improvement can be achieved. Establishing lower level measures at the shop level is critical for tackling the problems where they begin. Often states are monitoring the wrong items, thus wasting their time and resources. Consequently, MnDOT needs to continually use their fleet management system to help extract relevant information from their fleet operations to better monitor other areas of concern. Other DOTs that were benchmarked had a difficult time using their fleet management system because it was outdated, MnDOT should not have this problem because their system is approximately two years old. For MnDOT to become one of the leaders, they need to continually evaluate their fleet operation by comparing themselves with others both in the private and public sectors as was done in this project. Benchmarking will allow MnDOT to stay competitive and also continually help to cut costs and run an efficient operation. Overall, the benchmarking study was a success with all project objectives being achieved. The final step to conclude this benchmarking project involves taking the observations

and best practices observed and using them to set goals. The following section uses these conclusions and discusses a list of recommendations for MnDOT.

Recommendations

The recommendations listed in this section are based on the research done through literature and benchmarking surveys and interviews. The following list provides a list of direct recommendations and indirect recommendations. The direct recommendations are direct findings from the scope of this project. The indirect findings were beyond the project's scope, but were observed as good practices that MnDOT should consider.

Recommendation # 1—Establish measures at the senior (state) level, district level, and shop level.

Problem: Although, MnDOT's current senior-level measures have been well received by many and have seen dramatic improvements within each of the measured areas, these measures only monitor the state as a whole; there are no shop and fewer sub-district level measures. It has been mentioned that the districts would like to see how their districts and/or shops are progressing in comparison to the overall state picture. Finally, some of the problems MnDOT is facing, which were identified through the CEA in the early stages of this project, are:

- No standardization from district to district, or shop to shop
  - Data collection methods and definitions vary
  - Policies are weak and not fully coherent
  - No common reporting
  - Different goals
- A lack of accountability at many of the levels of the organization
- There are no controls from a central position to monitor the districts and shops (very decentralized)
- Lack of information sharing
- In-adequate picture of how the fleet is performing
- Non-existent mechanic performance standards (this is also shown in Figure 14 and 15 from the survey results, MnDOT is lacking in this area compared to other DOTs)
- Insufficient data to support decision makers
- Insufficient number of staff for data analysis
- Current targets lack supporting history to make decisions

Solution: Consequently to address the many problems listed above, MnDOT's fleet management section should implement additional **senior-level** measures along with developing **district level** and **shop level** measures. Of all the recommendations, this is probably the most important because it answers many of the problems MnDOT is currently facing. Table 18 identifies a list of measures that MnDOT should be tracking at each of the three levels. The table presents the recommended performance measures and their definition/rationale for being tracked. Each measure also shows what area it is managing (maintenance, fleet replacement, etc.) along with when to monitor it and at what levels of the organization. The measures chosen were based on what other state DOTs are using, and because they are deemed to be very beneficial in managing a fleet. The measures were limited to 24 because too many measures can be very cumbersome.

Table 18. Proposed Measures for MnDOT at the Senior, District, and Shop Levels

#	Performance Measure	Definition/ Rationale	Type of Measure	Level to Monitor	When to Monitor	Status
1	Maintenance & Repair Cost per Mile/Hour by Vehicle Type or Class	Total dollars spent on fully burdened labor, parts and commercial services divided by vehicle miles or hours. Normally excluded are costs associated with warranty work, make ready work and accidents. The lower the number, the more efficient an organization is managing and maintaining it's fleet.	Cost	Statewide, District, Shop Levels	Quarterly	
2	Total Vehicle Cost per Mile/Hour by Vehicle Type or Class	Measures the unit cost of a fleet mile or hour driven by class or by vehicle. Provides an indicator of cost savings achieved (mismanaged capital resources - identification of ineffective replacement, purchasing, and disposal practices, etc). All costs associated with the vehicle from purchase to disposal, such as fixed costs (depreciation, tax, tags, title, insurance, and overhead); operating costs(fuel, oil, fluids); and maintenance costs (parts, labor, tires, batteries).	Cost	Statewide, District, Shop Levels	Quarterly	
3	% of Fleet Below Utilization Targets	Measures the ideal fleet capacity and waste of fleet resources; aids in establishing realistic vehicle assignment criteria (internal trend analysis). A low utilization could indicate over capacity and wasted resources or a small geographical service area.	Assignment	Statewide, District, Shop Levels	Quarterly	MnDOT Present
4	% of Fleet Out of Life Cycle	Measures the compliance and commitment to the policy of the organization's replacement criteria program.	Fleet Replacement	Statewide, District, Shop Levels	Quarterly	MnDOT Present
5	Fully Burden Labor Rate of Mechanics for Light Duty, Heavy Duty and Others	Measures the efficiency of maintenance and repair services performed against other providers of these services; Makes fleet management aware of their costs and encourages fleet users to hold fleet management accountable for the cost and value of the service (be certain to compare apples to apples).	Fleet Services/ Maintenance & Repair	Statewide	Yearly	
6	Average Repair Costs by Vehicle Class	Measures the cost of maintenance and repair, and permits benchmarking against private contractors and other public maintenance & repair services. If the average repair costs are not decreasing, the PM program may not be successful. Tracking on a monthly basis can show cyclical trends, this should be questioned and causes identified. For example, if the winter months typically experience a higher then average repair cost, this could show that there are possibly more accidents during these months. In addition, more out-sourcing may be required to keep up with repairs, which would identify the need for more mechanics during these months.	Maintenance and Repair	District, Shop Level	Monthly	

#	Performance Measure	Definition/ Rationale	Type of Measure	Level to Monitor	When to Monitor	Status
7	Labor Hour Utilization (Ratio of Direct Labor Hours to Indirect Labor Hours by Shop)	Measures the utilization of mechanic/technicians and whether staff is used productively; if indirect manpower is reasonably reduced and controlled, the effect on total overhead expenses and fully burdened labor rate can be significant.	Maintenance and Repair	Statewide, District, Shop Levels	Monthly	
8	Return to Service Rate (% Returned in 24hrs, 2 days, Greater then 2 Days)	Measures the efficiency of mechanics/technicians repair services; promotes focus on turnaround time/out of service time. Typical performance target: 70%, 20%, 10% respectively.	Maintenance and Repair	Statewide, District, Shop Levels	Monthly	
9	Downtime Percentage	Measures downtime due to maintenance and repair; by class of vehicle; excludes accidents. The number of hours that a vehicle is unavailable for use during the hours it is normally available because it is being maintained or repaired. Targets medium/heavy- 2-4 %, specialized 6-8 %.	Maintenance and Repair	Statewide, District, Shop Levels	Quarterly	MnDOT Soon
10	Ratio of Internal vs. External Dollars Spent on Repairs	Identifies the use of external help for repairs, which could show that MnDOT's maintenance staff is; not qualified, understaffed or labor rates are cheaper outside of the organization. This could also show more expensive repairs tend to be out-sourced.	Maintenance and Repair	District, Shop Levels	Monthly	
11	% of Technicians or Mechanics ASE Certified	Measures how qualified the maintenance staff is. A higher % of certified mechanics could reduce the # of out-sourcing tasks and ultimately may reduce overall repair costs if in-house labor is cheaper. See measure 10.	Maintenance and Repair	Statewide	Yearly	
12	% of PMs Overdue	Measures effectiveness of PM program compliance; typical performance target for PMs completed on time is 95% to 98%.	Maintenance and Repair	District, Shop Levels	Monthly	MnDOT Present
13	Ratio of Preventive Maintenance (PM) to Reactionary Repairs	Measures the adequacy of the PM program in preventing vehicle repairs. Make sure to clearly define what is preventive maintenance and what is reactionary repairs	Maintenance and Repair	Statewide, District, Shop Levels	Quarterly	MnDOT Present
14	% Breakdown of Reactionary Repairs by Vehicle Class	Measures which classes of equipment are breaking down most often. Could help to improve purchasing standards of better vehicles and equipment.	Maintenance and Repair	Statewide, District, Shop Levels	Quarterly	
15	# of Reportable Accidents	Provides a safety indicator of the fleet. Trends can be identified and action can be taken to reduce this. For example, if there are a higher number of accidents during the winter months, increase winter driving training may be needed.	Maintenance and Repair	Statewide, District, Shop Levels	Monthly	

#	Performance Measure	Definition/ Rationale	Type of Measure	Level to Monitor	When to Monitor	Status
16	% of Repairs Due to Operator Abuse, Accidents, Unexpected Repairs, and PMs	Breaks down repairs into categories to identify areas of needed attention. If abuse is high, it could indicate a need for disciplinary actions pertaining to the use of the vehicles. If accidents are high, this indicates more vehicle training is needed or disciplinary actions are needed. Finally, if unexpected breakdowns are high, the PM program could be bad. Unscheduled repairs would have to be broken into categories of abuse related, accident related and unexpected repairs.	Maintenance and Repair	Statewide, District, Shop Levels	Monthly	
17	# of Vehicle Tow-In Road Call Actions	Measures how well the PM program is operating. Shows cyclical trends.	Maintenance and Repair	Statewide, Shop Levels	Monthly	
18	Breakdown of Total Costs of PM Maintenance, Abuse, Accidents and Unexpected Repairs	Provides an overall picture of the maintenance and repair program and could help to focus attention on certain areas. If PM costs are increased to establish a better PM program, unexpected repairs should decline thus observing reduced costs of unexpected repairs.	Maintenance and Repair	District, Shop Levels	Quarterly	
19	Driver/Operator to Equipment Ratio	Provides a benchmark for comparison with other fleets; may be particular useful in fleet agencies that provide services to customers with similar characteristics, such as other DOTs. May help to identify optimal staffing requirements.	Maintenance and Repair	Statewide, Shop Levels	Yearly	
20	Vehicle-Hours (or Days) Lost Waiting for Parts	Provides a measure of the downtime due to waiting for parts services.	Inventory	Shop Levels	Monthly	
21	Inventory and/or Parts Turnover Ratio	Measures stock utilization as a portion of maintenance and repair production; determining the turnover ratio gives an indication of excessive or depleted stock levels; it also highlights slow moving and/or potentially obsolete stock.	Inventory	Statewide, Shop Levels	Quarterly	
22	Automotive Parts Inventory Totals (Dollars and # of Parts)	Measures value of the parts inventory and the amount (volume) of inventory.	Inventory	Statewide, District, Shop Levels	Quarterly	
23	Total Fuel Consumption and MPG by Vehicle and/or Vehicle Class	Provides an indicator of the fleet's energy efficiency and operating effectiveness for corrective action. Could help identify when to service a vehicle for PM service based on fuel consumption (gallons used), mileage or engine hours.	Fuel	Statewide	Yearly	
24	Fleet Size	Identifies the reduction in fleet size because of performance metrics.	Fleet Size	Statewide	Quarterly	MnDOT Present
* Many of the definitions/rationale were adapted from Spectrum Consultants Inc., "Best Fleet Management Practices and Performance Measures Manual."						

In addition, when these measures are broken down to a few at each of the levels, they are more manageable. The measures should be standardized throughout the state for every shop and district so that all involved will be working toward common goals. All definitions will be the same (standardized) across the state, which will help for comparison with other shops and districts. Appropriate time frames for tracking are recommended (monthly, quarterly, yearly). The list below breaks down the number of proposed measures by categories and by levels within the organization.

Type of Measure		Number of Measures
■ Cost	=	2
■ Assignment	=	1
■ Fleet Replacement	=	1
■ Maintenance & Repair	=	15
■ Inventory	=	3
■ Fuel	=	1
■ Fleet Size	=	1
		24 Total

	Number of Measures		Monthly	Quarterly	Yearly
Statewide Level	19		5	10	4
District Level	16		7	9	0
Shop Level	20		9	10	1

The measures chosen will also help provide more control at the lower levels where many of the problems may begin. The senior-level measures will help to continually monitor the states overall improvement. In addition, better accountability at all levels of the organization will be achieved if these measures are monitored, hence establishing an organization that is working towards continuous improvement at all levels of the organization. Once the measures have a sufficient amount of data history, better targets can be assigned and improved fleet decision making will be possible for those in charge.

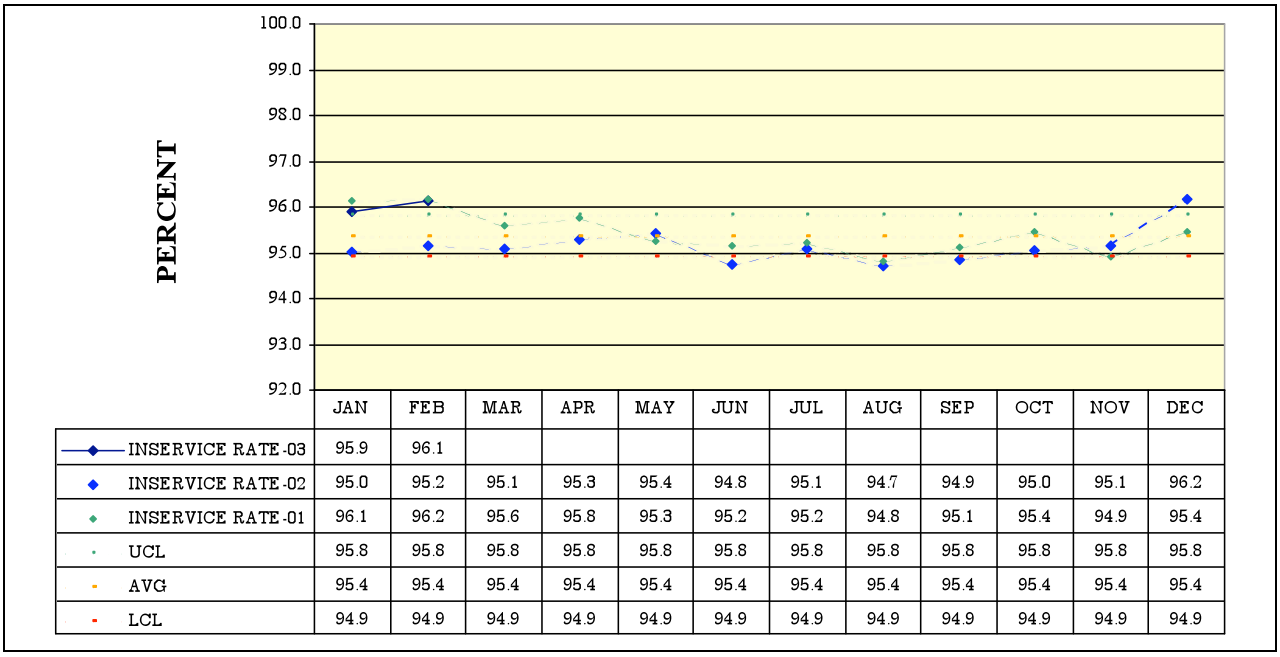
Recommendation # 2—Establish upper control limits and lower control limits for appropriate measures.

Problem: Current targets lack supporting history to make decisions.

Solution: With MnDOT adding and modifying measures, it is important to obtain a quality data history which will probably take one or two years to establish. Once the measures have been established and had adequate time to stabilize, the use of upper control limits (UCL) and lower control limits (LCL) should be used. Control limits are a useful statistical quality control management tool which monitors performance of an operation based on past history. The limits should be based on 1 standard deviation. If performance goes above or below the limit, this should trigger senior management to ask their lower level managers and supervisors to evaluate what is causing this. MnDOT should use a similar format as shown in Figure 21, which is used by Arizona DOT to track "In Service Rate." Looking at the graph, one might ask why is it important if performance is above the UCL, typically this would be a good thing. In this example, if the service rates go up, the direct result is the PM program has probably gone bad

because most vehicles will break down at some time, unless the vehicle is abiding by a strong predictive and preventive maintenance program. This can be validated by looking at the PM measures graph. Finally, using control limits allows one to see past data and, as in the case of Arizona DOT, cyclical trends can be seen based on a three year history. In Figure 21, during the summer months, is when Arizona DOT has the highest downtime rate, which can be attributed to the high heat.

Figure 21. Example of Arizona DOT Using Control Limits to Monitor In-Service Rates



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
INSERVICE RATE-03	95.9	96.1										
INSERVICE RATE-02	95.0	95.2	95.1	95.3	95.4	94.8	95.1	94.7	94.9	95.0	95.1	96.2
INSERVICE RATE-01	96.1	96.2	95.6	95.8	95.3	95.2	95.2	94.8	95.1	95.4	94.9	95.4
UCL	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
AVG	95.4	95.4	95.4	95.4	95.4	95.4	95.4	95.4	95.4	95.4	95.4	95.4
LCL	94.9	94.9	94.9	94.9	94.9	94.9	94.9	94.9	94.9	94.9	94.9	94.9

Recommendation # 3—Develop a Fleet Management Organizational Performance Index Chart and Shop Level Performance Index Chart.

Problem: The senior-level measures address particular areas of fleet management such as fleet utilization or downtime, but the big picture of how all these measures are helping the state is missing.

Solution: An Organizational Performance Index Chart as mentioned in Chapter 3 is a useful tool for showing how all these measures can work towards an organization's overall goal. Only a few DOTs are using such a tool, however, it is a valuable tool that can help show how the organization is progressing. Figure 19 is an example of what MnDOT's Organizational Performance Index Chart would look like for the few senior-level measures it is currently using. This tool can show that progress is being made towards established targets and goals. Table 19 is an example organizational performance index table which MnDOT should consider using to monitor its progress of a few key measures of fleet management. Tracking downtime and the number of vehicle accident repairs were added. Adding the measure of downtime is already underway and the number of accident repairs would be an important addition because there are no measures MnDOT is using that are related to safety, which should be a core measure of MnDOT's fleet. The main objective of the organizational performance index is to capture the

main areas of the fleet that are supposed to be most important to meeting the objectives and goals of the organization. Row 1 shows why each of the measures are used and what the objective of these measures are. With this index established, a chart similar to the one shown in Figure 19 can be created. This index format should first be applied at the senior level, and then can be used at the shop levels if desirable.

Table 19. Proposed MnDOT (Fleet Management) Organizational Performance Index

1	Services		Economic Fleet	Dependable/ Reliable Fleet	Optimal Fleet Size	Dependable Fleet	Safety
2	Measure of Perf.		Units within Lifecycle	Preventive vs. Reactionary Work Orders	Equipment within Utilization Standards	Downtime %	# of Vehicle Accident Repairs
3	Actual Results (Sept '02)		58.00%	34.00%	53.00%	8.00%	20
4	Targets						
	Green (end of '04)		90.00%	70.00%	95.00%	5.00%	10
	Yellow (end of '03)		70.00%	50.00%	80.00%	10.00%	15
5		Score					
	Potential	10	100.00%	90.00%	100.00%	3.00%	0
		9	94.00%	83.40%	94.80%	4.20%	4
		8	88.00%	76.80%	89.60%	5.40%	8
		7	82.00%	70.20%	84.40%	6.60%	12
		6	76.00%	63.60%	79.20%	7.80%	16
		5	70.00%	57.00%	74.00%	9.00%	21
		4	64.00%	50.40%	68.80%	10.20%	25
		3	58.00%	43.80%	63.60%	11.40%	29
		2	52.00%	37.20%	58.40%	12.60%	33
		1	46.00%	30.60%	53.20%	13.80%	37
6	Baseline (Worst)	0	40.00%	24.00%	48.00%	15.00%	41
7	Score		3.00	1.52	0.96	5.83	5.12
8	Weight		20.00%	10.00%	50.00%	10.00%	10.00%
9	Value		60	15	48	58	51

Total Index Value for Sept '02=	233
Total Possible Index Value Green=	847
Total Possible Index Value Yellow=	552

* Downtime was not tracked at this time, so the actual results are an estimate. The targets for Downtime % and # of Vehicle Accidents are not official, they were set as an example for this index table.

Recommendation # 4—Develop a strategic plan that includes short term and long term goals.

Problem: Most of the states that were observed as being high performing states within Fleet Management, all had strategic plans on hand (physically) that were broken into short term and long term goals.

Solution: Create a strategic plan, short term goals are 6 months to 2 years and long term are 2 to 5 years. A strategic plan provides a framework for organizing and prioritizing fleet goals, policies, and performance measures. The strategic plan could be compared with targets set and used in conjunction with the Organizational Performance Index Chart. This analysis could be shared with the legislature and taxpayers, which can show progress that the fleet is making towards quality improvement.

Recommendation # 5—Start using MnDOT's fleet management system to predict future breakdowns and failures of equipment based on past history.

Problem: MnDOT has a poor preventive and non-existent predictive maintenance program.

Solution: MnDOT needs to start using data history from their fleet management system to start making more economical decisions based on facts. Similar to Arizona DOT, MnDOT needs to use their data history to evaluate when pieces of equipment tend to break or fail. For example, Arizona was experiencing many tire failures which can be very costly when someone has to go to the vehicle where ever that may be and change the tire. It's also very unsafe for the driver and those are around them if a tire were to fail while driving. Consequently, using their fleet management system, Arizona performed a tire study and determined that all tires should be replaced after four years of age regardless of use. Tires were failing around this point even if the tire tread was adequate. This is a great example of how MnDOT could use their fleet management system to better predict vehicle and part failures. Using this information can also help identify why these problems may occur. Similarly, the fleet management system can also evaluate past data to help determine when vehicles/equipment should be disposed of, in addition to help develop economic purchasing standards, which is discussed in more detail in the next recommendation.

Recommendation # 6— Establish purchasing standards for each class of equipment based on MnDOT's data history.

Problem: MnDOT fleet management does not have any documented purchasing standards. According to the benchmarking findings, most DOTs and private companies have purchasing standards for each class of equipment.

Solution: As mentioned in the previous recommendation, MnDOT's fleet management system should be able to provide data for better purchasing standards to be developed. MnDOT has had the tendency to purchase the least expensive vehicle when all factors are not considered. However, using past data of relevant operational data, better decisions on which vehicle or piece of equipment to purchase can be used. Consider for example, if MnDOT would like to purchase a set of trucks in a certain class. Based on past history MnDOT can perform a study where they evaluate which truck (diesel or regular) would be the best choice. For example, the diesel may be less expensive to buy, however, according to past data the vehicles maintenance is more costly to maintain then the regular truck. As a result, by evaluating the history of equipment, more economical decision can be made based on facts. In addition, if MnDOT for example wants to compare a Ford vehicle with a Dodge, to see which truck is less expensive to maintain, such an analysis could be done by evaluating all factors that go into maintaining a vehicle (fuel, maintenance, depreciation, salvage value, etc). Consequently, if there are two available trucks, one being a diesel and the other a regular, MnDOT can pick the more economical one based on facts from past history. Also, MnDOT should use data history to determine if certain pieces of equipment should be purchased or if it would be cheaper to rent that piece of equipment.

Recommendation # 7— Conduct a cost/benefit analysis on the measures proposed and already in place.

Problem: MnDOT does not have much supporting material/ facts of cost benefit analyses of past management changes.

Solution: MnDOT should conduct a cost/benefit analysis to see the cost savings and improved efficiencies from implementing the performance measures both proposed and already in place. Adequate time should be allowed for the measures to take effect and for results to be seen. The analysis should begin approximately one year after implementation. (Ex: What type of cost savings have been recognized from the reduced fleet size because of the implementation of the various performance measures?)

Recommendation # 8—MnDOT needs to consider moving from a decentralized fleet to a centrally managed fleet (centralize fleet purchasing, ownership, and resale).

Problem: MnDOT currently operates as a decentralized system where the districts are assigned a budget and they purchase their own vehicles and monitor and control them. The problem is, vehicles are not utilized enough and there are too many people in charge of managing the states entire fleet. Although there has been a great reduction in the fleet size with the addition of the utilization measure, there is still a lot of room for improvement. Also, sharing of equipment between districts is absent and could be improved.

Solution: Consequently, a centrally managed fleet would help to eliminate these problems. The main advantage of a centrally owned fleet is its ability to run a more efficient fleet. A more efficient fleet is possible because vehicles and equipment can be monitored from a central location, which allows for equipment to be utilized more throughout the state and reduce the fleet size. If there is a piece of equipment that is being under utilized by a particular district, it can be transferred to a district that may need it. Also, a centrally managed fleet would delegate one person for the responsibility of the entire fleet. The planning, directing, managing, coordinating and supervising programs for the acquisition, assignment, utilization, maintenance and repair, replacement and disposal of the vehicle should be delegated to one fleet manager (Spectrum Consulting). A centrally managed fleet could possibly provide for more economical maintenance practices from district to district. Policies would be standardized for the entire state and district can eliminate the idea that they only can fix their vehicles and equipment not other districts.

Some of the benefits of a decentralized fleet can not go unexplained. Decentralized fleets may not be as economical as a centralized fleet, it is however, more flexible to changes. Problems that may occur in one district may not occur in other districts. This type of problem could result in some districts needing different equipment. Consequently, decentralized fleets can be more tailored to the districts' needs.

Recommendation # 9—If a centrally owned fleet as mentioned in recommendation 8 would be adopted, a user fee and/or internal rental rate for each district would need to be established.

- Rental rates and user fees will help make sure vehicles and equipment are utilized. If the piece of equipment is sitting around, the district will be charged if it is used or sits. Consequently, that district will make sure that it really needs that piece of equipment, otherwise they won't rent it. This will reduce the fleet size even more. New Hampshire reported a 20 percent reduction in fleet size using this method. Internal rental rates can be used to fully recover:
  - Replacement (depreciation & new equipment inflation),
  - Unavoidable operating expenses,
  - Purchasing,
  - Disposal and overhead costs.

Recommendation # 10—Establish a bar coding system for all parts within MnDOT.

Problem: MnDOT does not use bar coding to track their parts inventory levels, which has resulted in higher levels of inventory and inefficient transporting of parts.

Solution: Establish a bar coding system can monitor where parts are and their usage, in addition to reducing inventory costs. Iowa DOT had an excellent inventory system where every piece of equipment is bar coded. This helps for locating parts and reduces the amount of inventory needed because there is an exact account of where each part is. By stocking fewer types of parts, inventory management tasks are simplified and inventory-carrying costs are reduced. For example, MnDOT's District 1 and 2 may have the same part in each of their inventory centers, however, if the part were expensive and infrequently used, it may only be necessary for one of them to carry the part. Added inventory can accumulate lots of unnecessary dollars. Using the bar codes provided by the manufacturer should be researched. While inventory was not a direct research goal of this project, it was an important element of managing a fleet, in particular inventory management.

Recommendation # 11— Move from an appropriation to a revolving account.

Problem: The fleet replacement budget is not enough to sustain the current fleet according to its economic replacement points (life cycles). Currently, MnDOT's budget is of the appropriation type where MnDOT is given a budget each year by the legislature to fund their operation, where in turn MnDOT distributes various portions of the allocated money to the different departments that make up MnDOT. The fleet management division is allocated a set amount of money, which is dedicated for running their fleet. In particular, the fleet division has a vehicle replacement fund for the purchasing of new vehicles and equipment. When old pieces of equipment are beyond their life cycles, they need to be sold and new equipment is needed to replace them. With an appropriation account, the proceeds from the vehicle and equipment resale are returned to the general Minnesota fund, not MnDOT's fleet replacement account. Consequently, each year the legislature re-evaluates MnDOT's needs and re-distributes a new set amount of funds.

Solution: A revolving account was identified as the preferred funding type by most that were benchmarked. Fleets using this form of funding had a higher percentage of their fleet replaced according to their life cycles, thus creating a more efficient and safer fleet. The revolving account operates similarly to a self supporting account. If MnDOT for example, was to use a revolving account, the resale proceeds of vehicles and equipment would be redistributed back into MnDOT's fleet replacement fund, rather then the Minnesota general fund. These funds would be allocated for the purchase of new equipment.

Recommendation # 12— MnDOT should consider working toward the Malcolm Baldrige National Quality Award (MBNQA).

- Arizona and Pennsylvania DOTs are working towards the MNBQA and appear to be operating a very efficient fleet, as compared to those that are not working towards this award. The MBNQA criteria relies heavily on the use of performance measures and benchmarking practices. Throughout this research, these characteristics were identified by leading DOTs.

Recommendation # 13— Establish a formal fleet management review committee to oversee all fleet decisions.

- A fleet management review committee should be established for evaluating fleet decisions. The Minnesota Department of Natural Resources formed a committee similar to this and mentioned that this was a critical task force that helped many of the decision gain support from the different members of the committee thus creating more buy in. Representatives from each of the districts should be on this board, where policies and standards can be developed whereby meeting the different constraints of scattered districts.

Future Areas of Research

Future work in this area for MnDOT with NATSRL should concentrate on issues related to life cycle costing. Topics include defining the optimum fleet size, the cost/benefit of developing and maintaining performance measures, appropriate criteria for fleet replacement decisions, and benchmark other DOTs utilization and life cycle targets. Specific questions to consider include:

- → How much more does a piece of equipment cost when extending its life?
- → Perform a cost savings analysis from the implementation of performance measures (Justify that the measures are worth their investment).
- → Can bar coding be implemented by MnDOT to improve inventory management?
- → Can PM scheduling be based on fuel consumption rather then engine hours?

References

American Productivity and Quality Council (Internet, cited 2003-06-02), "The Benchmarking Code of Conduct," http://www.apqc.org/portal/apqc/ksn/Code_of_conduct_electronic.pdf?paf_gear_id=contentgearhome&paf_dm=full&pageselect=contentitem&docid=110003.

Bergoffen, Gene S., "Private Fleets Position for the Future; Private Truck Fleets Face Challenges Justifying and Benchmarking their Contributions," *Transportation and Distribution*, vol. 33, no. 4 (April 1992), pp. T1-3.

Kauffmann, Paul, Abel Fernandez, Charles Keating, Derya Jacobs, and Resit Unal, "Using Quality Function Deployment to Select the Courses and Topics that Enhance Program Effectiveness," *Journal of Engineering Education*, vol. 91, no. 2 (April 2002), pp. 231-237.

Leegard, Paul, "Review of Fleet Management Systems within MnDOT," preliminary draft report, (2001).

Petreycik, Richard M., "Why benchmark? Part One: What it is and How to do it," *U.S. Distribution Journal*, vol. 220, no. 9 (September 1993), pp. 23-26.

QFD Institute (Internet, cited 2003-06-15), http://www.qfdi.org/what%20is%20qfd/what_is_qfd.htm.

Spectrum Consultants Inc., *Best Fleet Management Practices and Performance Measures Manual*, (Copyright 1994-2003), California Fleet News Publishing.

Walker, Kelly W., *MnDOT Fleet and Shop Operations Summary of Audit Findings and Recommendations*," consultant report, Dallas: Kelly Walker Associates (2002).

Wyrick, David A., "Benchmarking Fleet Management," *Proceedings from the 2002 ASEM National Conference*, (October 2002), pp. 322-326.

Appendix A

Phase I—Benchmarking Survey

Mn/DOT - University of Mn. Duluth Fleet Management Survey

***Estimates are acceptable. Place an "X" in the Yes or No area provided. Thank you!**
This survey should take roughly 5-10 minutes.

Organization Name: _____

Contact Individual Name: _____

Title: _____

Phone: _____ **Fax:** _____

E-Mail: _____

Address: _____

		Number:	Yes	No
1. Number of facilities used for equipment repair/maintenance				
1a	Are you utilizing mechanic shifts in addition to a day shift		☐	☐
2. Indicate the number of Fleet Maintenance/Repair Operations Personnel				
2a	Certified Fleet manager(s) by a nationally recognized organization			
2b	Fleet manager(s)			
2c	Equipment Acquisition Specialist(s)			
2d	Equipment Disposal Specialist(s)			
2e	Shop Supervisors			
2f	Field Mechanics			
2g	Mechanics			
2h	Lube/Service Technicians			
2i	Welders			
2j	Service writers			
2k	Support staff			
3. Mechanic Training				
3a	Do you provide mechanic training		☐	☐
3b	Is training provided by an in-house training staff		☐	☐
3c	Is training provided by external training staff		☐	☐
3d	Is mechanic training provided primarily by vendor's sales department		☐	☐
3e	Do you have an established mechanic training program or training standards		☐	☐
4. Types of Equipment and vehicles				
4a	Which of the following types of vehicles and equipment do you perform maintenance and repairs on			

4. Types of Equipment and vehicles (continued)		**Yes**	**No**
4b	Over the road truck/tractor equipment	☐	☐
4c	Heavy duty trucks tandem axle dump	☐	☐
4d	Medium duty single axle dump trucks	☐	☐
4e	Light duty trucks/autos 1 ton or less GVWR	☐	☐
4f	Off-road/heavy equipment, loader, motor graders etc	☐	☐
4g	Truck chassis aerial units	☐	☐

5. Please indicate which of the follow apply to the types of maintenance/repairs and practices of your company shop personnel

5a	Do you have a documented Preventative Maintenance Policy	☐	☐
5b	Do you follow manufacturers schedules for your PM	☐	☐
5c	Do you adhere to a multi-level Preventative Maintenance schedule Example (PM-A, PM-B, PM-C, etc….)	☐	☐
5d	Do you adhere to documented tasks for your equipment PMs	☐	☐
5e	If yes, are they based on your own recommendations	☐	☐
5f	If yes, are they based on Mfg. Recommendations	☐	☐
5g	Have you instituted "Time to complete" standards for mechanic	☐	☐
5h	Do you perform component major Overhaul/Rebuilds	☐	☐
5i	Do you perform primarily minor repairs	☐	☐
5j	Are your mechanics using computer assisted diagnostics tools	☐	☐
5k	Have you established low priority seasons for each class of equipment for scheduled maintenance	☐	☐
5l	If yes, what is the ratio of scheduled vs. non-scheduled repairs	☐	☐
	10%	☐	
	25%	☐	
	50%	☐	
	75% or greater	☐	
	Not Sure of the ratio	☐	

6. Organizational Structure

6a	Who manages your fleet operations		
6b	Supplier or vendor employees	☐	☐
6c	Company employees or staff	☐	☐
6d	Are your fleet decisions made from a centralized administration or department	☐	☐
6e	Are your fleet decisions made at a divisional or department level	☐	☐
6f	Number of years with current organizational structure	☐	
6g	Do divisions pay equipment or user fees to a central budget	☐	☐
6h	If so does the user fee contain the following costs		
6i	Normal wear and tear	☐	☐
6j	Abuse and neglect	☐	☐
6k	Do divisions pay for vehicle and equipment PMs	☐	☐
6l	Do divisions pay for repair costs	☐	☐

	6. Organizational Structure (continued)	Yes	No
6m	Are fleet staff rewarded for their performance	☐	☐
6n	Where in the organization is the shop staff managed from		
6o	Centralized office/department or manager	☐	☐
6p	Each location or department manages their staff	☐	☐
6q	Is there a definitive authority responsible for policy & standards for all vehicle and equipment maintenance shops	☐	☐
6r	Does your company provide/allow assigned units for more than intermittent usage by employees	☐	☐
6s	Can employees with assigned units use them for personal use	☐	☐
6t	Do you have documented policy defining eligibility for assigned units	☐	☐
6u	Is your organization ISO 9000 certified	☐	☐
6v	Does your organization work towards the Baldridge Award	☐	☐

	7. Parts Management		
7a	Do you have an in-house parts/inventory department	☐	☐
7b	If yes are the employees company staff	☐	☐
7c	Number of Parts Technicians		
7d	Number of Parts Runners		
	Percentage of PM parts purchased from		
7e	OEM		
7f	After market		
	Percentage of repair parts purchased from		
7g	OEM		
7h	After market		
	Who does the parts/inventory supervisor report to		
7i	Shop supervisor	☐	☐
7j	Same supervisor as the shop supervisor	☐	☐
7k	Both report to different supervisors	☐	☐
7l	If you have multiple repair facilities do you have parts support at each site	☐	☐
7m	Do you have a company owned central parts depot for high dollar items	☐	☐

	8. Fleet maintenance and record keeping system		
8a	Are your equipment maintenance and repair records kept on paper/hard copy	☐	☐
8b	Do you utilize a computerized fleet management system	☐	☐
8c	Our system has been established < 2 years	☐	
8d	Our system has been established 2 – 5 years	☐	
8e	Our system has been established > 5 years	☐	
8f	Does your system capture “Live” data entry	☐	☐
8g	If you have multiple repair facilities are they networked together	☐	☐

	8. Fleet maintenance and record keeping system (continued)	**Yes**	**No**
	Do you use your system for:		
8h	Tracking Vehicle Repair Labor	☐	☐
8i	Tracking Vehicle Parts	☐	☐
8j	Tracking Vehicle Fuel Usage	☐	☐
8k	Tracking vehicle Usage	☐	☐
8l	Track repair data to make "Predictive Maintenance"	☐	☐
8m	To make automated fleet decisions	☐	☐
	Who begins the repair documentation in your shop(s)		
8n	Shop Supervisor	☐	
8o	Service writer	☐	
8p	Field/shop mechanic	☐	
8q	Operator	☐	
8r	Other	☐	

	9. Fleet Management		
9a	Do you purchase only new equipment	☐	☐
9b	Do you have established and documented purchasing standards for	☐	☐
9c	Each class of equipment	☐	☐
9d	Each make and model	☐	☐
9e	Each engine brand	☐	☐
9f	Each transmission/drive train	☐	☐
9g	Do you incorporate lifecycle costing into equipment decisions	☐	☐
9h	Do you utilize documented lease criteria for light duty vehicles	☐	☐
9i	Do you utilize documented lease criteria for equipment	☐	☐
9j	Do you have a documented vehicle/equipment purchase criteria	☐	☐
9k	Do you have a documented vehicle/equipment disposal criteria	☐	☐
	Which methods do you use for equipment disposal		
9l	Owner auction	☐	☐
9m	Consignment auction	☐	☐
9n	Direct sale	☐	☐
9o	Seal bid	☐	☐
9p	Trade in on new purchase	☐	☐
9q	Internet or E-commerce method	☐	☐
9r	Other	☐	☐

10	Would your organization or business be willing to engage in greater discussions for the mutual benefit of all parties involved	☐	☐

If you could change one thing with your fleet management system, what would it be and why?

Answer Here:

Please return the completed survey (if possible) by **Friday, August 16 by email, fax, or mail to**:

Brandon Storhaug
UMD- Graduate Research Assistant

105 Voss-Kovach Hall
1305 Ordean Court
Duluth, MN 55812

Phone: 218-726-8653
Fax: 218-726-8596
E-mail: bstorhau@d.umn.edu

Or

Kelvin Smith
Mechanic Training Coordinator

3920 Hwy 2 West
St.Paul, Mn. 56601

(218) 755-4581 voice
(218) 755-2028 fax
E-mail: Kelvin.Smith@dot.state.mn.us

Thank you for your time and effort in completing this survey!

Appendix B

Phase I—Interview Guide/ Questionnaire

Benchmarking Questionnaire
Mn/DOT – University of MN Duluth

Interview Start Time_____ **Date:_____**

Name of Org to be Interviewed_____

Attendees:

Please give us an overview your current fleet management operations.

****Please provide copies of supplement material that may be useful to answer these questions. This information will be used in our analysis. Your specific data will remain confidential and can be returned to you if you request.**

I. ORGANIZATIONAL STRUCTURE:

1. Describe your fleet and equipment organizational structure (provide an organizational chart) - Duties, responsibilities and authority over the following:
- Fleet Management
- Equipment Maintenance
- Purchasing and selling
- Parts and inventory

2. Why did you select your current type of organization and how long have you had this organization?

If you have reorganized recently:
- What were the issues that you needed to resolve?
- How did you resolve them?
- What types of improvements did you notice?
- What did you do right during implementation?
- What do you wish you had known when you started?
- What works better now? Why?
- What works worse since the change? Why?
- How do your end users or owners feel about the change?
- What advise would you advise me if I have to make a similar change?

3. What works well with your current organizational structure?
- How do you know it's effective?
- Why does it work well?
- What does your organization do that stands out from other similar organizations?

4. What are the major problems caused by your current organizational structure?
- What is the cause of these problems?
- If possible, what would you do to resolve or improve these problems?

5. What constraints do you have within your organization? (i.e. what can't you change?)

6. If you have multiple repair facilities, how do you manage and communicate with them?

II. FUNDING:

7. Describe the funding process used to purchase new and replacement equipment (e.g., dedicate budgets, revolving accounts, dispersed accounts)?
- Do you fund a standard unit(s) for each class of equipment?

8. How do you replenish or supplement your equipment-purchasing budget? (If using revolving or non-dedicated funding process, how are monies made available for the next cycle of purchasing? If using a dedicated funding process how is it adjusted to reflect changes in equipment costs?)

9. What works well with your current method of funding? Why?

10. What are the major problems caused by your current funding methods?

11. Why do these problems with current funding occur?
- If you could, what would you do to resolve or improve these problems?

12. What do you think would be the best method to fund the replacement and purchase of new equipment? Why?

13. If you have made any funding or funding method changes, describe:
- What were the issues that you needed to resolve?
- How did you resolve them?
- What types of improvements did you notice?
- What did you do right during implementation?
- What do you wish you had known when you started?
- What works better now? Why?
- What works worse since the change? Why?
- How do your end users or owners feel about the change?
- What advise would you advise me if I have to make a similar change?

III. MEASURES & TARGETS:

Glossary of Terms:

Measures: Measures are numeric indicators that allow you to assess the performance of an operation, individual or organization. For example, equipment "utilization" allows the use of equipment to be monitored; "scheduled verse unscheduled work" allows the emphasis on preventive maintenance to be tracked and "returns" allows the quality of mechanic work to be monitored.

Targets: Targets are goals or standards that correspond to the measures you have selected. The performance and success of the organization or individual is measured against these targets. For example a target of 100% utilization means that all equipment meets minimum utilization targets, 70% scheduled verses unscheduled work, means that 70% of all mechanic time or number of work orders (depending on your definition) are for preventive maintenance type work and 5% returns, would mean that no more than 5% of equipment repaired by a shop or mechanic shall be returned for additional work within some time period, perhaps 30 days, of the initial work order.

Management Level Measures – These measures give an executive or managerial perspective on the over-all performance of an organization. Utilization, Out-of-Cycle and Scheduled verses Unscheduled are examples of this type of measure.

Shop Level Measures – These measures give a managerial or supervisory perspective on particular aspects of an organizations operation. Downtime/out-of-service, rework and time-to-complete are examples of this type of measure.

14. Do you have any of the following management level measures? (scheduled vs. unscheduled maintenance, equipment life cycle, utilization rate)
- If so, how do you define them?
- What target levels of performance do you accept?
- How do you ensure data quality for those measures?

15. What other shop level measures & target levels does your organization have (For example; downtime, out of service, rework, flat rate)?
- How do you define these?
- What target levels of performance do you accept?
- How do you ensure data quality for those measures?

16. How do you obtain these measurements (what systems or methods do you employ)?

IV. POLICIES:

17. What documented fleet management policies and standards (such as life cycle an utilization) do you have?

18. How are fleet policy standards and management practices established and enforced?

- What criteria were used to set your standards and practices?
- How have you determined the appropriate life cycle of your various classes of equipment?
- How often do you reevaluate this? Can you provide us your list of life cycles?

19. What do you consider to be your most important fleet management policies?

- Why?

20. How does your fleet organization compare its efficiency and effectiveness against industry?

21. Does your organization work towards any type of quality awards? (Baldrige, ISO 9000, etc.)

- If so, what type of results have you noticed (positive & negative)?
- What has been the most difficult part of introducing it?
- Do you have full support from everyone?

22. Have you incorporated benchmarking into your business processes? How?

Thank you very much for your time and cooperation!

***Interview End Time_____**

Appendix C

Phase II—Benchmarking Survey

MnDOT & University of Minnesota Duluth

SURVEY of Fleet Management's Performance Measures used within State DOT's

The intent of this survey is to gain a better understanding of what performance measures state DOT's use to manage their fleet. There are 8 different sections to complete. [All measures are numbered]

Directions: *Click on the YES box for the measures your DOT uses to monitor performance, click the NO box if you don't use them. Thank you! This survey should take roughly 15-20 minutes.

****Please send survey back to Brandon Storhaug, email address is provided at the end of the survey.**

Organization Name:	
Contact Individual Name:	
Title:	
Phone:	
E-Mail:	
Address:	
Date:	

NOTE: The list of performance measures used below were developed from Spectrum Consultants Inc. and are being used under special written permission. The use of these measures may not be reproduced or distributed, in whole or in part, by any printed means without written permission of Spectrum Consultants, Inc. (Copyright 1994-2003)

	MEASURE/ INDICATORS	YES	NO
I.	**COST CONTROL AND CHARGEBACK MANAGEMENT**		
	Operating and Replacement Budget:		
1.	Ratio of total annual operating costs to annual replacement costs	☐	☐
	Replacement Reserve Funds:		
2.	Ratio of funds allocated for annual replacement to the estimated value of the current fleet (or class)	☐	☐
3.	Average annual capital replacement expenditures for the past five years, for replacement vehicles, for additions to the fleet	☐	☐
4.	Total actual capital expenditures vs. budgeted capital expenditures	☐	☐
	Operating Budget:		
5.	Total actual operating costs vs. budgeted costs	☐	☐
6.	Ratio of administrative overhead costs to total operating costs	☐	☐
7.	Ratio of maintenance and repair costs to total operating costs	☐	☐
8.	Ratio of fueling costs to total operating costs	☐	☐
9.	Ratio of motor pool costs to total operating costs	☐	☐
10.	Ratio of indirect cost allocation to total operating costs	☐	☐
	Fleet Costs:		
	Total vehicle cost per mile/hour		
11.	• By fleet	☐	☐
12.	• By department	☐	☐
13.	• By class	☐	☐
	Capital cost per mile/hour		
14.	• By fleet	☐	☐
15.	• By department	☐	☐
16.	• By class	☐	☐

17.	Annual unit cost of each vehicle by class	☐	☐
18.	Operating and maintenance cost per vehicle by class	☐	☐
19.	Administrative overhead and replacement cost per vehicle by class	☐	☐
	Total annual fleet expenditures per mile/hour driven		
20.	• By fleet	☐	☐
21.	• By department	☐	☐
22.	• By class	☐	☐
23.	Total budgeted operating expenditures	☐	☐
24.	Direct budgeted costs	☐	☐
25.	Indirect budgeted costs	☐	☐
26.	Total budgeted capital expenditures	☐	☐
27.	Unfunded replacement costs	☐	☐
28.	Total actual operating expenditures	☐	☐
29.	Total actual capital expenditures	☐	☐
30.	Total cost of administrative overhead	☐	☐
31.	Total cost of maintenance and repair service Light duty and Heavy duty	☐	☐
32.	Total cost of parts inventory services	☐	☐
33.	Total cost of fueling services	☐	☐
34.	Total cost of motor pool services	☐	☐
II.	**ASSIGNMENT AND FLEET SIZE MANAGEMENT**		
35.	Percentage of Fleet below utilization target **(and/or)** Proportion of vehicles driven below minimum miles/hours/trips criteria (breakeven point miles)	☐	☐
36.	Average annual utilization (miles, hours, and trips) by vehicle class and type of assignment	☐	☐
37.	Ratio of annual utilization (miles, hours) by vehicle class to capacity (or output available)	☐	☐
38.	Percentage change in fleet size in last 10 years **(and/or)** Percentage change in fleet size to population and number of employees	☐	☐
39.	Number and percentage of vehicles by total lifetime mileage grouping (to review age of fleet in miles/hours); **(and/or)** Percentage of lightly, heavily-used vehicles	☐	☐
40.	Percentage change in vehicle mix	☐	☐
41.	Percentage of organization employees served by fleet vehicles (and type of vehicle assignment) to total number of employees (available market)	☐	☐
	Number of vehicles and equipment		
42.	• By class/type	☐	☐
43.	• By department	☐	☐
44.	Number of miles/hours driven by class/type; by department; by function; by type of assignment, passengers per vehicle mile or revenue capacity vehicle miles delivered	☐	☐
III.	**FLEET REPLACEMENT (CYCLING) MANAGEMENT**		
45.	Ratio of vehicles identified at the optimum economic replacement point to vehicles actually being replaced	☐	☐
46.	Number of units to be replaced in the next year as a percentage of the fleet	☐	☐
47.	Number of units to be replaced in the next year as a compared to the replacement criteria guideline	☐	☐
48.	Average vehicle retention period by class	☐	☐
49.	Number and percentage of vehicles qualifying for replacement according to established age and/or mileage criteria	☐	☐
	Number and percentage of vehicles exceeding standards on:		
50.	• Number of repairs	☐	☐
51.	• cost of repairs	☐	☐
52.	• road calls	☐	☐
53.	• downtime	☐	☐
54.	• utilization	☐	☐

55.	• oil consumption	☐	☐
56.	• cost per mile	☐	☐
57.	Average cost per vehicle by class	☐	☐
58.	Number of qualifying vehicles that have planned replacement funding	☐	☐
59.	Proportion of vehicle replacements funded from annual contributions to replacement funds	☐	☐
60.	Average salvage value per class by method of disposal	☐	☐
61.	Ratio of salvage value to original purchase price	☐	☐
62.	Average number of days from out-of-service to disposal	☐	☐
63.	Turnaround time from ordering of vehicle to receipt of vehicle	☐	☐
64.	Turnaround time from receipt of vehicle to in-service date	☐	☐
65.	Average age of fleet; **(and/or)** Remaining life; **(and/or)** Proportion beyond replacement age; **(and/or)** % of Fleet out of life cycle (can be done by class too)	☐	☐
66.	Number and cost of new vehicle in the fleet	☐	☐
67.	Capital value of the fleet	☐	☐
IV.	**FLEET SERVICES DELIVERY MANAGEMENT**		
	Fully burdened labor rate		
68.	• Light duty	☐	☐
69.	• Heavy duty	☐	☐
70.	• Miscellaneous equipment	☐	☐
71.	Labor rate of area private garages, adjacent cities and private maintenance providers; Cost of Specific Repair or Maintenance Task by area private commercial garages, adjacent cities or counties, private maintenance providers **(done to compare/ set labor rate)**	☐	☐
72.	Percentage charge or markup on the price of parts (light duty, heavy duty)	☐	☐
73.	Fully burdened rate per gallon of fuel	☐	☐
74.	Cost of gallon of fuel from area private providers, adjacent cities and counties **(done to compare)**	☐	☐
75.	Fully burdened daily rate for motor pool vehicle by class	☐	☐
76.	Daily rate by class of private rental firms	☐	☐
V.	**MAINTENANCE AND REPAIR SERVICES**		
	Measure Fully burdened labor rate per/		
77.	• Light duty	☐	☐
78.	• Heavy duty	☐	☐
79.	• Miscellaneous equipment	☐	☐
80.	Average annual (target or predictable) maintenance and repair cost by class	☐	☐
81.	Ratio of direct labor hours to indirect labor hours by shop	☐	☐
82.	Average annual number of maintenance hours charged to repair orders by in-house personnel by class (by shop) **(and/or)** (by district)	☐	☐
83.	Ratio of number of maintenance employees (wrenching) to number of administrative employees by shop	☐	☐
84.	Mechanic/Technician performance (by repair and PM task) versus flat rate standard	☐	☐
85.	Ratio of number of fleet vehicles to number of fleet agency employees	☐	☐
86.	Ratio of total vehicles maintained to number of technicians on staff by class of vehicle **(and/or)** Number of repair/PM hours by class of vehicle	☐	☐
87.	Ratio of fringe benefits to total labor costs	☐	☐
88.	PM labor hours backlogged at month-end **(and/or)** Repair labor hours backlogged at month-end (by shop) **(and/or)** (by district)	☐	☐
89.	Percentage repairs that have turnaround time within one day **(and/or)** Percentage repairs that have turnaround time within two day **(and/or)** Percentage greater than two days; by shop **(and/or)** by district	☐	☐
	Total value of repairs recovered under warranty **(and/or)** Amount and percentage of total value of claims recovered **(and/or)** Mean time to collect on warranty claims- by manufacturer **(and/or)** Percentage warranty claims dismissed- by reason, such as		

90.	• By new equipment standard warranties	☐	☐
91.	• By new equipment extended powertrain warranties	☐	☐
92.	• By replacement part and component warranties	☐	☐
93.	• By repair labor warranties	☐	☐
94.	Average maintenance and repair cost per vehicle by class (by shop) **and/or** (by district) ; **(and/or)** Average maintenance cost per vehicle per mile by class by class (by shop) **(and/or)** (by district)	☐	☐
95.	Average hours per repair	☐	☐
96.	Average hours per repair task	☐	☐
97.	Average hours per PM service	☐	☐
98.	Average cost per repair order	☐	☐
99.	Average cost per repair task	☐	☐
100.	Average cost Per PM service	☐	☐
101.	Percentage of sublet maintenance and repair to in-house maintenance and repair	☐	☐
102.	Average commercial labor cost per repair order	☐	☐
103.	Average commercial labor cost per repair task (internal/external)	☐	☐
104.	Average commercial labor cost per PM service	☐	☐
105.	Average commercial parts cost per repair order	☐	☐
106.	Average commercial parts cost per repair task	☐	☐
107.	Average commercial parts cost per PM service	☐	☐
108.	Percentage of all PM inspections and annual state emissions inspections performed of those scheduled over a given period of time by shop	☐	☐
109.	Percentage of all PM inspections performed within 12 hours of presentation (by shop)	☐	☐
110.	Ratio of scheduled maintenance (PM) to unscheduled repair	☐	☐
111.	Ratio of repair work orders to total work orders; **(and/or)** Ratio of repair work orders for each reason for repair to total repair work orders	☐	☐
112.	Unscheduled repairs per vehicle maintained	☐	☐
113.	Percentage of breakdowns per 100 vehicle repairs miles/hours between breakdowns	☐	☐
114.	Accidents per 100,000 miles; Number of accidents per vehicle (annual)	☐	☐
115.	Abuse/misuse Incidents per 100,000 miles; Number of incidents per vehicle and by department	☐	☐
116.	Number (per employee) that have had accidents, abused, misused units in the past year	☐	☐
117.	Number and percentage of permanently assigned or full time driver's participating in driver training	☐	☐
118.	Percentage of repairs that are repeat repairs (Comebacks by shop)	☐	☐
119.	Downtime percentage	☐	☐
120.	Ratio of repairs before expected failure (Predictive Maintenance)	☐	☐
121.	Mean miles between unscheduled repairs by type of repair	☐	☐
122.	Percentage of repairs failing quality control inspections by reason and garage	☐	☐
123.	Average time to respond to a road call (during shop hours/after shop hours)	☐	☐
124.	Total target operating costs (predictable, routine M&R costs) vs. budgeted target costs by light duty, by heavy duty	☐	☐
125.	Ratio of sublet M&R costs to target maintenance and repair costs	☐	☐
126.	Total non-target operating costs (unpredictable, driver induced or emergency services) by light duty, by heavy duty, by type of non-target (Vandalism, acts of nature, abuse)	☐	☐
127.	Number of maintenance and repair technicians; Labor hours; Average compensation; Equipment, facilities and vehicles	☐	☐
128.	Number of PM orders closed	☐	☐
129.	Number of PM orders closed by PM service code	☐	☐
130.	Number of PM orders open at month-end by downtime status	☐	☐
131.	Number of repair orders, open by reason for repair	☐	☐

133.	Number of smog tests performed	☐	☐
134.	Number of B.I.T. inspections performed	☐	☐
135.	Labor hours for Repairs	☐	☐
136.	Labor hours for PM's	☐	☐
137.	Labor hours for indirect time	☐	☐
138.	Number of productive staff hours	☐	☐
139.	Average number of vehicles repaired per day	☐	☐
140.	Number of road calls (breakdowns)	☐	☐
141.	Number and proportion of repairs due to operator abuse (or number of operators cited for abuse)	☐	☐
VI.	**PARTS INVENTORY CONTROL SERVICES**		
142.	Vehicle-hours (or days) lost waiting for parts	☐	☐
	Percentage charge or markup on the price of parts		
143.	• By light duty	☐	☐
144.	• By heavy duty	☐	☐
145.	Parts turnover ratio (total number of parts used during a specified period divided by the average number of parts on hand at any given time); **(and/or)** Turnover ratio by stock classification	☐	☐
146.	Total annual value of stock lost due to theft, loss, deterioration, or obsolescence	☐	☐
147.	Average cost to process a purchase order	☐	☐
148.	Inventory adjustments (by line and value)	☐	☐
149.	Number of lines (and dollar value) of parts inactive in past six months	☐	☐
150.	Percentage of repairs delayed due to stockouts/lack of parts	☐	☐
151.	Percentage of parts requests filled from inventory (also called the fill rate)	☐	☐
152.	Number of open backorders by line, value, and age	☐	☐
153.	Ratio between the request fill rate and the level of investmentin inventory	☐	☐
154.	Average investment in inventory	☐	☐
155.	Number and value of parts purchased and received; **(and/or)** Number and value of parts issued to work orders	☐	☐
VII.	**FUELING SERVICES**		
	Average fuel consumption (miles per gallon)		
156.	• By vehicle	☐	☐
157.	• By vehicle class	☐	☐
158.	• By equipment	☐	☐
159.	Fuel cost per mile	☐	☐
160.	Average total fuel cost by class	☐	☐
161.	Fully burdened rate per gallon of fuel	☐	☐
162.	Month-end inventory (gallons and dollars) and turnover ratio	☐	☐
163.	Number of times a fuel tank becomes empty	☐	☐
164.	Average investment in fuel inventory	☐	☐
165.	Tank adjustments (gallons and dollars)	☐	☐
166.	Percentage recovery of fuel costs from customers	☐	☐
167.	Average time to repair broken fuel pumps	☐	☐
168.	Monthly/Annual throughput of each fueling site	☐	☐
169.	Fuel receipts (gallons and dollars)	☐	☐
170.	Fuel issues (gallons and dollars)	☐	☐
VIII.	**MOTOR POOL SERVICES**		
171.	Ratio of central motor pool vehicles to total fleet size	☐	☐
172.	Average number of available pool vehicle rented per day (e.g. replacement vehicle repaired, replacement, vehicle PM's, intermittent transportation); **(and/or)** Average number of available vehicle hours rented per day	☐	☐
173.	Fully burdened daily rate motor pool vehicle by class	☐	☐

174.	Percentage of vehicles delivered to customers with advanced reservations	☐	☐
175.	Percentage of vehicles delivered to customers with reservations made within one (1) hour or request; on-demand requests made within 45 minutes	☐	☐
176.	Ratio of central motor pool vehicles to number of organization employees	☐	☐
	Net motor pool revenues vs. motor pool costs		
177.	• By class	☐	☐
178.	• By vehicle	☐	☐
179.	Number of customers who could not be accommodated	☐	☐
180.	Ratio of pool cars dispatched to customers who are having cars repaired/maintained to total pool car dispatches	☐	☐
181.	Ratio of revenue miles to total miles	☐	☐
182.	Ratio of pool units to those required at peak hour	☐	☐
183.	Number of pools, department sub-pools	☐	☐
184.	Number of pool vehicles by type and location	☐	☐
185.	Number of employees authorized for motor pool assignment	☐	☐
186.	Number of revenue miles/hours driven by type and location	☐	☐
187.	**Does your organization use benchmarking as a means to set performance measure targets?**	☐	☐
188.	**Is your DOT working towards the Malcolm Baldridge National Quality Award?**	☐	☐
189.	**Do you do Predictive Maintenance?**	☐	☐
190.	**Do you do Preventive Maintenance?**	☐	☐

Any comments?

Thank you for your time and effort in completing this survey!

Created by: Brandon Storhaug; February 5, 2003

Any questions: Please contact Brandon Storhaug
Phone: 218-726-8653
Fax: 218-726-8596
"Send Survey to"……E-mail: bstorhau@d.umn.edu
University of Minnesota Duluth

Appendix D

Phase II—Interview Guide/ Questionnaire

Date:_____

Interview Start Time: _____

Name of Organization to be Interviewed_____

Attendees:

Materials to bring to Benchmarking Meeting:

1. Organizational Chart of your Fleet Mgt structure
2. Provide a list of your life cycle and utilization targets for your vehicle classes; similar to the one provided at the end of this document
3. Any documents of your performance measures: (higher level measures, middle level and shop level)
4. Any other related documents that would be pertinent for this meeting (past studies, etc)

Questions for Site-Visit:

I. Background:

1. Describe your fleet management structure and the structure of your DOT: – (an organizational chart of this would be great).

a. Centralized or Decentralized?

b. Number of Districts/ Regions and Maintenance Shops?

c. Size of Fleet?

d. Appropriation or Revolving Fund?

e. What is your annual budget?

f. What's your billing structure to districts, etc?

g. Who are your customers?

h. Is your parts organization operated from a centralized location or decentralized with geographically separated parts operations?

2. Talk about your fleet management system:

a. Type of system and how long has it been used?

b. Amount of historic data and quality of data?

i. Who enters the data into the system?

ii. What type of access is there to the data?

c. Types of reports generated and used?

d. Interfaces with other systems (e.g., inventory and payroll)?

II. Performance Measures:

3. Describe the history of your performance measures within your DOT and in particular within the area of Fleet Management?

a. What business changes have you made?

b. Why have you changed?

4. Are you using all your measures listed from the survey? (Which are used on daily basis, monthly, annually)?

5. Do you have different levels of measures (shop, field, management and executive)?

6. What are your higher level measures? (Example: MnDOT is using Life Cycle, Preventive vs. Reactionary Maintenance, Downtime, Fleet Size, and Utilization at the management and executive levels)

****See Example of MnDOT's measures located towards the end of this questionnaire****

a. What do you use your measures for?

b. Why are you measuring that (what are you trying to monitor or control)?

c. Who develops the measures (what organizational level)?

i. How does that process work?

d. Who monitors the performance measures (what organizational level)?

e. How often/ frequently do they monitor them?

f. Who is held accountable for the measures?

g. What actions do you take based on these measures?

7. What are your definitions (criteria) for each of your measures (the major ones) and if applicable?

a. Downtime (24-7 or 8hr days)=

b. Preventive vs. Reactive (Scheduled vs. Unscheduled) Maintenance =

c. Utilization =

d. Fleet Size =

e. Life Cycle (replacement) =

i. How do you set your life cycles, what happens in time of budget crunches, do you add another year?

f. Others =

8. Have you set performance/expectation targets for any of the measures that you are using? If so, what are they? [**See MnDOT's ***Vehicle Class Code List*** located at the end of this questionnaire. Please provide us with a list of your life cycle and utilization targets. **]

a. How do you determine your targets? (ex: what conferences do you attend?)

i. If your state uses benchmarking for evaluating measures…how do you incorporate that into your business operations?

ii. How does your benchmarking process work?

iii. Who do you benchmark against? (private, public)

iv. How do you determine they are the best?

9. How often do you re-evaluate your performance measures and targets?

10. What role do the districts/divisions/regions play in accountability? What is the role of the central office?

a. How does your process operate for enforcing these measures to all the districts/divisions/regions?

11. Talk about your measures:

a. What are some of the problems with your measures? Why?

b. What are the strengths/ benefits of your measures?

c. Have you seen any improvements in efficiency, cost, and quality?

III. Miscellaneous:

12. Is your organization working towards any type of quality improvement programs or awards with your fleet management area? (MBNQA, ISO 9000, Deming, Juran, etc.)

a. What steps is your organization taking to work towards this?

13. How do you know you have the right fleet size?

14. What are your short term and long terms goals as far as managing your fleet? (ex MnDOT is looking at centrally owned fleet, renting internally)

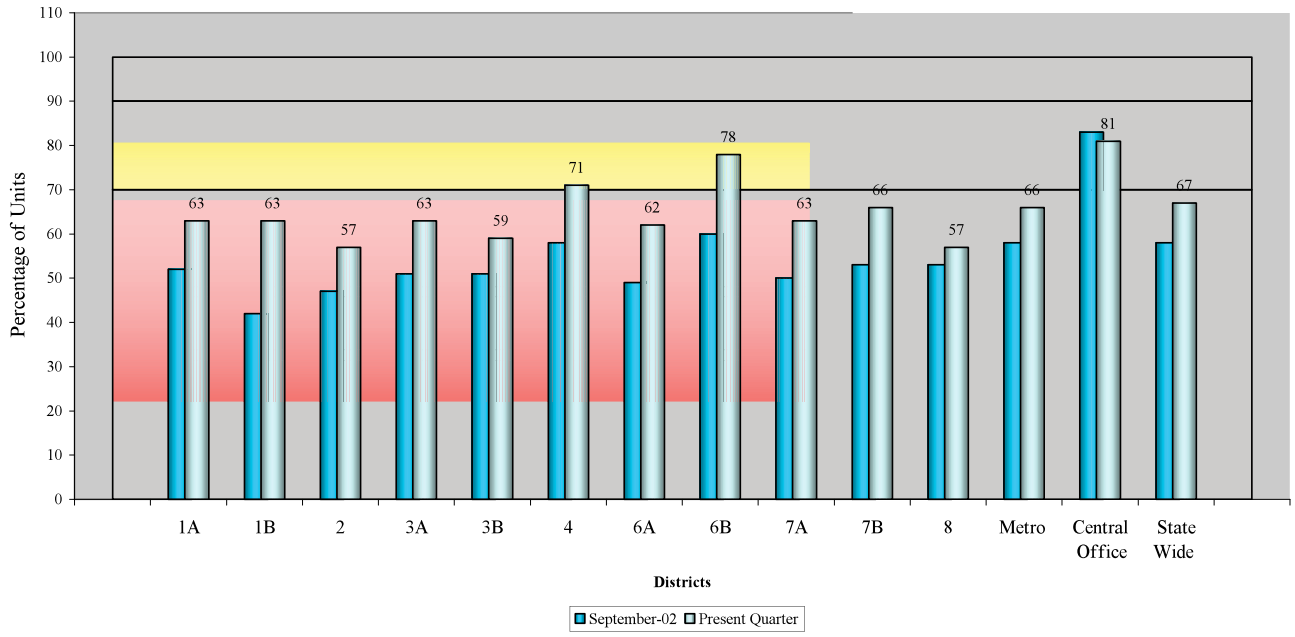
a. Short Term:

b. Long Term:

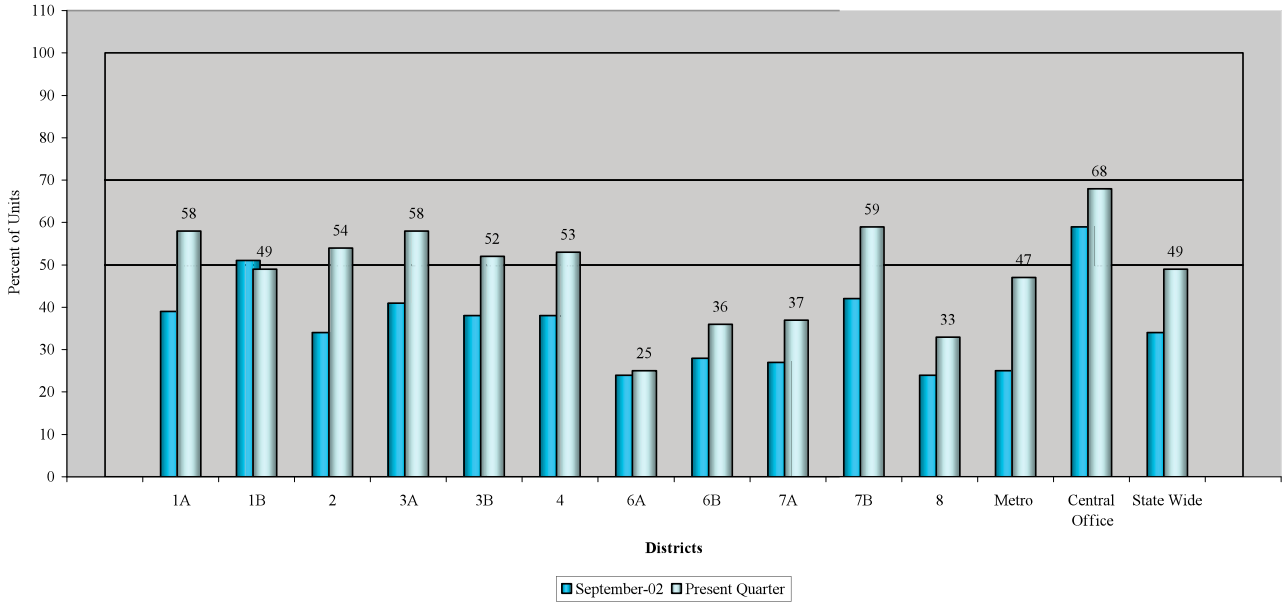
15. What operations do you have that you believe are unique to your organization? What are the advantages and reasons you have them?

A List of MnDOT's Higher Level Measures (DASHBOARDS): (5 main areas of focus)
****** (DOWNTIME is not included below, but is being tracked)**
(The yellow region is set as a 1 year target and the green area is a 2 year target) ***Current as of Jan 31, 200***

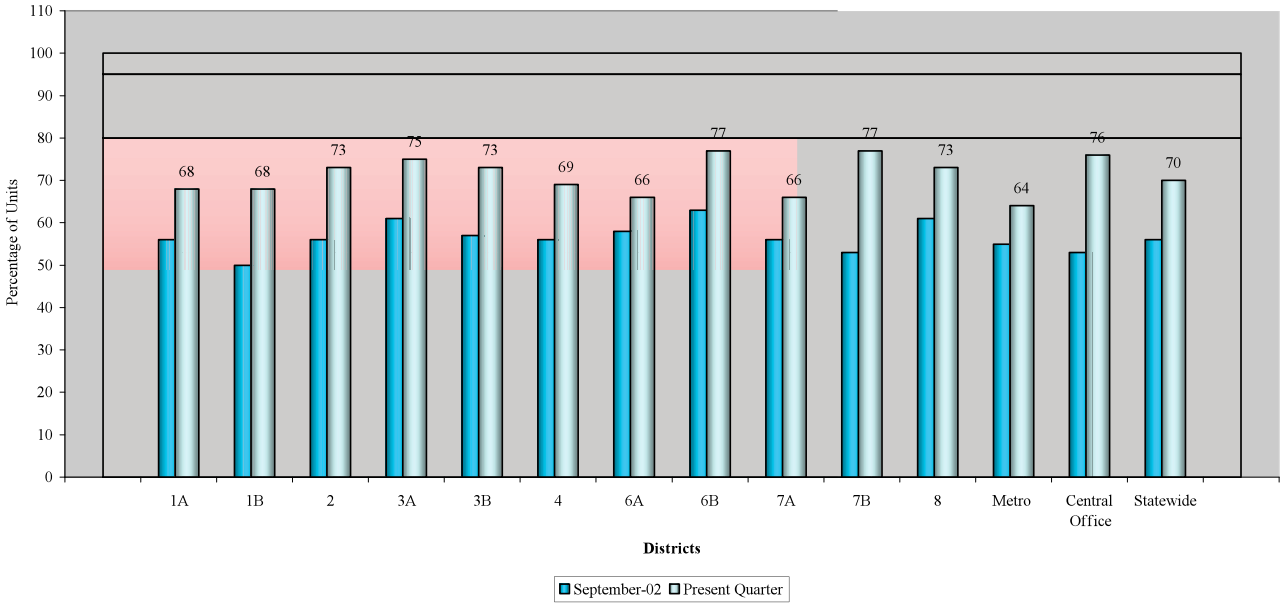
Units Within Lifecycle



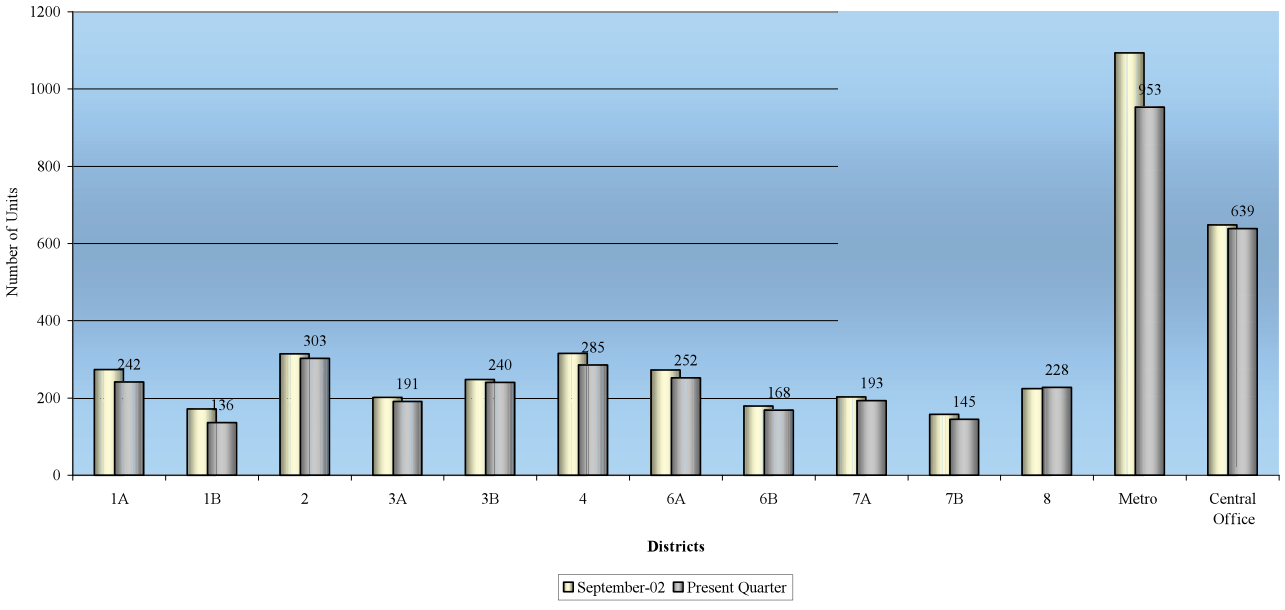
Preventive vs. Reactionary Vehicle Maintenance



Equipment Achieving Minimum Utilization



Fleet Size *
(for selected classes)



List of MnDOT's Lifecycle and Utilization Targets by Class

MCC	DESCRIPTION		MCC	DESCRIPTION
COMP	ENGINE DRIVEN COMPRESSOR		MOWTRAC	MOWER TRACTORS
GENSET	GENERATORS ENGINE POWERED		NMN	NON DOT OR BRASS TAG UNIT
HD AER	AERIAL-26001 GVW +		OFF ROAD	MOTORIZED OFF ROAD
HD TRLR	TRAILER-OVER 10000 GVW		PL SIN	PLOW TRUCK - SINGLE AXLE
HD VEH	26001>GVW EX/PLOW TRK&CVI		PL TAN	PLOW TRUCK - TANDEM AXLE
HELPER	9000 GVW OR LESS		RIG	RIG NEW PLOW TRUCKS
LT TRLR	TRAILERS-10000GVW OR LESS		SM VEH	9000 GVW OR LESS
MD AER	AERIAL-26000 GVW OR LESS		SM VEH H	9000 GVW OR LESS W/HR MET
MD VEHD	9001>26000 GVW-DIESEL		SNO ICE	PLOW,WING,SANDER,ETC.
MD VEHG	9001>26000 GVW-GAS		SNO ICEH	SNOW & ICE EQUIP-HOURS
MISC	MISCELLANEOUS		SNO ICEM	SNOW & ICE EQUIP-ODOMETER
MISC M	MISC. UNITS WITH ODOMETER		SNOOP	BRIDGE INPECTION UNIT
MOW	SMALL MOWERS WALK BEHIND		SWEEP	SWEEPERS
MOWATT	MOWER ATTACHMENTS		UNK	UNKNOWN
MOWRIDE	MOWER SELF PROP. RIDING			

			MnDOT		Your DOT	
CLASS2	DESCRIPTION	MCC	LIFECYCLE (months)	Utilization Standard	LIFECYCLE (months)	Utilization Standard
070	CAR SUB COMPACT	SM VEH	60	8,000 Miles		
080	CAR MEDIUM	SM VEH	60	8,000 Miles		
090	CAR FULL SIZE	SM VEH	72	8,000 Miles		
130	CAR STATION WAGON	SM VEH	72	8,000 Miles		
131	CAR STA WAGON (FHWA)	SM VEH	72	8,000 Miles		
132	CAR STA WAGON COMPACT	SM VEH	72	8,000 Miles		
140	VAN STEP/PARCEL	SM VEH	72	8,000 Miles		
150	VAN DELIVERY 1/2 TON	SM VEH	72	8,000 Miles		
151	VAN PASSENGER	SM VEH	72	8,000 Miles		
152	VAN MINI	SM VEH	72	8,000 Miles		
153	VAN DELIVERY 3/4 TON	SM VEH	72	8,000 Miles		
154	VAN DELIVERY 1 TON	MD VEH (D or G)	72	8,000 Miles		
160	TRUCK SUBURBAN 2X4	SM VEH	84	8,000 Miles		
161	TRUCK SUBURBAN 4X4	SM VEH	84	8,000 Miles		
170	TRUCK S.U.V. TYPE 2X4	SM VEH	72	8,000 Miles		
171	TRUCK S.U.V. TYPE 4X4	SM VEH	96	8,000 Miles		
180	PICKUP 1/2 TON	SM VEH	84	8,000 Miles		
181	PICKUP 1/2 TON UTILITY BO	SM VEH	84	8,000 Miles		
182	PICKUP 1/2 TON 4X4	SM VEH	84	8,000 Miles		
183	PICKUP 1/2 TON EXT CAB	SM VEH	84	8,000 Miles		
184	PICKUP 1/2 TON EXT4X4	SM VEH	84	8,000 Miles		
190	PICKUP 3/4 TON	SM VEH	96	8,000 Miles		
191	PICKUP 3/4 TON 4X4	SM VEH	96	8,000 Miles		
192	PICKUP 3/4 TON UTILITY	SM VEH	96	8,000 Miles		
193	PICKUP 3/4 UTILITY 4X4	SM VEH	96	8,000 Miles		
194	PICKUP 3/4 TON CREW CAB	SM VEH	96	8,000 Miles		
195	PICKUP 3/4 TON CREW 4X4	SM VEH	96	8,000 Miles		
196	PICKUP 3/4 CREW UTILITY	SM VEH	96	8,000 Miles		
197	PICKUP 3/4 CREW UTIL 4X4	SM VEH	96	8,000 Miles		
198	PICKUP 3/4 TON EXT CAB	SM VEH	96	8,000 Miles		
199	PICKUP 3/4 TON EXTCAB 4X4	SM VEH	96	8,000 Miles		

CLASS2	DESCRIPTION	MCC	LIFECYCLE (months)	Utilization Standard	LIFECYCLE (months)	Utilization Standard
200	PICKUP COMPACT	SM VEH	72	8,000 Miles		
201	PICKUP COMPACT EXTCAB	SM VEH	72	8,000 Miles		
202	PICKUP COMPACT 4X4	SM VEH	72	8,000 Miles		
250	TRUCK 1 TON DUMP	SM VEH	96	8,000 Miles		
251	TRUCK 1TON DUMP CREW CAB	MD VEH (D or G)	96	8,000 Miles		
254	TRUCK 1TON UTILITY	MD VEH (D or G)	96	8,000 Miles		
255	TRUCK 1 TON 4X4	MD VEH (D or G)	96	8,000 Miles		
256	TRUCK 1T UTILITY CREWCAB	MD VEH (D or G)	96	8,000 Miles		
257	TRUCK 1T UTILITY CC 4X4	MD VEH (D or G)	96	8,000 Miles		
258	TRUCK 1T FLATBED/STAKE	MD VEH (D or G)	96	8,000 Miles		
280	TRUCK 1 1/2T AERIAL LADDE	MD VEH (D or G)	96	8,000 Miles		
282	TRUCK AERIAL LIFT	MD VEH (D or G)	120	8,000 Miles		
284	TRUCK AERIAL BUCKET LIFT	MD VEH (D or G)	120	8,000 Miles		
286	TRUCK TANDEM UNDERBRIDGE	MD VEH (D or G)	120	8,000 Miles		
300	TRUCK 1 1/2 TON - 2 TON	MD VEH (D or G)	120	8,000 Miles		
310	TRUCK 1 1/2T-2T DUMP	MD VEH (D or G)	120	8,000 Miles		
320	TRUCK 11/2-3T SPEC EQUIP	MD VEH (D or G)	120	8,000 Miles		
330	TRUCK 2 1/2T- 3T DUMP	PL SIN	144	3,500 Miles		
332	TRUCK 21/2T-3T STAKE	HD VEH	144	8,000 Miles		
340	TRUCK LT TANDEM SNOW PL	HD VEH	144	3,500 Miles		
346	TRUCK 1M GAL DIST TILTCAB	HD VEH	180	8,000 Miles		
350	TRUCK 57M CHASSIS TANDEM	PL TAN	144	3,500 Miles		
352	TRUCK TANDEM TRACTOR	HD VEH	180	8,000 Miles		
354	TRUCK TANDEM LOG LOADER	HD VEH	144	8,000 Miles		
356	TRUCK TEST BED SNOWPLOW	HD VEH	144	8,000 Miles		
360	TRUCK FOUNDATION SURFACE	HD VEH	180	8,000 Miles		
361	CENTERLINE MARKER	HD VEH	120	8,000 Miles		
362	DURABLE PAINT STRIPPER	HD VEH	120	8,000 Miles		
371	GRAVEL EXP TRUCK MOUNTED	HD VEH	180	8,000 Miles		
372	SOIL AUGER TRUCK MOUNTED	HD VEH	120	8,000 Miles		
373	FOUND EXPLOR COR RIG MTD	HD VEH	180	8,000 Miles		
380	ELECTROMAGNETIC TRUCK MTD	HD VEH	96	8,000 Miles		
381	SURFACE PROFILOMETER	SM VEH	120	8,000 Miles		
382	SKID TESTING UNIT (FHWA)	SM VEH	180	8,000 Miles		
390	VAC SEWER CLEANER MTD	HD VEH	120	8,000 Miles		
391	LG CULVER/SEWER CLEANER	HD VEH	120	8,000 Miles		
424	MOWER TRACTOR <60HP	MOWTRAC	240	500 Hours		
425	MOWER TRACTOR >60HP	MOWTRAC	240	500 Hours		
427	MOWER TRACTOR 4X4 <60HP	MOWTRAC	240	500 Hours		
428	MOWER TRACTOR 4X4 >60HP	MOWTRAC	240	500 Hours		
430	MOWER SELF PROP RIDING	MOWRIDE	96	500 Hours		
620	GRADER MOTOR >70HP ALL	OFF ROAD	240	125 Hours		
720	TRACTOR LOADER <ICY	OFF ROAD	240	125 Hours		
721	TRACTOR LOADER/BACKHO 4X4	OFF ROAD	144	500 Hours		
723	TRACTOR LOADER/MOWER <70H	OFF ROAD	180	500 Hours		
724	SKID STEER LOADER <30HP	OFF ROAD	180	500 Hours		
725	TRACTOR BI-DIR >100HP VER	OFF ROAD	240	500 Hours		
726	TRACTOR LOADER/BACKHO 2X4	OFF ROAD	144	500 Hours		
727	SKID STEER LOADER >30HP	OFF ROAD	180	500 Hours		
730	CRAWLER W/DOZER OR LOADER	OFF ROAD	180	500 Hours		
750	CRAWLER TRACTOR LOADER	OFF ROAD	180	500 Hours		
760	LOADER 4X4	OFF ROAD	180	125 Hours		

Appendix E

Phase I—Survey Results

MnDOT & University of Minnesota Duluth--Benchmarking Fleet Management Survey I Results, July 2002

*Note: %'s may add to be 101% because of rounding

		Items MnDOT is Doing Differently Compared to the:					DOT 16 responses						Private 7 responses						City 2 responses				Gov. x1
		DOTs Average	Private Co. Average	Overall Average	Minnesota DOT	Overall Average	High	Avg	Low	% that said YES	% that said NO	% with No Response	High	Avg	Low	% that said YES	% that said NO	% with No Response	Avg	% that said YES	% that said NO	% with No Response	
	QUESTIONS																						
1	Number of facilities used for equipment repair/maintenance				17	28	70	23	1				17	4	1				1				326
1a	Are you utilizing mechanic shifts in addition to a day shift		X		NO	NO		NO		25%	75%			YES		43%	43%	14%	NO	0%	100%		YES
2	Indicate the number of Fleet Maintenance/Repair Operations Personnel																						
2a	Certified Fleet manager(s) by a nationally recognized org.				0	0	1	0	0				1	0	0				0				UN
2b	Fleet manager(s)				3	14	80	8	0				4	2	0				1				191
2c	Equipment Acquisition Specialist(s)				3	1	5	2	0				1	1	1				0				
2d	Equipment Disposal Specialist(s)				1	0	1	0	0				1	1	0				0				
2e	Shop Supervisors				16	23	67	16	1				3	2	0				0				290
2f	Field Mechanics				38	46	500	62	0				9	5	0				0				
2g	Mechanics				117	71	298	78	8				69	16	1				4				422
2h	Lube/Service Technicians				6	5	30	7	0				2	1	0				0				
2i	Welders				9	7	67	9	0				3	2	0				1				
2j	Service writers				0	4	67	6	0				0	0	0				0				
2k	Support staff				6	17	67	13	0				3	2	1				2				171
3	Mechanic Training																						
3a	Do you provide mechanic training				YES	YES		YES		100%	0%			YES		71%	29%		YES	50%	50%		YES
3b	Is training provided by an in-house training staff				NO	NO		NO		25%	75%			NO		43%	57%		YES	50%	50%		YES
3c	Is training provided by external training staff				YES	YES		YES		75%	25%			YES		71%	29%		YES	100%	0%		NO
3d	Is mechanic training provided primarily by vendor's sales department				NO	NO		NO		38%	63%			NO		29%	71%		YES	50%	50%		NO
3e	Do you have an established mechanic training program or training standards	X	X	X	NO	YES		YES		50%	50%			YES		57%	43%		YES	50%	50%		YES
4	Types of Equipment and vehicles																						
4a	Which of the following types of vehicles and equipment do you perform maintenance and repairs on																						
4b	Over the road truck/tractor equipment				YES	YES		YES		94%	6%			YES		86%	14%		NO	0%	100%		YES
4c	Heavy duty trucks tandem axle dump				YES	YES		YES		100%	0%			YES		71%	29%		YES	100%	0%		NO
4d	Medium duty single axle dump trucks				YES	YES		YES		100%	0%			YES		86%	14%		YES	100%	0%		NO
4e	Light duty trucks/autos 1 ton or less GVWR				YES	YES		YES		94%	6%			YES		86%	14%		YES	100%	0%		YES
4f	Off-road/heavy equipment, loader, motor graders etc				YES	YES		YES		100%	0%			YES		57%	43%		YES	100%	0%		NO
4g	Truck chassis aerial units				YES	YES		YES		100%	0%			YES		57%	43%		YES	50%	50%		NO

MnDOT & University of Minnesota Duluth--Benchmarking Fleet Management Survey I Results, July 2002

*Note: %'s may add to be 101% because of rounding

		Items MnDOT is Doing Differently Compared to the:			DOT 16 responses						Private 7 responses						City 2 responses				Gov. x1
	QUESTIONS																				
5	Please indicate which of the follow apply to the types of maintenance/repairs and practices of your company shop personnel																				
5a	Do you have a documented Preventative Maintenance Policy				YES	YES		YES		94%	6%			YES		86%	14%		YES	50%	50%		YES
5b	Do you follow manufacturers schedules for your PM	X	X	X	NO	YES		YES		75%	25%			YES		71%	29%		YES	100%	0%		YES
5c	Do you adhere to a multi-level Preventative Maintenance schedule Ex:PM-A, PM-B, PM-C, etc...	X	X	X	NO	YES		YES		88%	13%			YES		86%	14%		YES	100%	0%		YES
5d	Do you adhere to documented tasks for your equipment PMs				YES	YES		YES		100%	0%			YES		100%	0%		YES	100%	0%		YES
5e	If yes, are they based on your own recommendations				YES	YES		YES		93%	7%			YES		86%	14%		YES	100%	0%		YES
5f	If yes, are they based on Mfg. Recommendations	X	X	X	NO	YES		YES		75%	13%	13%		YES		43%	29%	29%	YES	50%	50%		YES
5g	Have you instituted "Time to complete" standards for mechanic				NO	NO		NO		31%	69%			NO		43%	57%		NO	0%	100%		NO
5h	Do you perform component major Overhaul/Rebuilds	X	X	X	NO	YES		YES		81%	19%			YES		57%	43%		YES	50%	50%		YES
5i	Do you perform primarily minor repairs	X			YES	YES		NO		38%	56%	6%		YES		71%	29%		YES	100%	0%		YES
5j	Are your mechanics using computer assisted diagnostics tools				YES	YES		YES		94%	0%	6%		YES		57%	43%		YES	100%	0%		YES
5k	Have you established low priority seasons for each class of equipment for scheduled maintenance		X		YES	YES		YES		63%	31%	6%		NO		29%	57%	14%	YES	100%	0%		YES
5l	If yes, what is the ratio of scheduled vs. non-scheduled repairs																						
	10%				NO	NO		NO		0%	100%			NO		0%	50%	50%	NO	0%	100%		NO
	25%				NO	NO		NO		29%	71%			NO		0%	50%	50%	YES	50%	50%		NO
	50%	X		X	YES	NO		NO		14%	86%			YES		25%	25%	50%	NO	0%	100%		NO
	75% or greater		X		NO	NO		NO		36%	64%			YES		25%	25%	50%	YES	100%	0%		YES
	Not Sure of the ratio				NO	NO		NO		21%	79%			NO		0%	50%	50%	NO	0%	100%		NO
6	Organizational Structure																						
6a	Who manages your fleet operations																						
6b	Supplier or vendor employees				NO	NO		NO		0%	100%			NO		0%	71%	29%	NO	0%	50%	50%	NO
6c	Company employees or staff				YES	YES		YES		100%	0%			YES		100%	0%		YES	100%	0%		YES
6d	Are your fleet decisions made from a centralized administration or dept.	X	X	X	NO	YES		YES		69%	31%			YES		86%	14%			0%	0%	100%	YES
6e	Are your fleet decisions made at a divisional or department leve	X	X	X	NO	YES		YES		81%	19%			YES		71%	14%	14%	YES	100%	0%		NO
6f	Number of years with current organizational structure				20	12	28	13	2				20	12	3				14				10
6g	Do divisions pay equipment or user fees to a central budget		X		NO	NO		NO		44%	56%			YES		71%	29%		NO	0%	100%		NO
6h	If so does the user fee contain the following costs																						
6i	Normal wear and tear				NA	YES		YES		38%	0%	63%		YES		100%	0%			0%	0%		N/A
6j	Abuse and neglect				NA	NO		NO		13%	19%	69%		YES		60%	40%			0%	0%		N/A
6k	Do divisions pay for vehicle and equipment PMs	X	X	X	NO	YES		YES		81%	19%			YES		71%	29%		YES	100%	0%		YES
6l	Do divisions pay for repair costs	X	X	X	NO	YES		YES		75%	25%			YES		71%	29%		YES	100%	0%		YES
6m	Are fleet staff rewarded for their performance				NO	NO		NO		13%	88%			NO		43%	57%		NO	0%	100%		NO

MnDOT & University of Minnesota Duluth--Benchmarking Fleet Management Survey I Results, July 2002

*Note: %'s may add to be 101% because of rounding

		Items MnDOT is Doing Differently Compared to the:					DOT 16 responses						Private 7 responses						City 2 responses				Gov. x1
		DOTs Average	Private Co. Average	Overall Average	Minnesota DOT	Overall Average	High	Avg	Low	% that said YES	% that said NO	% with No Response	High	Avg	Low	% that said YES	% that said NO	% with No Response	Avg	% that said YES	% that said NO	% with No Response	
	QUESTIONS																						
6n	Where in the organization is the shop staff managed from																						
6o	Centralized office/department or manager		X		NO	NO		NO		19%	56%	25%		YES		86%	0%	14%	NO	0%	50%	50%	
6p	Each location or department manages their staff		X		YES	YES		YES		81%	13%	6%		NO		29%	43%	29%	YES	100%	0%		YES
6q	Is there a definitive authority responsible for policy & standards for all vehicle and equipment maintenance shops	X	X	X	NO	YES		YES		88%	13%			YES		100%	0%		YES	100%	0%		YES
6r	Does your company provide/allow assigned units for more than intermittent usage by employees				YES	YES		YES		81%	19%			YES		71%	29%		YES	100%	0%		YES
6s	Can employees with assigned units use them for personal use				NO	NO		NO		13%	88%			NO		14%	86%		NO	0%	100%		NO
6t	Do you have documented policy defining eligibility for assigned units		X		YES	YES		YES		69%	31%			NO		43%	57%		NO	0%	100%		YES
6u	Is your organization ISO 9000 certified				NO	NO		NO		6%	81%	13%		NO		14%	86%		NO	0%	100%		NO
6v	Does your organization work towards the Baldrige Award				NO	NO		NO		25%	75%			NO		0%	100%		NO	0%	100%		NO
7	Parts Management																						
7a	Do you have an in-house parts/inventory department				YES	YES		YES		88%	6%	6%		YES		71%	14%	14%	YES	50%	50%		YES
7b	If yes are the employees company staff				YES	YES		YES		88%	0%	13%		YES		67%	0%	33%	YES	100%	0%		YES
7c	Number of Parts Technicians				92	13	67	18	0				2	1.4	1				1				
7d	Number of Parts Runners				0	5	67	8	0				2	0.8	0				1				
	Percentage of PM parts purchased from																						
7e	OEM				15	25		22						33					23				
7f	After market				85	75		78						68					78				
	Percentage of repair parts purchased from																						
7g	OEM				35	50		44						64					65				
7h	After market				65	50		56						36					35				
	Who does the parts/inventory supervisor report to																						
7i	Shop supervisor		X		NO	NO		NO		19%	69%	13%		YES		43%	29%	29%	YES	50%	0%	50%	NO
7j	Same supervisor as the shop supervisor	X		X	NO	YES		YES		44%	44%	13%		NO		29%	43%	29%	NO	0%	50%	50%	YES
7k	Both report to different supervisors	X	X	X	YES	NO		NO		25%	69%	6%		NO		14%	57%	29%	NO	0%	50%	50%	NO
7l	If you have multiple repair facilities do you have parts support at each site				YES	YES		YES		86%	7%	7%		YES		67%	0%	33%	NO	0%	100%		NO
7m	Do you have a company owned central parts depot for high dollar items				NO	NO		NO		44%	56%			NO		14%	43%	43%	NO	0%	50%	50%	
8	Fleet maintenance and record keeping system																						
8a	Are your equipment maintenance and repair records kept on paper/hard copy	X	X	X	NO	YES		YES		69%	31%			YES		57%	43%		YES	50%	50%		YES
8b	Do you utilize a computerized fleet management system				YES	YES		YES		100%	0%			YES		86%	14%		YES	50%	50%		YES
8c	Our system has been established < 2 years	X	X	X	YES	NO		NO		0%	94%	6%		NO		17%	67%	17%	NO	0%	100%		NO
8d	Our system has been established 2 – 5 years		X		NO	NO		NO		19%	75%	6%		YES		50%	33%	17%	NO	0%	100%		NO
8e	Our system has been established > 5 years	X		X	NO	YES		YES		75%	19%	6%		NO		17%	67%	17%	YES	100%	0%		YES
8f	Does your system capture "Live" data entry				YES	YES		YES		56%	44%			YES		67%	33%		NO	0%	100%		NO

MnDOT & University of Minnesota Duluth--Benchmarking Fleet Management Survey I Results, July 2002

*Note: %'s may add to be 101% because of rounding

		Items MnDOT is Doing Differently Compared to the:					DOT 16 responses						Private 7 responses						City 2 responses				Gov. x1
		DOTs Average	Private Co. Average	Overall Average	Minnesota DOT	Overall Average	High	Avg	Low	% that said YES	% that said NO	% with No Response	High	Avg	Low	% that said YES	% that said NO	% with No Response	Avg	% that said YES	% that said NO	% with No Response	
	QUESTIONS																						
8g	If you have multiple repair facilities are they networked together				YES	YES		YES		100%	0%			YES		67%	33%		NO	0%	100%		NO
	Do you use your system for:																						
8h	Tracking Vehicle Repair Labor				YES	YES		YES		100%	0%			YES		100%	0%		YES	100%	0%		YES
8i	Tracking Vehicle Parts				YES	YES		YES		100%	0%			YES		100%	0%		YES	100%	0%		YES
8j	Tracking Vehicle Fuel Usage				YES	YES		YES		88%	13%			YES		100%	0%		YES	100%	0%		YES
8k	Tracking vehicle Usage				YES	YES		YES		88%	13%			YES		67%	33%		NO	0%	100%		YES
8l	Track repair data to make "Predictive Maintenance"	X	X	X	NO	YES		YES		50%	50%			YES		67%	33%		NO	0%	100%		NO
8m	To make automated fleet decisions	X	X	X	NO	YES		YES		56%	44%			YES		83%	17%		NO	0%	100%		NO
	Who begins the repair documentation in your shop(s)																						
8n	Shop Supervisor		X		YES	YES		YES		63%	38%			NO		43%	57%		YES	50%	50%		NO
8o	Service writer				NO	NO		NO		13%	88%			NO		0%	100%		NO	0%	100%		NO
8p	Field/shop mechanic		X		YES	YES		YES		63%	38%			NO		29%	71%		YES	50%	50%		NO
8q	Operator				NO	NO		NO		19%	81%			NO		29%	71%		NO	0%	100%		YES
8r	Other				NO	NO		NO		0%	100%			NO		29%	71%		NO	0%	100%		NO
9	Fleet Management																						
9a	Do you purchase only new equipment	X	X	X	NO	YES		YES		56%	44%			YES		57%	43%		YES	50%	50%		YES
9b	Do you have established and documented purchasing standards for																						
9c	Each class of equipment	X	X	X	NO	YES		YES		94%	6%			YES		100%	0%		NO	0%	100%		
9d	Each make and model		X	X	NO	YES		NO		44%	56%			YES		86%	14%		NO	0%	100%		
9e	Each engine brand		X		NO	NO		NO		31%	69%			YES		71%	29%		NO	0%	100%		
9f	Each transmission/drive train		X		NO	NO		NO		31%	69%			YES		57%	43%		NO	0%	100%		
9g	Do you incorporate lifecycle costing into equipment decisions	X	X	X	NO	YES		YES		69%	31%			YES		100%	0%		NO	0%	100%		YES
9h	Do you utilize documented lease criteria for light duty vehicles		X		NO	NO		NO		25%	69%	6%		YES		71%	29%		NO	0%	100%		NO
9i	Do you utilize documented lease criteria for equipment		X		NO	NO		NO		31%	63%	6%		YES		57%	43%		NO	0%	100%		NO
9j	Do you have a documented vehicle/equipment purchase criteria	X	X	X	NO	YES		YES		69%	25%	6%		YES		71%	29%		YES	50%	50%		YES
9k	Do you have a documented vehicle/equipment disposal criteria	X	X	X	NO	YES		YES		81%	13%	6%		YES		57%	29%	14%	YES	50%	50%		YES
	Which methods do you use for equipment disposal																						
9l	Owner auction		X		YES	YES		YES		50%	50%			NO		43%	57%		YES	100%	0%		NO
9m	Consignment auction	X			YES	YES		NO		44%	56%			YES		57%	43%		YES	100%	0%		YES
9n	Direct sale	X			YES	YES		NO		44%	56%			YES		71%	29%		NO	0%	100%		YES
9o	Seal bid	X	X	X	YES	NO		NO		38%	63%			NO		29%	71%		NO	0%	100%		YES
9p	Trade in on new purchase				NO	NO		NO		25%	75%			NO		43%	57%		YES	50%	50%		NO
9q	Internet or E-commerce method				NO	NO		NO		25%	75%			NO		29%	71%		NO	0%	0%		YES
9r	Other				NO	NO		NO		13%	88%			NO		0%	100%		NO	0%	0%		NO
10	Would your organization or buisness be willing to engage in greater discussions for the mutual benefit of all parties involved				YES	YES		YES		100%	0%			YES		57%	29%	14%	YES	100%	0%		YES

Appendix F

Phase I—Interview Response Summary

Section F1—DNR, MnDOT and Xcel Energy Responses

Question	DNR	MnDOT	Xcel Energy
Contacts	❖ Ty Kovach, Fleet Operations Manager ❖ Tim Morse (Dept. of Admin.) former DNR Fleet Operations Manager	❖ John Howard ❖ Jerry Houliston ❖ Tom Duerr ❖ John Lenz ❖ Val Svenson	❖ Rob Streeter, Fleet Asset Consultant ❖ Jan Hebaus, Fleet Project Specialist ❖ Jim Happe, Fleet Construction (fabrication) and Maintenance Manager ❖ Charlie Kaekler, Fleet Project Specialist ❖ Bruce Wick, Fleet Construction (fabrication) and Maintenance Manager
Organizational Structure:	10/03/02 Start: 2:05 p.m.- End: 4:50 p.m.	10/07/02 Start: 12:40 p.m.-End: 3:40 p.m.	10/08/02 Start: 9:20 a.m.-End: 11:50 a.m.
1. Describe your fleet and equipment organizational structure (provide an organizational chart) - Duties, responsibilities and authority over the following: • **Fleet Management** • **Equipment Maintenance** • **Purchasing and selling** • **Parts and inventory**	3000 pieces of equipment, 2090 with licenses (mostly light trucks). Commitment is to have a safe fleet. Most of the fleet is maintained within warranty. Their total fleet and maintenance staff is 26 people for the entire state. Each class "A" shop has one facility and operations manager, equipment specialist and part time clerk (~60% of their time). Their largest shop is in Grand Rapids, which has 5 mechanics. The other three shops (Bemidji, New Ulm and St. Paul) have one to three mechanics each. No Full time Fleet Mgr. CO has one buyer, one account clerk, one fleet analyst, and a half time Operations Manager (Ty) All vehicles included in the fleet (some equipment has been exempted from fleet management) are owned by fleet management and are leased to operating units.	John Howard, State Equipment Engineer, works in the Office of Maintenance and is part of program support. All the repair and equipment shops in the districts are part of program delivery. Program support is responsible for standards and measures, equipment specifications and acquisition. Any policy developed must go up the organizational chart and then back down. Districts and Office of Maintenance do not connect common supervisors until the commissioners' level. Districts are responsible for all equipment maintenance and repair decisions. Several variations for shop staffing are sued throughout the state. Some use superintendents as fleet managers; others have shop supervisors that may supervise two shops several miles apart. Fleet staff reports to different supervisor than inventory staff. Maintenance or customer of the shop supervises some fleet staff. Metro, represent largest district fleet.	See organizational chart. Seven Regional Fleet Managers and one Standards and Acquisition Manager report to a national Fleet director in Denver. Each Regional Manager has from one to 9 locations. Minnesota has two regions Metro East (3 locations) and MN/ND (9 locations and the biggest shop). They deal with multiple locals of the same union, but have different contracts with each. Rob Streeter who reports to an Xcel Denver corporate manager handles equipment purchasing and sales. Parts Inventory is in transition from an in house stock to consignment parts (NAPA, etc.) Most parts inventory is PM or lube and service items. Union foreman do shop supervisions,

Question	DNR	MnDOT	Xcel Energy
	Four class "A" shops - have no diagnostic equipment. Maintenance on common type equipment and all warranty work is done in commercial shops. Grand Rapids does the larger off-road unit repairs/ maint (major repairs)	Engineer with fleet management responsibility has no control to enforce any policy except for maintenance subordinates. One district or department, Central shop, has an inventory and a shop, they report to one supervisor "John Howard"	which is the same union as the mechanics.
2. Why was the Organization Structure selected?	To provide a safe fleet and budget shortfalls.	History--The addition of Superintendent Fleet operations has shifted some responsibilities and workloads. District 7 uses this format. Superintendent, two shop supervisors in separate shops. In D7 the superintendent reports to an administration manager.	It reflects the merger of Xcel and New Century Energy two years ago (2000). Intent was to reduce managers (each shop use to have a manager).
If you have reorganized recently: **- What were the issues that you needed to resolve?**	1989 they centralized their fleet. At that time: • Equipment couldn't perform tasks, unreliable, and too costly to maintain. • Utilization rate wasn't up to par. • Too many regions not being used efficiently • Inventory levels were high at each region • Unsafe equipment • Equipment replacement and management was a low priority within the operating units.	• Too much equip, not utilized enough	• Uniform procedures, policies and reporting procedures. • Use merger to reduce overhead. • Organize so fleet people work with fleet people. Communication and interaction with the shop with fewer managers
- How did you resolve them?	Commissioner's staff set-up and participated in a "**Fleet Committee**". This committee recommended hiring a Fleet Manager and centralizing ownership of the fleet, establishing rental rates to the operating regions and setting up a revolving account. The revolving account was approved by the legislature in 1989(?). Developed a life cycle for every piece of equipment.	• Metro merged from two districts to one. Done to combine functional areas with fewer staff. Separated fleet operations into two areas shop functions and equipment purchasing/disposal. • Central equipment pool provides a place to get low usage units.	• Reorganized and consolidated management. • Use one Fleet Management System across entire organization. • Quarterly shop meetings with managers.
- Types of improvements that were observed?	• Reduction in maintenance $ (of new vs. old equipment) has reduced the # of mechanics and shop facilities (2 shops	• More equipment sharing, fewer owner issues as one department. • Easier to prioritize purchases. Able to	• Improvement in uniformity throughout the organization • Old system promoted retention of spare

Question	DNR	MnDOT	Xcel Energy
	closed). • Age of fleet has improved and is safer. • By increasing use of pooled equipment and eliminating spares, the fleet size was reduced. • More reliable equip & less downtime	reduce some types of equipment. Snow and ice operations are done geographically while non-S&I is done functionally with tasks being done by seasonal work crews.	units. Developed **Maintenance Repair Units** to determine staffing levels. Applied to PM work. Fleet average age was reduced as well as size of fleet.
- **What did you do right during implementation?**	Change was championed from the commissioner (fleet committee); all top level regional management teams were involved. Decision was made to have safe equipment and to prioritize in order of need set life cycles.		
- **What do you wish you had known when you started?**	• Clearly define what equipment would be exempt from fleet management.		• Urban development and sprawl drive facility expansion.
- **What works better now? Why?**	• Fleet is newer, safer, more reliable • Tasks can be done faster & more efficient • Utilization rates are up • Fleet is managed as primary duties of one person rather than an additional duty to operations. All fleet costs are borne by operational budgets, which gives them the incentive to optimize the use and age of their fleets.	• Better equipment, consistency, easier to prioritize, downsize in some areas. • New equipment provides opportunities for safer equipment and up to date technology, which equals less downtime.	• Change forced implementation of new fleet management software to track all company units not just regional ones. • Able to shift the work load to accomplish more work. • They have the ability to move crews and the equipment closer to work and repair facility.
- **What works worse since the change? Why?**	Costs have become a bigger issue to operating units. There is pressure to shift those costs away from operating budgets. Sometime equipment replacement is deferred in order to delay or prevent personnel layoffs.	• Encountered more or different union issues than before. • Struggling with the end picture	• Union issues when trying to accomplish work when work crosses over between local unions
- **How do your end users or owners feel about the change?**	• No more complaints about unsafe equipment. • Breakdowns are reduced. • They are unhappy with their lease rates.	• Fleet manager can only influence or create awareness to fleet issues involving other areas of department. • They prefer to be owner of equipment and not share or share on their terms.	

Question	DNR	MnDOT	Xcel Energy
- **What advise would you give me if I have to make a similar change?**	• Make sure your lease rates are defendable (look at commercial rates and rational used in developing yours.) • Define what is in, what is out (valid excuses) • Safety can be a leading factor for decisions • Get approval from higher up	• They realize that it's hard, but it's for the best and things are going in the right direction. • Patience, try to have concept of what the end looks like. • There is pride in ownership, so watch out when you start exchanging vehicles and equipment. • Because the equipment isn't theirs all the time, the equipment might be with someone else, as a result, they have to do more planning ahead of time to make sure they always have the right equipment and that it is available for them. • Focus on the core work and what equipment you need to get those jobs completed. • Develop a flow chart, set criteria	
- **Additional changes**	They have recently gone from six regions and shops to four of each. This was to reduce administrative costs. Attrition and transfers are closing two shops. These two shops are being closed to prevent the continuation of the six-region concept.	Decentralized statewide fleet allows decisions closer to the work. Districts create their own spending plan. Statewide fleet administration is in consistent.	
3. What works well	See 2. As part of change description. • Fleet committee makes decisions on equipment; • Funding structure provides newer units less maintenance requirements and costs. • Equipment is spec'd to the needs of owner. • Communication is made with the owner & buyer to ensure correct application.	• Districts controls their own budget • All disposal funds are returned to district accounts • Decisions are being made at a lower level which promotes more job satisfaction in feeling that they have a say in things. These decisions are made for smaller impact decisions. People closer to the work are usually able to make better decisions that are effecting their job. • Higher up decisions are made when concerned with $$$$.	• Communications between units seems to work well. – Weekly telephone calls, email, quarterly face-to-face foreman meetings. • Using MRUs to establish mechanic staffing levels. • No more ownership or department issue for equipment. Fleet department owns everything.
4. Problems with current organizational structure?	• Political administration changes, this requires significant amount of time to educate that person by the fleet	• Difficult to standardize units • Lack of pride in units with de-centralized equipment	• Broader geographic area makes shop comparisons difficult.

Question	DNR	MnDOT	Xcel Energy
	manager. • Cannot restrict the options that the equipment users order. (They can review and advise). • Speed of getting new units to replace old one • Would like to be able to get higher utilization rates on equipment – this would improve cost efficiency.	• Low utilized or spare count too high • No authority to address how equipment is operated • Inspections are done on a calendar year, not seasonally	
5. Constraints	• Bidding laws and manufacturer – dealer contracts. • It would be nice to work directly with the manufacturers rather than dealers. This would simplify purchasing.	• Fixed budget amount from legislature • Politics enter into decisions • Managerial changes with elections • Managers move through the organization before developing an understanding of fleet structure	• Working with different locals of the same union causes many problems. They are in the process of contacting the national union to work out a MOU or different arrangement.
6. Communication with Multiple shops?	Ty is the Operations Manager. He communicates with the four regional managers by conference calls, email, quarterly face-to-face meetings. Consolidated database, 3 yrs old , created by vision technology.	Shop meetings, e-mails, phone contact Statewide meetings at all levels of shop staff, some are held annually only Meet as functional groups only not cross functional.	Shops are located to minimize loss time for travel. Shops are constructed with each service center. Staffing is set by MRU's. Mechanics relocated to compensate work load in Metro
Funding:			
7. Funding Process used to purchase new and replacement equipment.	The internal billing of regions takes labor time (positions). The Legislative approval is needed to borrow enough money to start revolving fleet account. Once in place, field divisions are billed for the equipment they "own". This replenishes the account to make loan payments. The divisions also create a purchase list of equipment. The division director then approves equipment upgrades or changes.	• Equipment budget is allocated to districts by a formula, which is based on fuel usage and snow and ice formula (this measures miles, interchanges, and travel volume) data is roughly 3 years old • Total budget amount for equipment is $14,500,000, less Central shop operating dollars. • Auction receipts go directly to district equipment account. Compensation for accident damage goes to district from restitution account.	• Funding for all equipment is via a load from BLC, now Citibank. • Loan is repaid as a lease rate for each piece of equipment. • Currently 85% of equipment is leased. • 1992 and older is owned • Process started in 1989. All new equipment has been purchased using this process. • Older units were initially left as owned and number of these has shrunk with time. • Xcel cuts check for units purchased. Director of Transportation sets spending limit for equipment lease. • The Fleet management "rents" equipment to operating departments. Rent is 25% lease and 75% overhead (maintenance, repairs)
8. Replenish Fund?	The revolving fund and access to a source of loans	• Allocated Bi-annually and dispersed annually by legislative law.	• Lease payment budget is replenished by department payment to fleet account.

Question	DNR	MnDOT	Xcel Energy
	Periodic billings fill the revolving account for payment and next cycle of purchases. Equipment rate is established using replacement value (2-4% of replacement cost), fuel, and maintenance.	• Districts can add district operating money • Usually a safe account not affected budget shortfalls • It's up to the districts discretion to rent vs. buy.	• Vice President approval for new equipment • Director of transportation sets budget • All rental payments are equal for that particular type of equipment throughout the fleet.
9. What works well	• User rates are fair and defendable. • Regions can lease outside fleet operations loan program. • Fuel transactions or payments were reduced to 12 for the entire fleet since it is included in the user rate.	• Leases and rentals can be paid using equipment dollars • Amount is constant so budgeting is easy for districts; they can count on it every year. • Separates funding into different categories	• Initial rates were quite low. • Utilization has improved and fleet size has been reduced, as departments have to pay for all equipment at the same rate regardless of age. • There isn't a need to gather capital each year for equipment purchases, only determine spending level. (easy to budget)
10. Funding problems	Need to keep a $1.5million cash balance at the beginning of each Fiscal year. • Timing is very critical to ensure enough funds are available to make loan payments. • User rates have no provision for administrative fees or costs. • Leased units outside the DNR avoid payment for insurance and fuel costs as incorporated into the DNR fleet rate. Fleet budget has to pay these and leasing division does not. • There is no data available to track who and/ or what is leased from a higher position. Administrative burden to administer the program	• 11 million additional needed to bring fleet to life cycle • Annual allocation with zero balance required at end of bi-ennium • Can't get equipment down to life cycle because budget doesn't allow this. • Operating costs and equipment costs are two different accounts, however, it would sometimes be nice to combine them because of how life cycle costs works (over time it costs more to maintain equipment which only comes out of equipment account).	• Current rental rates are quite high. • Departments lose track of units they are paying for. Some departments buy to improve response and convenience, IE a trailer for each unit that needs hauling. • Its hard to get the life out of the vehicle, usually the equipment/ vehicle has to be kept one year after its desired life cycle. • Hard to predict the life cycle.
11. Cause of funding problems	• A problem with revolving accounts is that, when built up it becomes vulnerable to be taken from some other area, especially in time of economical lows. • The initial internal billing structure was labor intensive. This was not allowed for in the initial implementation.	Legislative allocation and life cycle schedule	• Work orders accumulate to class of vehicle regardless of what department requires the work. These and other costs continue to accumulate to the equipment class forcing rate increases. Current internal rental rates are quite high. The additional costs triple the rental rate to the individual departments. Large or expensive repairs billed to the owning department instead of inclusion

Question	DNR	MnDOT	Xcel Energy
			to the rental rate would bring down rates and punish abusive operation.
12. Funding Improvement		Metro likes the flexibility to pick what they want.	Current lease system works well. Department budgeting is now easier; they all know their equipment cost and what the rate for any new units will be for the following year.
13. If you have made any funding or funding method changes, describe:	Revolving Account	Adjusted the funding formula to remove credit for fleet count or amount of units	In 1989 transitioned from fully owned fleet to leased equipment. Currently 85% to 90% of all equipment is funded via the lease program. Internal Rental rates are normally adjusted annually, but can be adjusted to reflect unexpected costs.
- What were the issues that you needed to resolve?	• Old and unsafe equipment at operating units. • Funding for equipment always had low priority in operating budgets.	• Get ride of the idea that having more vehicles meant getting more funding.	• Old equipment and having to front the capital to purchase new equipment.
- How did you resolve them?	• Legislation establishes a revolving account and one-time funding to start program.	• Changed formula, which emphasized the lane miles and the actual volume of area covered.	• Negotiate a loan with BLC, now part of Citibank to provide capital. All purchasing, management and resale decisions are made by Excel.
- What types of improvements did you notice?	• All equipment is safe. Most is operating within warranty periods.	• Less funds needed • More savings • Got rid of useless equipment. • Fuel usage recording and measure became more accurate • Auction receipt return to seller not general account	• Reduction in unused equipment • Better decisions by individual departments. Department heads can start and stop lease whenever they want. In effect they can "rent" short term if equipment is available in the pool. • No more spares sitting for just in case situations.
- What did you do right during implementation?	See organization changes – section 2.		• Retained all the control for fleet decisions, both disposal and acquisition. Auction is disposal of choice.
- What do you wish you had known when you started?	• To set up a business plan to include staffing, how to allocate revolving account, setting of internal lease rates and use of loans to buy new equipment. • Should have benchmarked the maintenance costs, they were a bit high.		• Better history for establishment of a more accurate life cycle. Mistakes here can leave too much residual debt at disposal.

Question	DNR	MnDOT	Xcel Energy
-What works better now? Why? **- What works worse since the change? Why?** **- How do your end users or owners feel about the change?** **- What advise would you advise me if I have to make a similar change?**	• Everything about the fleet works better, because fleet management is the focus. • Internal administration of the internal billing. This was set up in a cumbersome manner and there was insufficient staff assigned to it. No method to keep high repairs costs applied to owning department. They like the fleet, but don't like the costs. Put together a business plan that includes definition of fleet (what is in and what is out), administration responsibilities and staffing, use of loans to buy new equipment, letting of lease rate and allocating revolving accounts. Document base line of maintenance costs and equipment down times.		• Life cycles are more accurate. • Owning departments are more conscious of size of their fleet and what they have. • Xcel must dispose of all units. All repair costs affect rental rate, no way to reduce poor operator damage costs on rate. Get accurate life cycles in place for accurate rate.
Measures and Targets:			
14. Management Measures	Life Cycle – Set an initial life cycle for class of equipment, then negotiate for different uses. (e.g. some class of equipment are used both on and off road. Off road use reduces life cycle.) Light trucks were initially set using national standards and modified by history and confirmed by comparing to Missouri DNR at 6years /80,000 miles. • Utilization Rates- These are set based on Cost / mile and cost / hour of operation. • Scheduled vs. Unscheduled – not measured Number of vehicles due for replacement	Some management of low use or combination use for equipment to reduce number of units Recently introduced measure for districts to meet • Scheduled vs. unscheduled =just implemented targets for districts to meet • Life cycle = miles, and age of vehicle • Utilization = for small equipment such as mowers, fuel usage is monitored, which is the amount of fuel consumed in a given season. MnDOT just came out with some utilization targets for every district to meet.	Report and use MRUs to establish staffing. Lifecycles are set following industry standards and range from 8 to ten years. However, they are beginning to use their equipment management system to reflect different use characteristics. Scheduled vs. Unscheduled work. Their Lubrication and Inspection, L&Is constitute 70% of their work. They do monitor equipment breakdown (EB's) times, which is another term for equipment downtimes due to mechanical causes.

Question	DNR	MnDOT	Xcel Energy
	annually Cost/mile and Cost/hour per class for the entire fleet.		Only use miles or hours to make service schedules.
15. Shop measures	Equipment down time – desired measure, but not currently done. They tried $/hr to track mechanical downtime, but it was very high/ alarming so they don't do that.	None	Don't formally report on "come-backs". Rely on operating managers to report problems. Utilizing a check sheet for inspections. This relates to **Maintenance Repair Unit** for each unit, and helps determine staffing levels.
16. Obtaining measures	• Have their own system built by a company now out of business. It is internet based.		• Paragon "Fleet Anywhere" was part of merger and national fleet management. All shops now using same system running in Denver. System is new and employees are uncomfortable with it yet. • Mechanics and foremen enter all data.
Policies:			
17. Documented Policies	• They have a manual in draft form which they will provide.	• Recent policies result of recommendations from consultant and internal review of fleet • Support EMS (Equipment Management System) for accurate measures • Travel procedure manual- commuter vehicles	• They are in the process of combining the policies of the two merged companies. There is an extensive Xcel Policy Manual. • They have 14 different Preventive maintenance checklists in the company, which they are in the process of consolidating.
18. Policy development and enforcement	• Twelve-member fleet committee established all policies. This committee has a member from the Commissioner's staff and from each of the Divisions and the Fleet Manager. • Committee decisions are directed top to bottom of organization.	• Only recently implemented policies. Each district is responsible for enforcing their own policies.	• Corporate office in Denver sets most policies for fleet operations.
19. Most important Policies	• Deciding what is in and what is out of the Fleet. • Providing safe vehicles	• Utilization rate is probably the most important because all of the other policies stem from this.	
20. Industry comparisons	Has completed a study of rates of other fleets. Will send this to Kelvin. • Comparison to fleet rates outside DNR showed their rates for	• MN/DOT doesn't track cost, response time and public opinion is scale for effectiveness • Budget forces changes in business	• Previous Director has benchmarked other utilities. They used a consultant to direct this work. As a result they have made changes to

Question	DNR	MnDOT	Xcel Energy
	equipment were competitive.	practices • fleet employees go to seminars and conferences with other people of the same title and get an idea of what is out there	their operations – This was 7 or 8 years ago.
21. Quality Awards	None	Difficult to provide government employee with rewards	No – They do require their mechanics have fluid power certifications.
22. Benchmarking	• No, but they would like too. • They do occasionally talk to former employees for input • They do look at leasing costs of private organizations • Have looked at Missouri DNR	In process at this time	See 20
Extra Thoughts and Ideas:			
Miscellaneous	• Lease program started out with 100% loan from Department of Administration. Currently at 50% loans. Desire to become fully funded internally. Borrowing is method of smoothing out peaks of purchasing. • All equipment may be leased either by the month or hourly rate. The equipment is charged at a minimum monthly rate to cover depreciation, replacement, insurance, fuel and maintenance. Users are charged for second $1000 of insurance claims. • Their internal shop mechanic rate is not competitive with private garages at all ($160/labor hour). Therefore, they only perform maintenance on specialized and critical pieces of equipment. • They are being pushed toward longer life cycles because of the budget restrictions. This increase fleet maintenance costs by 7.5% last year.	• Cannot reward productivity or good business practices • MN/DOT can't pick or target specific customers • Decision makers for fleet and fleet maintenance are not getting upper management support • Politic rather than business drives too many decisions • Improve data accuracy • Major organizational changes will have more administrative costs and additional employee time to manage • Metro (Minneapolis & St Paul) have different organizational hierarchy than districts, maybe result of size and location. • Fleet policies lack any enforcement authority, difficulty maybe because of where the connection is in the organizational structure between districts and Program Support • Need to review current life cycles of equipment for accuracy	• Both regions shops are staffed 5days a week –24 hours per day. The second shift is the largest in both regions. • Use Lubrication analysis to set Lubrication and Inspection (PMs) at 5000 miles and 300 hours. It was 4000 miles and 200 hours. Do engine oil analysis on 100% of equipment. • Annual Aerial inspections are contracted out. • Use **Maintenance Repair Units (MRU)** to establish number of mechanics in shops. • Internal rental rates are based on 173 hours of use per month plus all repair and maintenance costs. (Don't know if fuel was included.) • PMs/L&I are done "front to back". Any repair work found is considered scheduled work during L&I. • Any repairs estimated to cost more than $1000 require manager's approval. Most of this work is sent out. • Equipment can be easily moved between locations and departments. It is charged back using their EMS. • They require their mechanics have fluid power certifications. • Attempt to provide 40 hours training for

Question	DNR	MnDOT	Xcel Energy
			mechanics annually.
Personal Observations and opinions.	• There seems to be reluctance to make additional improvements to fleet management. General sense is that they have made such dramatic improvements that additional improvements are not worthwhile. • Anytime rental rates are used; the ability to address poor operation and unit care cannot be directed back to the "owner" or offending dept.	• Different people going in their own direction with different ideas to meet statewide goals and solutions influenced heavily by the political environment in which they work. • There is no set policies that pertain to all districts. There is a lack of comm. among districts. Perform measures like ultiz rates, sched & unscheduled practices seem to be going in the right direction	• Focus is on equipment uptime. Shifts are staffed to work on equipment during periods not utilized. • Anytime rental rates are used; the ability to address poor operation and unit care cannot be directed back to the "owner" or offending department. • Staffing levels determined by actual projected PM schedules appear accurate.
Additional Follow-up needed.	See question 17, 20 • Fleet Study Report---&---Business Report/ Plan • Organizational Structure Chart	• Organization Structure	• Need to find out if rental rate includes fuel. • Compare MRU's to our fleet where possible.

Section F2—Sysco MN and Iowa DOT Responses

Question	Sysco MN	Iowa DOT
Contacts	❖ Dan Knutson, Fleet Manager	❖ Tim Nordholm, Equipment Services ❖ Carol Coates, Office of Procurement & Distribution ❖ Lee Wilkinson, Office of Maintenance ❖ Brad Osborne, Maintenance Equipment
Organizational Structure:	10/09/02 Start: 9:00 a.m.-- End: 10:35 a.m.	10/25/02 Start: 10:00 a.m.-- End: 2:50 p.m.
1. Describe your fleet and equipment organizational structure (provide an organizational chart) - Duties, responsibilities and authority over the following: • **Fleet Management** • **Equipment Maintenance** • **Purchasing and selling** • **Parts and inventory**	SYSCO Minnesota – one of 87 operating companies – 10th largest. One shop – Two managers – Manager of Transportation (routing and driver issues) and Fleet Manager. Operates in Minnesota – ½ ND and ½ WI a little of IA – 135 units. Clerical person does parts. $75,000 inventory on hand. Includes brakes, batteries, etc. There is a corporate "Traffic Department" that arranges initial deliveries from the manufactures / producers. Shop consists of 11 mechanics and 3 fueler/washers/inspectors. Lead mechanics set schedule and report to Dan Knutson, fleet manager. Dan reports to the Director of Transportation.	• I/DOT has a seven member Transportation Commission and a Director that both report to the Governor. • I/DOT Director has six divisions reporting to him. The two most responsible for the mobile equipment fleet are Operations and Finance Division and the Highway Division. • O&F Division has an Office of Procurement and Distribution with an Equipment Services Unit and a Distribution Center Unit. They set specs; purchase new fully built equipment; manage entire parts inventory. • The Office of Procurement operates in a similar fashion to MN/DOA and oversees all purchasing and inventory operations. This office manages a Central Inventory Center that nearly all supplies are disbursed from. They use 5 delivery tractor/trailer units to make bi-weekly trips to all districts. Districts have consignment inventories for equipment maintenance only such as filters belts and the like. • The Central Shop functions for Iowa DOT are a pre-delivery for plow trucks assembled as turn key. They also perform major repairs for the districts and oversee the \Ames central motor pool. The Central Shop is managed through the Office of Procurement, Carol Coates. • Hwy Division has an Office of Maintenance that operates the central repair shop with about twenty mechanics. The central repair shop performs most rework on new equipment. The Hwy division also has six districts. Each district has a district mechanic reporting to a district operations manager that reports to a district maintenance manager that reports to the D/E. Each district mechanic has about nine area supervisors with several garage locations within each area. In total, there are about ninety garages with mechanics in I/DOT; however, the "garage mechanics" also perform hwy maintenance work. There is 16 – 20 district mechanics who may be called onto work as road maintenance if the supervisor determines a need.
2. Why was the Organization	Last major change (1989) in fleet management occurred with the	Currently prefer a decentralized structure.

Question	Sysco MN	Iowa DOT
Structure selected?	merger of 3 former companies. Hired Dan from Red Owl Stores, where he was a fleet manager. Work 3 shifts, 7 days. Night shift crew is the biggest. One lead person per shift. Service 12 locations with the one shop in Mounds View. 124 power units. 11 mechanics. Mechanics wanted to go to 4-10's. They were allowed to come up with a plan to make it work. They have a sense of ownership in the business.	In March 2000, decentralized so each district could handle their own issues – back to the way it was previously. Also to create better utilization of cross use of employees and align functions. (hybrid of a matrix & functional organization) • Parts inventory still stored and managed at a central location; with District "ownership" of a part occurring as soon as they place an order for delivery from the central warehouse • Delivery trucks make regular rounds of all the I/DOT districts and fifty three areas.
If you have reorganized recently: - **What were the issues that you needed to resolve?**		• Too much equipment, each supervisor thought they had to have "one of their own" of everything. (Too much equip, not enough employees) • Too many positions that weren't needed.
- **How did you resolve them?**		• They were told from above to sell a percentage of the equipment. • They looked at utilization levels.
- **Types of improvements that were observed?**		• Allowed to "clean house" 100 plow trucks were sold off and numerous other "spare" equipment items. • Winter of 00'-01' (most severe in 100 yrs) proved, there is too much equip, not enough personnel. • The number of supervisors was also reduced. • Created a silo "effect", brought everyone together, used cross functional expertise of staff and resources.
- **What did you do right during implementation?**		• I/DOT Central Office management is convinced there is enough equip for a severe storm.
- **What do you wish you had known when you started?**		
- **What works better now? Why?**		• Communications between Central Shop and Operations & Finance are more formal now. • Districts pay more attention to their utilization levels, less "spare" equipment.

Question	Sysco MN	Iowa DOT
- **What works worse since the change? Why?** - **How do your end users or owners feel about the change?** - **What advise would you give me if I have to make a similar change?** - **Additional changes**		• Did have "complaints" when reducing equipment levels, however, operations are fine so employees are too. • Individuals had to get used to working with new or different supervisors, however, they seem to be adapting to that.
3. What works well	• Shop structure has grown with overall organization. Shop lead workers have autonomy. 11 mechanics 3 shifts 4 bays. Mechanic pay $15 to $23. • Use a two year intern with Hennepin Co. Votech ($11.5 + $.50/hr./6mos). • Just went to 4 – 10 hour days. Fit days with workload (Tue-Thurs). Mechanic attitude and productivity seems to be better. PMs are all on time. • Most of the PM and inspection work done on evening shift when units have returned from routes. • Central SYSCO sets up new equipment purchasing contracts. Sales are handled locally. Corporate negotiates directly with Fords and Sterlings.	See 2. As part of change description. • There are no parts or purchasing people in the districts. • Purchasing agents do contracts with vendors without any Department of Admin (General Services) approvals.
4. Problems with current organizational structure?	• Trade-in / resale has lost leverage with local dealers since corporate deals directly with manufacturer. • The mechanics responsibility of recording parts installed to units, creates gaps in inventory and charged out part numbers. • Corporate controls bidding and provides us with limited choices for new equipment purchases. • We must sell our own used equipment.	• Need to have open work orders to obtain parts, limits on quantity by equipment unit max need, so that takes some getting used to. • People have new supervisors was main cause of adjustment issues.
5. Constraints		• Cash flow, when you have to pay interest payments to pay for the truck chassis before it can be used. Cash flow causes outsourcing to outfitters and there are few outfitters to choose from. Need to raise labor rates on rework of new equipment equal to outfitters.
6. Communication with Multiple shops?	Single shop, specification meetings	• Single Central Shop with crew of twenty; however, ninety "Garages" each with a "garage mechanic/maintenance worker" throughout the state. Bi monthly meetings with all mechanics and central shop.
Funding:		
7. Funding Process used to purchase	• Sales and projected growth drive equipment monies available.	• Lease payments from districts pay into a revolving account.

Question	Sysco MN	Iowa DOT
new and replacement equipment.	• Fleet manager prepares recommendations, which proceed up chain. • SYSCO MN buys equipment outright. • Money is borrowed internally from corporate. • $2.3 million in sales/power unit. • Corporate goes out for bid. 200-500 trucks per year. 3 truck choices – multiple award. • Corporate deals directly with manufacturer.	• Payment amount is based on recovery of original cost and expected life. Additional replacement funds for increased costs and lease shortfalls are requested from the legislature annually. • Cost Center managers are responsible for setting depreciation. • Approximately 11 million equipment fund. • All equipment is purchased with revolving account, including computers. Only trucks are used to create the gap report for additional funding. • IA/DOT felt this was an easier concept to follow for funding requests when justifying new equipment purchases. • Districts budget to make their rental payments.
8. Replenish Fund?	• Available purchase dollars based on projected sales	• District payments replenish the equipment purchasing fund ($7M/yr) but fall short of funding the replacement unit in its entirety. Additional central appropriations to pay the cash flow for inflation on new purchases ($4M/yr).
9. What works well	• Corporate SYSCO deals directly with manufacturer on equipment purchase and pricing. Drives down cost, higher quality and allows more options to be purchased,	• Districts have a reasonable incentive to only rent the equipment they need when they need it. • Convincing legislator to fund equipment purchases would prove more difficult to justify funding shortages due to inflation type expenses. • Small fleet costs and fleet size fluctuation
10. Funding problems	• Standard Specifications from corporate don't include a predelivery requirement. This means that the local shop has to spend twenty hours per truck to outfit new trucks, which use to be done by the local dealer.	• Poor operators impact the class rate. Classes with large numbers of units are affected less by increases in maintenance costs. Important to remember for new purchase upgrade discussion, ex: blow a snow blower, and there are only 8 of them, costs go way up. If there are 400 of them they wont go up that much.) • Central revolving fund gets dollars from equipment disposals so not as much incentive for districts to keep up equipment condition. • There is no depreciation after the "life cycle" is complete. Depreciation is taken according to how much the vehicle cost, instead of how much it is worth. This is why the revolving account is short every year.
11. Cause of funding problems	• Each operating company is on their own for equipment re-marketing.	• Easier to obtain fund replenishment from legislature for new equipment price inflation than to obtain increases for district budgets to pay higher total equipment rental costs. • Not really any funding problems for equipment since there is no population growth in the state; however, wonder how the current system could deal with population growth causing need for more equipment. • By keeping a vehicle for a year after its life cycle hurts the

Question	Sysco MN	Iowa DOT
		revolving account because there is no charge for that depreciation that year?
12. Funding Improvement		
13. If you have made any funding or funding method changes, describe:		• Mainly just the recent top down directive to reduce the amount of equipment (spares). • Used to have more than 1,000+ plow trucks. Sold off 100 snow plow trucks and other items etc… Before the reduction, each supervisor thought they had to have at least one of every type of equipment item, rather than sharing equipment within the district. • Old system allowed arbitrary fleet size decisions by districts. Budget cuts forced fleet reductions. Calculated plow run cycle times and established plow truck recommendations. Remaining equipment was reduced with joint discussions with the districts. Mowers were reduced by study to determine shoulder mower times.
- What were the issues that you needed to resolve?		
- How did you resolve them?		• Established policy to upgrade equipment at next purchase. • Established a "base unit" funding level. Points were applied to "B" or non-motorized equipment. New B equipment purchases could be traded for upgrades to motorized equipment purchases.
- What types of improvements did you notice?		• Equipment utilization rates are now higher. • A committee is just now beginning to look at measuring and determining appropriate equipment life cycles and how to finance them.
- What did you do right during implementation?		
- What do you wish you had known when you started?		
-What works better now? Why?		
- What works worse since the change?		

Question	Sysco MN	Iowa DOT
Why? **- How do your end users or owners feel about the change?** **- What advise would you advise me if I have to make a similar change?**		
Measures and Targets:		
14. Management Measures	Quarterly Operating Cost sent to corporate (Houston) where they benchmark. Mechanics per Refer (1 per 42 refers). Delayed route reports are generated daily. Cause of delay will list mechanical if appropriate. Utilization is driven by number of trucks per dollars of sales. 45% PMs (includes work generated from PMs). 50% driver write-ups. Shooting for 75% PMs.	• Present information to districts to describe utilization on top to bottom lists. • The payroll timesheet for each employee and/or supervisor of a crew notifies them whenever preventive maintenance (PM) is past due on the equipment they, or the people they supervise, are responsible for.
15. Shop measures	• "Work standards" built on productivity measures for all work functions-history. Employees need to hit 98% of work standards per week. Can recoup in the next month. Every six months, increases are based on performance • Truck down time is affected by truck schedule. Each truck's operating time is on system. Work done on the truck during this time is down time. • Mechanics create work orders, so "rework" probably is not accurate. • All work found on PMs is coded 45% - 50% are driver write-ups. Target is 75% PMs. • Downtime is difficult to measure. We don't use it as a critical shop measure. • Delayed rote report. • 40 hours per year per mechanic for training. • Focus on PMs and driver write-ups (DOT req). • Farm out major repairs if busy. • 10k mile A-ser, 20k m B-ser, 30k m oil change.	• There are no shop performance measures implemented. They do encounter problems with hours billing rates to other government entities. District shops do maintenance for other entities and repair times are not consistent between shops, thus the differences. • Owners of equipment track downtime using their own discretion and standards. • Each class of unit had points awarded to it based on anticipated mechanic hours for maintenance, which was used to determine staffing levels. • Everyone had to agree to what downtime was. Downtime is measured "if the equipment cannot be used for snow and ice removal". • Flat Rate= None • Database tells when to do PM maintenance, usually based on mfg suggestion.
2. Obtaining measures	TMT (Transman) – 9 years. Each operating company selects their own software. Touch screen is used to determine log-in & log-out. The touch screen technology has saved a lot of computer time.	• No current EMS reports on downtime. • Usage measures result of crew sheet inputs from supervisors.
Policies:		

Question	Sysco MN	Iowa DOT
17. Documented Policies	• "Standard Operating Procedure" has list of all applicable policies – useful to the mechanics. Includes work standards, computer system, work rules. • Corporate Policy Manual is for management level. • 7 year life cycle on tractors • 10 years on straight trucks.	• Have policy and procedure manual published by Division Directors. [See Especially Instructional Memorandum (IM) #11.010 Equipment Chapter, Titled: Vehicle Maintenance of 8/19/02, 3pgs] • Vehicle manufacturer's standards used with 200 hr oil change intervals on diesel engines. New lifecycle committee developing lifecycle chart, will send when ready. Must use CAFÉ standards for fleet by state law. Passenger vehicles 12k mi/yr urban 7k mil/yr out state minimums; sent to auction at 75k miles. • Database tells when to do PM maintenance, usually based on mfg suggestion.
18. Policy development and enforcement	• Unanswered questions generated in biweekly employee meetings. Dan works with employees to write the policy. • Operator abuse is addressed at regular meetings. 3 strikes and your out.	Operators: Pre-trip inspections and minor main. Mechanics: Does repairs; obtains authorization for repairs above $400. Supervisors: assure all their employees adhere to equipment policy (IM's).District Mechanics: Provide technical guidance & provides approval for repairs below $2k. Central Shop: Perform major rebuilds that can't be accomplished in Districts. Equipment Services: Provide approval for repairs above $2k; analyze chronic equipment failure, approve major equip mod
19. Most important Policies	• Delegate increased employee responsibility, including work standards. • Empowerment of employees has increased productivity. Mechanics "love" productivity standards.	• Revolving account as it provides a flat line for equipment funding instead of peaks and valleys. Project out two years purchases and work for potential purchases.
20. Industry comparisons	FDI – Food Distributors International publishes an annual survey of 90 food distributors. Uses this as a guide to determine number of units per mechanic. (50 trailers, 16 power units, 50 trucks) ATA has one out for truck fleets.	• CAFÉ (pollution emissions) laws affect new light duty purchases.
21. Quality Awards	No quality awards.	• ISO 9000/Baldridge: Does work on that for I/DOT as a whole. • Go to midwest fleet management conference
22. Benchmarking	Within SYSCO's different Regions Food distributors International provides comparison study reports to compare performance	• Not formally, however, did look at the "buy or build" decision with regard to equipment in the past.
Extra Thoughts and Ideas:		
Miscellaneous	• Oil analysis on all units sent to "Cleveland Tech". M10s and L11s, looking for coolant in the oil – intervals were built using oil analysis A at 10 B at 30 • Road units are done PMA and Bs. Six levels of PMs. • Training: 40 hours/ year/ mechanics • Does Sterling warrantee work in-house. • Mechanic picks parts on PM parts list. Scans parts by	• Had two Governors in 32 years which increases stability in I/DOT. Prior to that a commission operated I/DOT and that further insulated it from politics. • Perform some equipment management functions for other state agencies today. • District Mechanics have their positions defined in statute and pay levels of about $33k/yr.

Question	Sysco MN	Iowa DOT
	exception. • Maintenance on vehicles increases rapidly at seventh year. • Mechanics code abuse or unreported accident. Driver is located. Three abuses per year and driver is suspended or fired. • Mechanic staffing is set by number of different types of units per mechanic. • $75,000 in inventory. Parts managed by clerk. • $450 million in annual sales. • Log 5 million miles. • 124 power units. • Have Petrovend fuel. • Use auto-lubricating systems. • Use oil analysis.	• Contract out oil changes and brakes on light equipment, especially mechanics busy with HEM work. • There inventory center does not bar code, this could be a huge savings for the size and amount of inventory they hold. • Use an "A" and "B" equipment concept; some changeable attachments on "A" equipment are considered "B" equipment. Each category has its own funding level and dollar substitutions are allowed – "supercab and 4wd" pickup truck options must be funded by using "B" equipment dollars. Monroe builds all plow trucks. • While state population is not growing; it is becoming more urbanized. • When reducing plow truck fleet, decided to change mix from 66.7% single axle and 33.3% tandem to 50% single axle and 50% tandem. • Operate two twelve-hour shifts when snow and ice control requires it. • Cannot use WEX inputs for hour meter and odometer readings since have not developed system to obtain fed diesel taxes yet.
Personal Observations and opinions.	• SYSCO has singular use fleet, built on standardized unit replacement. Provides staff with fewer variations to maintain. • Empowerment and accountability play a large part in management philosophy. Strong recognition of importance of minimizing downtime, as demonstrated by emphasis on night shift work.	• As far as organizational structure goes, it seems like IOWA DOT went from a functional structure to a hybrid of a matrix and functional org. This was done to better utilize employees skills in a cross functional manner.
Additional Follow-up needed.		• See 17 Life Cycles of class "A" • Snow Plow Study

Appendix G

Phase II—Interview Response Summary

Section G1—Arizona, Oregon, New York and New Hampshire DOT Responses

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
	Attendees *Benchmarking Team: MnDOT: 1. Jim Lilly 2. John Howard 3. Kelvin Smith 4. Bob Ellingsworth UMD: 5. Brandon Storhaug	♦ John Nichols- Operations Admin. ♦ Dennis Halachoff- Fleet Manager ♦ Jerry Massie- Fleet Coordinator ♦ Jim Moline – Parts Manager ♦ Linda Peterson- Maintenance Program Mgr *2,3,4,5	♦ Patrick Howard- Fleet Warranty Admin *1,2,3,4,5	♦ Joe Darling- Director *1,2,3,5	♦ Tom Jelley- Hwy Garage Admin. ♦ Barbara Tors- Sys Dev Spec *1,4,5
I.	**Background:**	3/19/03 Start: 10:00 a.m.-- End: 2:30 p.m.	3/21/03 Start: 10:00 a.m.-- End: 4:30 p.m.	4/7/03 Start: 1:30 p.m.-- End: 5:00 p.m.	4/9/03 Start: 10:00 a.m.--End: 1:00 p.m.
1.	**Describe your fleet management structure–**	4 main functions under Equip. Admin (214 total staff) 1) Fleet Management • Specify, design, acquire, allocate and dispose of all ADOT equipment assets 2) Maintenance Operations 3) Fuel/Scales Management 4) Fiscal & Mgmt Services • IT services • Financial services • Training Labor: • Labor wage rate charged to customer = $37/hr reg labor, $28/hr for preventive maintenance labor • Labor Hours broken dedicated to each agency (customer) • 118,000 hrs (81%) for ADOT • 18,000 hrs (12.5%) for ADOA • 5,000 hrs (12.5%) for ADES • 3,400 hrs (2.2 %) others • 1,700 hrs (1.2%) for Game and Fish	• Fleet Mgr, shop Supervisor, then three areas under them (repair, fab, inventory) • There is also a shop mgr and shop coordinator • Fleet Manager creates policies, takes care of the fleet	From Top-Down: • Top: Assistant Commissioner • Then, Director (Joe Darling)"Fleet Mgr." • Then, Regional Manager for each of the 10 regions	"Bureau of Mechanical Services" From Top-Down: • Top: Jom Jelley (Fleet Mgr) • Then, (all same level) ♦ Fuel Distribution Division ♦ Mechanical Division ⇒ Many different units/ areas, plus 6 satellite locations (districts) ♦ Administration Division
	Centralized/ Decentralized	Centralized	Decentralized	Centralized	Centralized
	# of Districts, Regions, Maintenance Shops?	• 3 Regions (Northern, Central & Southern) • 21 shops (13 full, 9 sub-shops with 1-2 techs)	• 5 regions/ 50 districts • 3 repair facilities (31 field mechanics) who report centrally	• 10 regions, main-warehouse in each region • Approx 70 counties (each county has a shop with basic parts)	• 6 districts with a satellite maintenance facility at each
	Number of Lane Miles				
	Size of Fleet	All vehicles belong to Equipment Services (self sufficient) 4,700 pieces of equipment (ADOT only) • 1,624 light line • 843 heavy • 194 Off road, earth moving • 2,015 associated equipment (mounted on, parts of equip) specialized equipment Number of vehicles they are supporting state	Fleet Size, 4,500 total (2,500 with wheels) • Approx, 375 snowplows (10 yard trucks) • $5.5 million in repairs • ¾ of repairs are outsourced (dealers, private) • Do some of their own fabrication.	14,500 pieces of equipment • 1,400 large dumps trucks (snow plows) • 650 small dumps	960 pieces of equipment • ~300 snow plows

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
		wide (maintaining): • ADOT- 4,676 • ADOA- 2,160 (dept of admin) • ADES- 576 (dept of • DPS- 900 (dept of public safety) • MISC- 1,596 • Total= 9,908			
	Appropriation or Revolving Fund	Revolving Fund	Appropriation Fund	Appropriation Fund	Revolving Fund
	What is your annual budget?	• $32 million budget • ADOT keeps the $'s they get from selling (it goes back the equipment fund, central headquarters, not the state general fund, reinvested into more equipment)-2 auctions/yr ($675,000 in 2002)	• $20 million for 2yrs (fleet acquisition money only), which is going to $15 million because of budget cuts • biennial funding (new money every 2 yrs), every odd year • beginning of the 1st yr try to build up the equipment, otherwise the money is taken away	2 budgets • $18 million- non personal services (fuel, parts, supplies, etc) • $17.3 million (equipment) with roughly 12 million going to heavy duty vehicles rest divided up for each region	• $13 million for operations • $7.5 million is for replacement
	Describe your billing structure to districts, etc?	Billing structure: (2 parts) • Rental rate to districts • Usage fee: based on miles or hours used. (this covers maint & fueling costs)	• Rental fee/ month for regions • $ from equip sales goes to general state fund • Repair Facilities-- charge the customers for repairs, they must make a profit	No billing structure	• Charge a user fee to each district
	Who are your customers?	ADOT supports many agencies with their maintenance and fueling sites ◆ Fueling users: 30 different agencies- ranging from counties, cities, to other municipalities (have some partnerships/agreements with a couple cities and counties) ◆ Maintenance: 14 different agencies ◆ ADOA & ADES-Exclusive Vendors ◆ ADOT Fleet- 590 Organizations ◆ ~95% of all work is done in house, some is outsourced. (specialized) ◆ Have their own body shop (central), because of the insurance policy they have (the state pays for 90% of all body shop work done), run about $8 to $9 cheaper then private • ADOT is able to support all other agencies because the agencies are paying for their services fully.	• Tax payers • Employees • Districts	• Highway maintenance division hold 80% of the fleet, mainly trucks • Traffic and Safety Division handle ITT (intelligent traffic technology) efforts, mainly light duty • Construction Divisions have cars and vans	
	Is your parts organization operated from a centralized location?	• Decentralized • Separate Inventory System (Pecos)		• Decentralized?? • Repair Parts Maintenance System (RPMS)—10 warehouses for all regions • Use bar coding • 90-93 % parts replenishment ratio	• Centralized • Main warehouse, but doesn't hold a lot of inventory like the other warehouses
2.	**Talk about your fleet management system**				
	Type of system and how long has it been used?	• Fleet Anywhere • Upgrade in 1998 Maximus—going to Fleet Focus	Use an EMS ?(Equip Mgt System) • Runs off of a main frame • 20 yrs old	• EMIS- Equip Management Info System • Approx 30 years old • Currently moving to "Fleet Anywhere"	• M4 system since 1998
	Amount of historic data and quality of data?	• Data goes back to age of information system, roughly 1997 and 1998 • Good data	• Not too far back • Poor quality of data entered	• Data goes back to age of information system • Average quality of data, could be better • Not much for repair history, most of data	• Not too far back • Data is ok, however, meter data is questionable

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
				is a summary of costs	
	Who enters the data into the system into the system?	• Employees at shop level	• People in the field enter data	• There are data input people who aren't DOT employees who manually enter the data (outsource this task), this is done at a regional level	• Districts and field people
	What type of access is there to the data?	• Available anytime	• Available anytime	• Most of everything is available, but could take some time because of the manual input of data. (every month there is data reports available)	• Available anytime
	Types of reports generated and used?	• Capable of many types of outputs (using Microsoft Access & Excel	• For reports and graphs, information has to be downloaded to Microsoft Access or Excel (data has to be manipulated)	• Period Report (monthly)- broken into State, Regional and Field • End of year (annual) -	• Crystal Reports, some Access reports • Billing, fuel usage, average salvage value
	Interfaces with other systems (e.g., inventory and payroll)?	• None	• Inventory- yes	• None	• Inventory- yes • Payroll- no
II.	**Performance Measures:**				
3.	**Describe the history of your performance measures within your DOT and in particular within the area of Fleet Management?**	• 13 -14 years ago had an audit • set up rental rates	• Approx 8yrs ago, started to move towards TQM, which failed • Principles of TQM works well, but it was thrown down their throat • There wasn't really any enforcement or any accountability assigned • People were not told when things weren't running very well	• Measures ever since 70's • Currently moving towards a total preventive program	• Started 2 months ago
	What business changes have you made?	• Managing how they buy, where they buy internally • Constantly looking at how much it costs to run this place	• Trying to reduce all the garbage • Tracking equipment utilization • Need to reinvent their measures	• Changing IT systems	• Trying to define their own measures • Decided to mfg their own trucks, and saved $12,000/truck, based on own analysis
	Why have you changed?	• Audit 13 yrs ago ◆ Buying too much equipment and wasn't being utilized ◆ Equipment wasn't going to the right people	• Driven by an internal audit and it said that they haven't changed much since 1988, as a result they are trying to reinvent their performance measures. • Have a tough time backing decisions because there isn't data available to back this • Trying to focus on measures that back all levels, but with not too many measures • Looking for the measures that build on each other, for example utilization	• Data accessibility is weak and lengthy • Need to transfer data without having to do it manually	• Quality improvement • To beat last years performance • To justify our existence for competition to ourselves and legislature • To know if we are getting better • "how do you know you need to improve of you don't measure things"
4.	**Are you using all your measures listed from the survey? (Which are used on daily basis, monthly, annually)?**	Yes- Using all measures, except not on a daily basis • Use approximately 20-30 measures on a monthly basis-see question 6 • Financial ones are quarterly	In the process of implementing them • They are currently developing measures • Working on 20 new measures plus some measures that have been used for the past 10 yrs (cost per mile, utilization)	• No, but they are available if needed • Higher level measures analyzed monthly and then looked at annually to monitor overall progress towards goals	• No, but they are available if needed • Higher level ones are monitored monthly
5.	**Do you have different levels of measures (shop, field, management and executive)?**	Everything is measured at different levels: (state level, regional level (3), shop level. • Print a monthly metric report, includes about 217 pages in metrics (charts and graphs), but to different levels. • State level (Senior Mgt level)- 30 metrics • They want the measures to be driven all the way down to the technician level all the way up to the senior management level	• The 20 measures are mostly at the senior level (fleet mgr and boss) • Many of the measures have inner relationships with measures that should be used by shop level	• State, regional, field level	Not really
6.	**What are your higher level measures?**	1. Reportable Industrial Accidents & Injuries 2. Cumulative Total of Reportable Industrial	1. Cost of Ownership & Operations- per mile and per hr.	Statewide Report/ Higher Level 1. % Fleet Uptime	1. Cost per Mile 2. Fuel Usage

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
		Accidents By Regions 3. Technician ASE Certification 4. Certified Parts Personnel 5. CDL Inspections Performed 6. CDL Inspections Pass/Fail (state total) 7. Accident Claims Paid by RISK 8. Vehicles Accident Repairs 9. Operator Abuse Repairs 10. Vehicle Tow-In Road Call Actions 11. Man Hour Utilization (State Wide) 12. In Service Rate (State Wide) 13. Return to Service Rate 14. Overdue PM's and Emissions 15. Repair Parts Fill Rate 16. PM Parts Fill Rate 17. Statewide inventory Line % Error Chart 18. State Inventory Dollar % Error Chart By Shop: 1. Man Hour Utilization 2. In-Service Rate 3. Return to Service Rate 4. Overdue PM's and Emissions 5. Inventory Line % Error Chart 6. Inventory Dollar % Error Chart Misc: 1. Fleet Usage-Miles driven annually= 25 M miles (tracked for past 14 yrs) 2. Fleet Usage-Hours = 125,000 to 130,000 hrs usage (tracked for past 14 yrs) from the graphs--peaks of usage are high during high snow seasons	2. Fleet Condition Rating 3. Replacement per Standards 4. Replacement Projections (useful life) 5. Implementation of OSU Replacement Plan 6. Equipment Utilization 7. % of Fleet with Current Usage Information 8. MMS Activities vs. Meter 9. Specifications quality- % Processed without Issue 10. Processing Time to Develop Specifications 11. Processing Time to Acquisition 12. Specifications Quality- Need vs. Actual Equipment 13. Fleet Maintenance Quality 14. % Annual Inspections Completed 15. Oil Sampling Quality 16. % Oil Sampling Participation 17. Downtime- Repair Reason Codes 18. Customer and Needs Assessment Survey 19. Inventory Details (fleet creep) 20. Internal vs. External Repair Dollars	2. Number of Road Calls 3. Hrs on Distribution 4. Labor Hours (from customers) 5. % Downtime due to P.M. 6. Training 7. Number of Late Departures (too see if customers are getting their equipment on time) 8. Total Late Departure Days 9. Number of PMS 10. Number of Repairs 11. % Main Shop Capacity Scheduled 12. Hours at Work (productivity) 13. Hours out of Prime Functions 14. % Direct Labor Uptime 15. RPR and PM Man-Hours to Standard 16. Number of PM and Work Orders without Standards 17. Total Days Down- Major Units <u>Organizational Performance Index</u>: (see attachment from NY) Weighted factor—in brackets [ ] 1. [50%] Fleet Downtime 2. [30%] % of Planned PM Performed 3. [10%] Parts Consumed as % of Parts Purchased 4. [10%] Repairs & PM Hrs (as % of total hrs at work)	
	What do you use your measures for?			• Controlling, monitoring and moving towards goals	• Control and monitor
	Why are you measuring that (what are you trying to monitor or control)?			• Use performance measures index, that combines the 5 major areas of concern to come up with an overall idea of how the region is operating (uses a weighted factor)	• Control Utilization and Fuel Costs
	Who develops the measures (organizational level)?	• Senior level with regional mgr input	• Senior Level	• Central office with input from regional and field employees	• Fleet Manager
	How does that process work?		• No Process	• Every year look at a 3 year history and make decisions based on this	• No process
	Who monitors the performance measures (what organizational level)?	• Mid and Senior Level	Will be…Senior Level: • Fleet Manager • Regional Managers	Senior Level: • Assistant Commissioner • Fleet Manager • Regional Manager	• Fleet Manager
	How often/ frequently do they monitor them?	• See questions 4 & 6 above • Monthly-maintenances • Quarterly- Incentives rate charges	• See questions 4 & 6 above • Monthly, quarterly, yearly, every 2 years	• See questions 4 & 6 above • Monthly, Quarterly, Annually	• See questions 4 & 6 above • Monthly
	Who is held accountable for the measures?	• Fleet Manager and Districts	No one right now, but • It should be more then one person (and must start at the bottom level) • For the maintenance level, there should be someone who is responsible for their	• Fleet Manager and Regional Manager	• Fleet Manager

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
			portion • Fleet Mgr should be responsible for the overall fleet and must delegate responsibility		
	What actions do you take based on these measures?	• By looking at the graphs, there is an UCL and a LCL, and if it is outside of these limits there are questions of what and where is the problem. This is directed at the mid and lower levels. • There process- do we have a problem at the state level (yes or no?), do we have problem at regional level (yes or no?) and where is the problem at the shop level? Re-evaluate monthly.	• No actions is taken now	• Fleet Manager and Regional Director talk and decide what the problem is and where it is coming from. Then make decisions based on this, attack the point of the problem.	• If things aren't satisfactory, find out what the problem is and where it is coming from. Then impress the need to the right people in order to change things
7.	**What are your definitions (criteria) for each of your measures (the major ones) and if applicable?**		See handout of measures and their definitions		
	Downtime =	In service rate statewide • % of the time the asset is available to the customer for the use, based on a 24 hour 7 days a week clock. Reasoning for 24-7, when it's in the shop, and if there is an emergency, it can't be used. Air force uses 24-7. • Use a control limit system (upper and lower control limit, based on 1 std deviation), done so that you can evaluate yourself based on past history. • If perf. goes up or below the limit, senior mgt asks managers to look into it. If your above your control limit you are doing good, but why would you care if you are above?..because in service reason goes up, there has to be a reason. Typically if your service rates go up, that means your PM program has gone bad. Vehicles are always going to break down, so that means that you aren't bringing in your vehicles for service. You can validate this by looking at your PM measures/ graph. • Using the control limit process, allows you to see past data and as in the case of ADOT, they cyclical. During the summer months, is when ADOT has the highest downtime rate, heat related.	Maintenance Downtime • When a piece of equipment comes to the shop, it starts and ends when it leaves. • Probably going to be based on a regular 8 hr day, except for snow equipment in its relative season	• For every 8 hrs = 1 day of downtime, • Clock starts when operator reports it	• NA
	Preventive vs. Reactive (Scheduled vs. Unscheduled) Main. =		• NA		
	Utilization =				• Hrs and Miles
	Fleet Size =				
	Life Cycle (replacement) =				
	How do you set your life cycles, what happens in time of budget crunches, do you add another year?	• In times of budget cuts, equipment is forced to be held longer • 28% of equipment is overdue their replacement criteria point	• Have a "Hopeful" replacement cycle • Oregon State University (OSU) did a Life Cycle Analysis (replacement model) • Washington DOT supposedly has a good	• Always extend lifecycles, don't have the funds to replace	• Life Cycles based on past experience • In times of budget cuts ◆ the data support goes out the window (ignored)

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
			program, which functions well because they are using a revolving account • Average replacement has to be by class/ year of purchase because it gets misinterpreted by real old equipment and the real new equipment • In times of budget cuts, must add years because can't afford new equipment		♦ Fleet replacement funding is the 1st to be cut
	Others =	Return to service rate: • Measures how effective they are in getting the equipment back to the customer. No target set yet. Unofficial one of 60% of everything that comes in should be back in 24 hr period or less, currently is 67%. • Summers and Holidays do effect this measures Overdue PM's and Emissions: • Department, region and shop • Compare 2003 to 2004, objective is to better then the previous year • Oil analysis: (engine oil, axle, tran, hydraulic, for heavy duty), supposly done every 36,000 miles ("D" service)where the vehicle is hooked up to a machine Man hour utilization: • Technician productivity-based on direct labor hrs, standard of 70% based on aggregate average across the year. Typically a shop wont maintain a 70% consistently (not where they want to be, but close)		Training- look at if everyone is getting their required training, usually takes 3 years to rotate everyone • hydraulic systems • diesel diagnostics • electronics	
8.	**Have you set performance expectation targets for any of the measures that you are using? If so, what are they?**	• Yes, see question 7 above	• Not Yet		• No, haven't gotten that far yet
	How do you determine your targets (ex. What conferences do you attend)?	• Western States Conference and look at the private sector	• Western States Conference • Starting to look at benchmarking as a means especially to similar sized states like Washington and because it is close by • Also using past data history	• Look at 3 year history of where we were and then establish a baseline and goals (sometimes it is an interim goal) • Look at the TRB • No Active Conference Meetings for east coast (except try to get together in NH for meeting with other eastern states)	• Eastern States Conference
	If your state uses benchmarking for evaluating measures…how do you incorporate that into your business operations?	• Don't Incorporate it business process	• Don't Incorporate it business process	• Don't Incorporate it business process and not so much for performance measures	• Don't use benchmarking
	How does your benchmarking process work?	• Ad Hoc process	• Ad Hoc process	• Ad Hoc process	• NA
	Who do you benchmark against? (private, public)	Private and Public • Other Western States • Private maintenance shops	• Other Western States, specifically similar sized states • TRB conference	• Some eastern states • PennDOT • Private sectors and cities in certain areas	• NA

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
				(labor hrs for competitive purposes)	
	How do you determine they are the best?				
9.	**How often do you re-evaluate your performance measures and targets?**	• Look at business opportunities twice a year as an entity, look at expenditures and areas to improve upon. (senior level and supervisors attend) • Once a year at the Western States Conf.	• Depends on who is in charge and at what level (yearly at western conf.) • There is no set policy, however, would like to look at it every 2 years similarly to funding manner	• Annually • Goals are always adjusted based on progress (targets are usually temporary)	• As needed
10.	**What role do the districts/divisions/regions play in accountability? What is the role of the central office?**		• There is really no accountability at any of these levels. • Centrally, ODOT is trying to monitor districts and give some direction and guidance.	• The fleet manager updates the assistant commissioner, then the fleet manager meets with the regional director and finds out what the problem is and where it is and arranges how to improve or fix the problem	• Districts monitor abuse (accidents) • Central Office is more so with utilization, meter readings, costs
	How does your process operate for enforcing these measures to all the districts/divisions/regions?		• Try to compliment their people when doing a good job, otherwise, get a little stern	• No formal process	• No formal process
11.	**Talk about your measures:**				
	What are some of the problems with your measures? Why?	• No Problems	• Data quality problems—putting in garbage data • No standardization throughout the org • Building in Excel for charts and graphs is difficult • There are gaps in the data that don't match up with financial purposes	• Some of the measures don't apply anymore • Too many financial measures • Lag time of data entry people (reports are based on 6 week old data)	• Garbage in = garbage out (Barb) • No standardization • Cant just look at outcomes, especially with bad data • Terminology varies, they are constantly defining what is what • Need consistent data
	What are the strengths/ benefits of your measures? Why do they work well?		• Focus efforts on personnel and equipment • Justify dollars • Using hard facts to go to legislature • Improve processes • Improve lifecycles based on measures	• Good training program • Maintenance for PM's	• No strengths
	Have you seen any improvements in efficiency, cost, and quality?	• Don't have any analysis on this • More certified mechanics • More awards and certifications of shops • Reduced costs • Improved operations and efficiencies	• None yet	• Improved training • Big cost reduction from increased PM's	• Operating and maintenance costs have been reduced • More replacement funding
III.	**Miscellaneous:**				
12.	**Is your organization working towards any type of quality improvement programs or awards with your fleet management area? (MBNQA, ISO 9000, Deming, Juran, etc.)**	• Somewhat on the MBNQA • Continuing Education • Technicians ASE certification (see question 9) Blue Seal • 6 of their shops are Blue Seal (out of 21 shops), Blue Seal means that 75% of all technicians are ASE certified. 100% of all services provided by that shop have to have a certified technician in that particular area. There are only 40 shops in Arizona that are Blue Seal Certified out of maybe 6,000. • Goal is to have half of the shops, Blue Seal certified. Quality program that measures the contributions to Equipment Services:	• Not yet	• No	• No

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
		• ASE Blue Seal (shop level) • Safety Awards-Annual (shop level and individual basis) • Individual Bi annual awards-anywhere in the organization • Quarterly Golden Wrenching Awards (recognizes the technicians) before he came there, they recognized a lot of the people that support equipment services, but didn't recognize the people that make equipment services work. • Annual Golden Wrench Award- recognizes quarterly award winners on an annual basis • APEC Awards- parts expediter (there 21 of these people in the state as a part person) • Annual parts and safety award • ASE awards • Tool box plack • Patches			
	What steps is your organization taking to work towards this?	• They have a very aggressive training program that tracks the development of each employee. (Measure the career path of each employee) from the time they get there to the time they become a senior technician. (All computerized.) • Look at what you need to be trained in and then arrange you to get the training			• They are just trying to find the right people to help lead this quality improvement process
13.	**How do you know you have the right fleet size?**	The best way to determine the right size of the fleet (In an aggregate) is through utilization standards. If you put only 50 miles a month on a vehicle you do not need the asset. On the other hand if you are running about 1000 miles per-month their seems to be a need for the asset. In fleet management the overall goal is to have a vehicle reach life expectancy in age and miles at or about the same time. Example: If the vehicle has a life expectancy in miles of 100K and a life expectancy in age of 5 years. The goal is to have the vehicle drive at least 20K miles per year. In 5 years the vehicle would have reached both factors. The problem most fleet managers have is trying to get the utilization at the level needed to make both happen at the same time.	• They aren't positive that they have the right size fleet • Try to compare with similar size states	• Don't know, By meeting requirements	• By meeting the services that are asked of them • No one ever asks that question • No data is available to back this
14.	**What are your short term and long terms goals as far as managing your fleet?**				
	Short Term:	1. Obtain Proper Funding for the fleet • Minimize Lose Revenue (32 million budget) ❖ strategizing on keeping the amount of money in their bank account, so others don't take it….done by making long term purchasing contracts…when	• Trying to build accountability at the lower levels • Getting the right mix of equipment and measures • Better buying practices and justifications • Break each measure down to determine which measures effect others • Improve data collection	• Reduce fleet size • Get knew information system up and running • Identify all systems that need to be interfaced	• Establish some performance measures • To survive to the end of the fiscal year

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
		funding starts to build up, they spend immediately on the new vehicles they need (can order it within the next day) • Manage Available Funding ❖ how they buy, where they buy internally ❖ they are constantly looking at how much it costs to run this place (performance measure) • Partner with customers on funding issues 2. Focus on their strength (the people are what makes things run) • Working environment • Education training ❖ Many people are contacting ADOT about their ASE program • Career path development (objective to obtain long term employment) • communication 3. Focus on customer needs (the bigger you get, sometimes you tend to focus on yourself and not the customer) • Improve communication ❖ (in the beginning, senior level was left of developing metrics) (senior leaders tell ADOT what their priorities are, then make develop idea and decisions from two levels, the working and senior levels) • Develop mutual understanding	• What does the customer need? • Working on developing reports that the customers can use • Currently looking at measures for the shop level because that is where the root causes are		
	Long Term:	• Provide a comprehensive technician development program that assures equipment services technicians are 100% core qualified (in progress) • Maintain a culture of safety in equipment shops by reducing industrial accidents/injures by 50% over the next few years (in progress) • Establish a pilot program for scheduling maintenance in shop for PM • Implement an equipment services user-accessible, standardized reporting system for the equipment services management information system.(DONE) • More 3rd party financing	• Convince the right people to move from appropriation funding to a revolving account	• Take over all fleet maintenance for the state agencies	• Need to compare ourselves • Make sure that the legislature and tax payers know they are getting the best bang for their buck • Put on the tax payers hat
15.	**What operations do you have that you believe are unique to your organization? What are the advantages and reasons you have them?**	• Training Program is great		• Alternative fuel vehicles program • They know by how much they are competing with competitors (private industry) • Parts Operations	• Fabricate cheap snow plows
	Interesting Notes:				

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
		• In times of budget cuts ($1 B shortfall-state), ADOT is finding that their outside customers are coming to them more because they can't afford to have it done in the city. • There are no walls between districts, maintenance can be done anywhere. (no lines, no issues) • There is a centralized management system, so it doesn't matter where the vehicle is fixed • No sharing between districts as far as equipment goes, however, if someone needs a piece of equipment, they can loan it to them and some sharing of money occurs. • We are constantly look at how much it costs to run this place, • We know exactly where every nickel is going • We know what we do well and we know where we don't do things not so well. • We run our state like a business • Everything we do in Equipment Services is measured in some form or another. (john) Technicians ASE certification • (goal 75% ASE certified, they give their mechanics a stipend pay for completing the course work and test), can be as much as a $700 pay increase per month. Purpose (incentives) is to get people to stay current with technology and to stay competitive with the private sector as far as pay goes. At 69% right now. • ADOT funds it ($330,000/yr) for the training and certifications/incentives • This monitors performance; each mechanic has to maintain a level of performance. (Ex: two of their mechanics lost an extra $400 a month because they failed to maintain a performance level for a master technician. (They didn't meet minimum expectations of supervisors and the program) hence they were kicked out of the program. • Focuses on keeping a higher level of performance. Before this program, they were losing mechanics left and right to near by businesses and agencies that paid their employees more. They were losing about 20-25% of there technicians a year before the program. It's been going for two years now, and they have lost only 1 technician thus far. Predictive Maintenance- Study all breakdowns (ex: study breakdown of tires, found that 85%	• Downtime is a highly debated topic, the question of whether to use a 24-7 structure or a regular work hr day. It was brought up that it's a good idea to promote good business practices, and 24-7 really doesn't accurately portray what is really going on. (It should be based on a work day period), except items that are 24-7 like snow plows during their season. • Oregon has a fleet advisory board • For disposal purposes, Oregon is using the internet service "ebay" to sell vehicles. (great reviews, and getting more for their buck) • How much information can you really use effectively • Need to get the people to believe in what you are doing • Training is very crucial in the development of measures (ex: data entry and the importance of the measures to the overall operation) • Need to create relationships in order for things to function • Need to listen to the shop people of what really is going on • Just by looking at the measures, improves quality • Just by looking at graphs might not show obvious changes, however, this could change the thoughts and mentality of the employees. • Manipulating data so that is useful is the most important • Data is only as good as people who enters it • If no one knows there is a problem, there isn't much you can do about it • We generate a lot of reports, but nobody uses them because they are worthless • The problem with monitoring the data is, you need someone who can read the data/ numbers not just create them • "Hopeful replacement program"-this seems to be a trend in both the private and public sector, especially in times of budget cuts	• Nothing drives decision making like a fiscal budget • Need to be able to show and justify your decision making • Would work towards a quality award, but that requires additional personnel • People enter the data don't understand the data • Data is handled so many times that you have to make sure the reports are good • Data entry people don't have ownership of the measures which causes data quality issues • Performance measures able you to show that you are doing the job competitively	• By implementing a rental rate to the districts NH DOT reduced the fleet size by 20% • Types of Management ♦ Budget based (most public) ♦ Outcome based (performance measures) MnDOT (from Jim) • Private firms are run based on profit • Public runs a hobby shop, or a feel good mentality • Short Term Goal = To survive to the end of the fiscal year • There is a big learning curve vs. outcomes vs. budget changes within an organization • A picture is worth a thousand words, in reference to MnDOT's graphs

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
		of all tires failed when they were over 4 years old, so they changed policy that all tires need to be replaced after 4 years regardless of tread wear.) Result-reduced tire failure by 90%. Fueling Services: Typically the ADOT sites save the tax payers roughly 25-35 cents per gallon compared to retail by serving most of the state agencies. They are the biggest fueling station in the state (59 sites, 52 of them are computerized from central shop), for many agencies (4.1 M Gallons Annually (106 tanks)) Over 1,000 Customers Daily, Use a fuel card (if site isn't available) 227,700 gallons annually with this method			
	Comments:				
		• ADOT, seems to be doing a very good job with their metrics, and their Fleet Management System is able to support such analysis' • ADOT—has a leading training program • Its hard to compare apples to apples (Ex: revolving to appropriation fund organizations) • They are currently looking at a new technology PDA that can track the mechanics hrs throughout the day. For MnDOT: • Should MnDOT think about renaming the downtime to in-service rate? • They had a board that listed all their measures maybe like 30-40 that are updated monthly so that everyone can see it, that would be a good idea for MnDOT (not as many measures thou) (at the Central and Shop levels) • MnDOT should add a few more measures, maybe to like a family of ten measures. • If possible, look into the idea of charging the districts a usage rate. • Once MnDOT established a list of past data, they really should look at using control limits as a measure. Not only to compare with past years, but to also see patterns. MnDOT doesn't have any measures where the districts can really look at their own status, there needs to be more of that. However, comparing to the other districts is a really good idea too. • MnDOT should look into the Blue Seal of Excellence ASE. It's a good way for continuous improvement and drive for excellence in quality of performance. • MnDOT needs to become more centralized and even possibly work similar to ADOT as far as maintenance goes. Maybe they can team up with the DNR and other state	• Oregon is in the beginning stages of rebuilding their performance measures. • Oregon, was the leader in performance measures when they first began, however, it appears that since then they have digressed. With the recent budget cuts has driven them to further look into their fleet management program and in particular develop some metrics to help manage and back decision making. There seems to be a lack of accountability and quality data available. For MnDOT: • What does MnDOT want from this study? ♦ Did I choose the best performance measures compared to others? ♦ What other measures should we be doing?	• NY is in the stages of upgrading to a better information system • With the budget cuts, NY feels that these focused efforts will help improve their fleet operations • It appears that NY has good data, but there IT system is out dated and requires lots of manual data input which restricts the amount that they can do with measures because of the time of all tasks. Once the new IT system is up, it should provide for a great tool for future growth since they already have an apparently good foundation established. • It's a good idea to do maintenance for all state agencies for reducing costs for the DOT and all agencies involved and for the taxpayers. • East Coast states seem to be lagging in comparison to others	• NH is in the beginning stages of creating measures For MnDOT: • Maybe MnDOT can work with NH on building a Life Cycle Model • It was mentioned that some Districts aren't broken down properly and they cant see their comparisons to the overall state, rather they are contributing to their own districts/ • MnDOT needs to add a Safety and Training Measure • Add a rental rate to districts

	Question	Arizona DOT	Oregon DOT	New York DOT	New Hampshire DOT
		agencies. • Having partnerships with other agencies, they win because they are getting lower maintenance costs, ADOT wins because there are more shops available			
	Follow-up Quest./ Mat. Needed				
		• Talk with Linda about a list of all the Metrics that they use • Get a hard copy of the presentation from John Nichols • Find out specifically if possible, what measures are looked at by each of the levels: (in particular the higher level ones) Talk with Jerry • Ten principles of alligator management??? Talk with John about this… • To what extent are they working toward the MBNQA? The steps?	• Org structure • Hard Copy of Measures to Print out • Get a map of where the regions are (online) • Break down of Number of Equipment • Keep Pat updated on Life Cycle/ Fleet Replacement Model from Texas University	• Email Joe a copy of the Western States Labor Rates so he can get a better idea for them to set rates • Email to get a list of life cycles (they don't have utilization)	• Need a list of ATA codes • Keep in contact with Barb for future Life Cycle Models • Btors@dot.state.nh.us

Section G2—Maine, Michigan and Pennsylvania DOT Responses

	Question	Maine DOT	Michigan DOT	Penn DOT
	Attendees *Benchmarking Team: MnDOT: 1. Jim Lilly 2. John Howard 3. Kelvin Smith 4. Bob Ellingsworth UMD: 5. Brandon Storhaug	♦ Tom Lucas *1,2,3,4,5	♦ Dan Smith- Fleet Mgr *1,2,5	♦ Charles Goodhart- Chief, Fleet Mgr ♦ Ron Klose- Technical Trainer Mgr ♦ Nick Fazio- Admin Mgr ♦ Jeff Mitchell- Roadway Programs Specialist ♦ Mark Reigle ♦ Bill ♦ Ray Rugh- Hwy Equip Mgr III ♦ Perry Croyle- Western PA Fleet Advisor ♦ Rick Dolbin- Hwy Equip Mgr III *1,2,4,5
I.	**Background:**	4/10/03 Start: 1:30 a.m.-- End: 3:30 p.m.	4/14/03 Start: 10:00 a.m.-- End: 12:00 p.m.	4/16/03 Start: 10:00 a.m.-- End: 3:00 p.m.
1.	**Describe your fleet management structure–**	From Top-Down: • Top: Dir. of Bureau of Maint. & Operations • Then, Assistant Director • Then, (all same level) ♦ Traffic engineer division ♦ Bridge maintenance division ♦ Motor transport service (W. Wieczorek) ♦ Hwy maintenance division • Then, a district engineer from each of the 7 districts reports to each of the above 4 divisions	From Top-Down: • Top: Chief Operations Officer, Admin Services and Auto & Equip Fleet Admin at the same level (Fleet Mgr under EFA) • Then, (all same level) ♦ Highway Development ♦ Operations Contract Support ♦ Highway Delivery ♦ 7 Regions	From Top-Down: • Chief- Charles Goodhart • Then, (same level) ♦ Rick Dolbin-Hwy Equip Mgr III ♦ Nick Fazio- Admin Mgr ♦ Ray Rugh- Hwy Equip Mgr III
	Centralized/ Decentralized	Centralized	Decentralized	Decentralized
	# of Districts, Regions, Maintenance Shops?	• 7 Districts (each district has 3 divisions), main maintenance facility at each division and 5-7 satellite facilities per division	• 7 regions with 35 garages	• 11 Districts with a total of 67 counties (each has 1 main maintenance shop)
	Number of Lane Miles	3,400 center lane miles		42,000 miles??
	Size of Fleet	• 700 heavy duty vehicles ♦ 500 are snow plows • 500 light duty vehicles • Misc. = 1,200	• 672 leased vehicles (cars and some light duty) • 3,626 pick-ups, med size, and specialized equipment • 330 snow plows	24,000 pieces of equipment • 4,000 rolling stock • 2,450 dump trucks which are considered snow plows
	Appropriation or Revolving Fund	Revolving Fund	Appropriation Fund	Appropriation Fund
	What is your annual budget?	• $24-25 million • $5.6 million for replacement	• $5.6 million for fleet replacement • Resale goes back to MiDOT general fund	• $35 million capital Improvement Fund • Resale funds go back into general county fund
	Describe your billing structure to districts, etc?	• Split Rate (Rental Rate) ♦ Usage rate ♦ Possession rate	• Equipment rate- user fee based on hours • Flat rate for leased vehicles	No Billing Structure
	Who are your customers?	• Motor Transport Service (THEM) • Bridge Maintenance Division • Traffic Engineering Division • Hwy Maintenance Division (main customer, rent equip to them	No other agencies	No other agencies
	Is your parts organization operated from a centralized location?	• Central warehouse (65% comes from here)	• Decentralized • Each region having various amounts of inventory available	• Decentralized • Any major parts can be purchased locally • Minor parts are available centrally, PM stuff.
2.	**Talk about your fleet management system**			
	Type of system and how long has it been used?	• Legacy System since 1990 • Currently looking for new system	• Maintenance Star • Been in place Since 2000	• Maintenance Operations Resources Information System (Mainframe) Since 86’
	Amount of historic data and quality of data?	• As far back as you want to go • Good quality	• All data was scrapped prior to 2000 • Data quality various from region to region because of	• Major data goes back roughly 15 months, however, older data can be retrieved such as annual reports

	Question	Maine DOT	Michigan DOT	Penn DOT
			different standards	• 80% of data is reliable and intelligent enough to make management decisions
	Who enters the data into the system into the system?	• Mechanic logs on and starts time of work order (log in and out) • Shop foreman writes the work order • For satellite facilities, info is sent to clerk at central office who enters data	• All new vehicle information (purchasing)- done by central office • Service and repair done by the garages	• Mechanic supervisors, garage supervisors (mixture of people)
	What type of access is there to the data?	• Available anytime	• Depending on level of access, it can be instantaneous	• Roughly a 1 day lag time for everything to be current otherwise its available upon request
	Types of reports generated and used?	• Many different ones • Can be in Excel form and from the EMS output form	• Many different types of reports	• Usage reports • Repairs • Financial
	Interfaces with other systems (e.g., inventory and payroll)?	• Inventory- yes • Payroll- no	• Inventory- yes • Payroll- no	• Inventory- yes • Payroll- yes • Work Orders- yes • Budget- yes • Procurement- yes
II.	**Performance Measures:**			
3.	**Describe the history of your performance measures within your DOT and in particular within the area of Fleet Management?**	• Since 1979	• Not a lot of history	
	What business changes have you made?	• Changing IT system	• Changing IT systems • Moving from leasing to owning some equipment	• 95' developed a fleet model that talks about performance measures and goals (cost per usage) • Developed fleet dashboards • Penalized districts for under utilized equipment
	Why have you changed?	• Outdated system	• Outdated system • Owning equipment to get rid of the many restrictions/ requirements for maintaining and keeping equipment	• Wanted common goals and to set standards • Fleet was too large • Improve average age of fleet • Monitor and control • Justification of dollars for higher up people
4.	**Are you using all your measures listed from the survey? (Which are used on daily basis, monthly, annually)?**	• No, but they are available if needed	• No, but they are available if needed	• Yes, except scheduled vs. unscheduled • Monthly, quarterly, annually, see questions 6 below
5.	**Do you have different levels of measures (shop, field, management and executive)?**	No	Yes	Yes
6.	**What are your higher level measures?**		1. Retention Schedules 2. Usage Reports 3. Fuel Costs 4. Fuel Used 5. Non Fuel Charges 6. Replacement Criteria	Dashboards: M=monthly, Q= Quarterly 1. [M] % of Stockroom Orders Filled Correctly 2. [M] % of Operators Certified 3. [Q] % of Mechanics Certified 4. [M] % of P.O>'s within 10% (+/-) of Estimate 5. [M] % of PM's Performed within Time Standard 6. [M] Average # of Days to Provide Engine To Customer 7. [M] % of Delivery Times Met on P.O.'s 8. [Q] # of Defects For Unit Inspected 9. [Q] % Timely Response to 1-877-DOT-TRUK Calls 10. [M] Customer Satisfaction with Remanufactured Engines 11. [Q] # of Newsletters Issued by 10th of the Month 12. [M] Invoices Processed Within Time Standards 13. [M] % of Fixed Sites That Polled

	Question	Maine DOT	Michigan DOT	Penn DOT
				14. [M] % of Fuel Trucks That Polled 15. [Q] % of Capital Equipment Budget Utilized within the Quarter 16. [Q] % of Planned vs. Actual Courses Given Organizational Performance Index: Weighted factor—in brackets [ ] 1. [15%] % of stockroom orders filled correctly 2. [15%] % of operators/mechanics trained successfully 3. [30%] % of purchase orders filled with 10% (+/-) of estimate 4. [10%] % of PM's performance within mechanic time standard 5. [10%] Average number of days to approve 838's 6. [10%] Average number of days to fill engine orders 7. [10%] S.L.U.R Goal: To provide our customers with the highest quality equipment manager services in a timely manner with the most efficient use of resources
	What do you use your measures for?			• Control, monitor and to improve
	Why are you measuring that (what are you trying to monitor or control)?			• Manage the core fleet and to improve average age of equipment (cost/ usage)
	Who develops the measures (organizational level)?	• Should be users and upper management	• Combination of fleet manager and higher level managers	• Central office with comments from districts
	How does that process work?	• No Process	• No Process	• Have a task force in charge of this
	Who monitors the performance measures (what organizational level)?	• Combination of District level and Senior Management	• Regions monitor their own and Fleet manager concentrates on utilization	• Every level monitors their own measures
	How often/ frequently do they monitor them?	• See questions 4 & 6 above • Monthly	• See questions 4 & 6 above • Monthly, but depends on how important the issue is	• See questions 4 & 6 above • Monthly, Quarterly, Annually
	Who is held accountable for the measures?	• Division Engineer	• Regional Equipment Manager	• All the way down the chain of command • "Because they are decentralized, accountability is decentralized"
	What actions do you take based on these measures?	• No Action	• Contact regions for justification	• Depends on the level
7.	**What are your definitions (criteria) for each of your measures (the major ones) and if applicable?**			
	Downtime =	• NA		NA-is tracked but not used, bad data
	Preventive vs. Reactive (Scheduled vs. Unscheduled) Main. =			• NA
	Utilization =			• Usage based on number of hours used for the day (billed), may be used for only 2 hrs during the day, but it was billed for 7 hrs.
	Fleet Size =			• Dump truck are based on snow lane miles • Other is based on utilization
	Life Cycle (replacement) =			
	How do you set your life cycles, what happens in time of budget crunches, do you	• Replace approx 48-50 snow plows per year • Based on funds available • Based on history	• Life cycles are based on history and aren't sure where or how they were set	• Age, hrs, miles

	Question	Maine DOT	Michigan DOT	Penn DOT
	add another year?	• Replace about 10% each year of vehicles		
	Others =			
8.	**Have you set performance expectation targets for any of the measures that you are using? If so, what are they?**	• No	• No	• Yes, see dashboard attachment
	How do you determine your targets (ex. What conferences do you attend)?	• Eastern States Conference • Don't have targets	• Midwest Regional Conference • Don't have targets	• Midwest Regional Conference • Southeast Conference • Meet annually (Task Force) • TRB council
	If your state uses benchmarking for evaluating measures…how do you incorporate that into your business operations?	• Don't use benchmarking	• Don't use benchmarking	• There is a formal benchmarking process, however, it is too detailed, not used often
	How does your benchmarking process work?	• NA	• NA	• Ad Hoc process
	Who do you benchmark against? (private, public)	• NA	• NA	• Private- for PM and quality assurance • Partnered with MAC truck to better improve vehicles for PennDOT
	How do you determine they are the best?			• If they meet what your needs are
9.	**How often do you re-evaluate your performance measures and targets?**	• A couple times per year	• As needed	• Annually
10.	**What role do the districts/divisions/regions play in accountability? What is the role of the central office?**	• Districts try to monitor some things	• Regional- in charge of repairs and operational measures • Central- in charge of purchasing	• Accountability depends on level within the organization • Central looks at utilization
	How does your process operate for enforcing these measures to all the districts/divisions/regions?	• No Enforcement	• No formal process	• Goes down chain of command
11.	**Talk about your measures:**			
	What are some of the problems with your measures? Why?	• Since the divisions don't own their equipment, there is a concern that if one division maintains their equipment better then another, how can they be rewarded?	• Getting buy in from regions • Enforcing universally • Getting accurate information (data entry)	• Hard to manipulate data and to extract it • Have some measures that aren't used (downtime for example) • Large state, measures don't meet all needs of various districts
	What are the strengths/ benefits of your measures? Why do they work well?	• No strengths	• No Strengths	• Tool and a snapshot of fleet • Justify expenditures • Let executive management know conditions of fleet • Shows how you have evolved • Getting buy in from everyone which resulted in every measurement having an overall consensus of districts and upper management • Got upper management support
	Have you seen any improvements in efficiency, cost, and quality?	• None	• No	• Reduced fleet size • Reduced costs and efficiency because of cost/usage from .77 cents/hr to .44 cents/hr • Improved sharing between districts • Maintenance and repair costs haven't gone up compared to inflation

	Question	Maine DOT	Michigan DOT	Penn DOT
				• Age of fleet has gone down • Quality of equipment has improved
III.	**Miscellaneous:**			
12.	**Is your organization working towards any type of quality improvement programs or awards with your fleet management area? (MBNQA, ISO 9000, Deming, Juran, etc.)**	• No	• Not in this department, but could be done in other departments	• Yes, MBNQA but not directly as a department, however, quality improvement has trickled down to this level. • Also working towards ISO certification.
	What steps is your organization taking to work towards this?			• Have a process for quality improvement and also train employees on quality improvement
13.	**How do you know you have the right fleet size?**	• When things get done	• Don't know, By meeting requirements	• Fleet model was developed to determine this answer • Districts give a presentation and must justify to Peer Review Committee for approval • Based on minimum utilization which drives fleet size
14.	**What are your short term and long terms goals as far as managing your fleet?**			
	Short Term:	• Develop strategic plan • Work on developing and integrating a new information system	• Work on measuring mechanic productivity • Establish assignment criteria for fleet size • Fully integrate IT system with all capabilities	• To improve and enhance fleet model • Look at leasing small vehicles
	Long Term:	• Be consistent • Work on the idea of divisions having a sense of ownership somehow (what to do when divisions take good care of their vehicles as compared to ones that don't) • Don't operate like "crisis management"	• Maintaining the fleet • Move from reactive to preventive maintenance	• Fleet age is still not met by all districts, improve this • Fleet size (no justification, but a feeling that it is too large)
15.	**What operations do you have that you believe are unique to your organization? What are the advantages and reasons you have them?**	• Safety training • Training for repairs	• None	• Internally partnering • Fleet Model
	Interesting Notes:			
		• We have 1 state, but it operates like 7 states within 1 state • **<u>We are consistently inconsistent</u>**	• The term benchmarking is relatively unknown within DOT's	• Because they are decentralized, accountability is decentralized • Improvements were observed just by making districts aware of the problems • If you measure it, you can improve • If you don't measure, how do you know how to improve • Have a lot of data, but not easy to extract
	Comments:			
		• Maine is currently looking to change their information system • Maine seems to print out many reports, however, there doesn't seem to be much in the way of visual measures that everyone can see. (too many reports and not a lot of action being taken) • No one seems to be held accountable and there doesn't seem to be any sense of direction as far as performance measures go. • The districts act like their own state and don't really collaborate with other districts.	• Michigan is very mixed up as far as organizational structure and accountability. • Michigan isn't really monitoring or enforcing measures over regions • Regions relatively manage themselves	• Overall, PennDOT is running an efficient operation that is devoted to quality improvement. Their willingness to learn from others has worked as a catalyst to bring them into the future as a leader in the DOT industry • PennDOT is lacking an information system that can provide them a tool for extracting data in an easy to understand format • PennDOT has much to improvement upon in the area of performance measures, however, they are ahead of most other DOT's • Currently, upgrading IT system

	Question	Maine DOT	Michigan DOT	Penn DOT
				For MnDOT: • Try to work towards a quality improvement organization like PennDOT • Add organization performance index like PennDOT and NY DOT
	Follow-up Quest./ Mat. Needed			
				• Rick Dolbin- give business card to John • Email Charlie to get the following: • Copy of Dashboards • Process improvement guide for MBNQA • Copy of formal benchmarking process • Copy of fuel consumption • Electronic version of PM manual • Current Shop Index • Allocation numbers for Budget (formula) • Dump truck analysis • Copy of cost/usage equation • Fleet replacement report