Utah Department of Transportation

Performance Audit
Fleet and Equipment Management

Final Report

May 2001
Utah Department of Transportation
Performance Audit of Fleet and Equipment Management

Table of Contents

Executive Summary ........................................................................................................... E-1
A. Audit Issues ............................................................................................................. E-1
B. Methodology and Approach .................................................................................. E-1
C. Equipment Operations Division Activities ......................................................... E-2
D. Overall Management of Equipment Operations Division – Findings and Recommendations ............................................................................................................. E-3
E. Administration and Management – Findings and Recommendations ... E-5
F. Equipment Acquisition, Utilization, and Replacement – Findings and Recommendations ............................................................................................................. E-9
G. Equipment Maintenance and Repair – Findings and Recommendations..... E-11
H. Parts Procurement and Supply – Findings and Recommendations..... E-13
I. Introduction .................................................................................................................. 1
A. Audit Issues ............................................................................................................. 1
B. Methodology and Approach .................................................................................. 3
C. Report Organization ............................................................................................... 5
II. Overall Management of Equipment Operations Division ............................................. 6
A. Overview of Equipment Operations Division ......................................................... 6
B. Business Areas, Activities, and Products ............................................................. 10
C. Business Objectives and Business Model ............................................................. 13
D. Overall Fleet Management Model and Practices ............................................... 13
III. Administration and Management .............................................................................. 20
A. Background ............................................................................................................. 20
B. Resource Allocation and Staffing .......................................................................... 22
C. Organization ........................................................................................................... 27
D. Central Shops ......................................................................................................... 28
E. Management Information ...................................................................................... 30
F. Staffing and Human Resource Management ......................................................... 33
G. Recommendations ................................................................................................. 37
IV. Equipment Acquisition, Utilization, and Replacement ................................. 41
   A. Background ............................................................................................. 41
   B. Equipment Acquisition ........................................................................... 43
   C. Equipment Replacement ........................................................................ 44
   D. Lifecycle Management ........................................................................... 47
   E. Cost Recovery ......................................................................................... 52
   F. Distribution of Equipment ...................................................................... 56
   G. State Fleet ............................................................................................... 59
   H. Recommendations .................................................................................. 62

V. Equipment Maintenance and Repair .............................................................. 64
   A. Background ............................................................................................. 64
   B. Preventive Maintenance .......................................................................... 66
   C. Mechanic Utilization .............................................................................. 68
   D. Maintenance Outsourcing ....................................................................... 70
   E. Warranty Recovery .................................................................................. 72
   F. Recommendations .................................................................................. 73

VI. Parts Procurement and Supply .................................................................... 74
   A. Background ............................................................................................. 74
   B. Parts Procurement and Supply ............................................................... 74
   C. Recommendations .................................................................................. 79

Appendix A: Benchmarking Assessment of Fleet Management Best Practices ...... 1
Executive Summary

This executive summary presents the findings and recommendations from a performance audit of the Utah Department of Transportation (UDOT) Equipment Operations Division.

A. Audit Issues

As part of audit initiation, a series of interviews were conducted with senior management to identify audit issues. These interviews raised the following two overarching questions to address as part of this audit:

- What are the opportunities for significantly improving the efficiency and effectiveness of fleet management through different business models?
- How does UDOT’s fleet management model compare to contemporary best practices and industry trends?

In addition, issue identification defined several audit questions that were evaluated through the audit. The audit questions were used to examine the business areas, processes, and practices of the Equipment Operations Division in order to identify potential opportunities for improvement.

B. Methodology and Approach

The methodologies and approach for completing the performance audit included:

- **Clarification and definitions of the questions to be answered by the audit.** A series of issue identification interviews were held with Equipment Operations Division management and UDOT senior management to define precisely the questions that would be researched and answered by the audit.

- **Fact-finding interviews in UDOT Regions and Districts.** Interviews were conducted with Equipment Operations Division staff at headquarters and in the field, as well as with vehicle operators, and warehouse and procurement staff.

- **Collecting and analyzing data.** Data analysis was completed, based on information provided by UDOT Equipment Operations Division, from the financial and asset management information systems.
• **Benchmarking UDOT fleet equipment management practices.** Dye Management Group, Inc. completed a benchmarking analysis, contrasting the operational and management practices at UDOT with functions performed by equipment managed at other state departments of transportation. A further best practices survey of other large public fleets was completed, in order to understand the emerging trends in public and private fleet management.

C. **Equipment Operations Division Activities**

The business activities of the Equipment Operations Division evaluated in the audit are described below:

1. **Administration and Management**

   This business area provides overall direction to Equipment Operations Division and performs general administrative services including establishing policies and procedures for managing fleet equipment, managing assets, preparing budgets, funding Equipment Operations Division, managing facilities, and providing data processing support.

   Key objectives for this business area include:

   - Maximize efficient and effective use of resources.
   - Manage staff resources to meet Division and Department-level performance goals.
   - Apply known best management practices.

2. **Equipment Acquisition, Utilization, and Replacement**

   This business area includes the work activities necessary to develop equipment specifications, acquire and outfit new and replacement equipment, as well as make equipment assignments, train equipment mechanics, monitor equipment utilization, and dispose of equipment.

   Key objectives for this business area include:

   - Achieve best value for price.
   - Maintain state-of-the-art knowledge.
   - Provide superior customer service.
3. Equipment Maintenance and Repair

The maintenance and repair business area includes the performance of: equipment preventative maintenance, inspections, and repairs, as well as quick fix, road call, towing, and field services. This business area initiates and processes warranty claims and manages maintenance and repair outsourcing.

Key objectives for this business area include:

- Perform quality repairs.
- Maintain low maintenance costs.
- Provide superior customer service.
- Minimize mechanic downtime and repair comebacks.
- Maximize warranty recoveries.
- Optimize shop response time.

4. Parts Procurement and Supply

This business area includes the processes necessary to acquire replacement parts for equipment, manage the parts inventory, and distribute the parts as needed.

Key objectives for this business area include:

- Achieve quick turnaround.
- Supply quality parts.
- Seek best parts pricing through vendor contracts.
- Maintain adequate and effective inventories.

D. Overall Management of Equipment Operations Division – Findings and Recommendations

UDOT’s current approach toward fleet and equipment management is driven by the constraints arising from the requirements and historic practices that have governed equipment procurement and shortfalls in equipment replacement funding. The business functions currently performed by the Equipment Operations Division are those required to manage a “low-bid” procurement process that does not allow for consideration of lifecycle cost, lease-buy back or other procurement models. The functions in turn are then further focused on the work required to perform preventative maintenance and then major maintenance on equipment that is retained beyond the warranty period.

The overall thrust of the findings and recommendations of this audit is that UDOT should, as a strategic department-wide objective, transition towards a lifecycle management
approach towards fleet and equipment management. For the purposes of the analysis and recommendations presented in this audit, lifecycle management refers to an overall approach to equipment management that considers the relationships between equipment procurement, maintenance, and replacement. The recommended transition will involve establishing policy and may require UDOT to seek statutory change to use alternative, more cost-effective procurement mechanisms. A lifecycle management approach will enable UDOT to better manage and control equipment costs, provide greater predictability regarding equipment costs, and implement best management practices.

Findings and recommendations on the overall fleet management model and practices are summarized in Exhibit E-1.
Exhibit E-1: Findings and Recommendations on Overall Fleet Management Model and Practices

<table>
<thead>
<tr>
<th>Area and Issues Addressed</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business Objectives and Business Model</strong></td>
<td>• There are no department-wide business objectives for fleet and equipment management.</td>
</tr>
<tr>
<td>• What are the goals and mission of the</td>
<td>• The efficiency and effectiveness of UDOT’s overall fleet management business model is constrained by the current requirements and practices governing equipment acquisition, management, and replacement.</td>
</tr>
<tr>
<td>Equipment Operations Division?</td>
<td>• Low-bid acquisition requirements only consider initial price and create a non-standard fleet.</td>
</tr>
<tr>
<td><strong>Overall Fleet Management Model and Practices</strong></td>
<td>• There is little or no lifecycle management (as defined earlier).</td>
</tr>
<tr>
<td>• How efficient and effective are UDOT’s</td>
<td>• Overall maintenance costs are difficult to manage due to procurement and replacement requirements and practices.</td>
</tr>
<tr>
<td>overall management, business model, and</td>
<td>• Current cost recognition for equipment use needs strengthening.</td>
</tr>
<tr>
<td>practices?</td>
<td></td>
</tr>
</tbody>
</table>

**Overall Fleet Management Model and Practices Recommendations**

Recommendation II-1: Establish department-wide business objectives and statewide accountability structure for fleet and equipment management.

Recommendation II-2: Transition to a lifecycle management approach for the procurement and management of UDOT’s fleet through:

• Establishing the capability for and undertaking approaches to equipment procurement that address lifecycle costs.
• Undertaking lifecycle management across the Equipment Operations Division’s business areas.
• Developing an equipment business management function in the regions.
• Moving toward true cost recognition in the management and use of equipment.

E. Administration and Management – Findings and Recommendations

Findings and recommendations for the administration and management business area are summarized in Exhibit E-2.
## Exhibit E-2: Findings and Recommendations on Administration and Management

<table>
<thead>
<tr>
<th>Area and Issues Addressed</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resource Allocation and Staffing</strong></td>
<td></td>
</tr>
<tr>
<td>• Is the function well managed, and are the right resources available where and when they are needed?</td>
<td>• Equipment Operations Division’s resources are adequately distributed to meet requirements, and are in line with comparable state departments of transportation.</td>
</tr>
<tr>
<td><strong>Organization</strong></td>
<td></td>
</tr>
<tr>
<td>• Is the organization of the Equipment Operations Division appropriate to address its function?</td>
<td>• The Equipment Operations Division has limited control over factors related to lifecycle management of equipment.</td>
</tr>
<tr>
<td>• What is the reporting structure and management accountability for costs?</td>
<td>• The Equipment Operations Division lacks control over preventive maintenance, region and district non-preventive maintenance activities, and other activities undertaken by Maintenance staff.</td>
</tr>
<tr>
<td>• The Equipment Operations Division sets regional/district vehicle and equipment budgets for staff time; however, local Maintenance managers supervise Equipment Operations Division staff.</td>
<td>• Some states have decentralized fleet and Equipment Operations Division and have regional equipment managers.</td>
</tr>
<tr>
<td><strong>Central Shops</strong></td>
<td></td>
</tr>
<tr>
<td>• Is Central Shops needed?</td>
<td>• Overall, the Central Shop complex is playing a decreasing role in statewide maintenance.</td>
</tr>
<tr>
<td></td>
<td>• According to the UDOT Fleet Manager, 50 to 60 percent of the work performed at Central Shops is in support of Region 2.</td>
</tr>
<tr>
<td></td>
<td>• Long repair turnaround times due to distance and other factors reduce demand for Central Shops.</td>
</tr>
<tr>
<td></td>
<td>• The recommended transition to lifecycle management will further change the Central Shops statewide functions and reduce staffing needs.</td>
</tr>
<tr>
<td></td>
<td>• Other western states have decentralized equipment maintenance activities.</td>
</tr>
<tr>
<td>Area and Issues Addressed</td>
<td>Findings</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Management Information</strong></td>
<td>• Several drawbacks exist with Equipment Operations Division information technology and support.</td>
</tr>
<tr>
<td>• A number of overall management issues are addressed.</td>
<td></td>
</tr>
<tr>
<td>• Several drawbacks exist with Equipment Operations Division information technology and support.</td>
<td></td>
</tr>
<tr>
<td>• CARS is not integrated with UDOT’s financial management system.</td>
<td></td>
</tr>
<tr>
<td>• Legacy equipment data was not captured when CARS was implemented.</td>
<td></td>
</tr>
<tr>
<td>• Some CARS functions are not fully utilized by UDOT staff.</td>
<td></td>
</tr>
<tr>
<td>• Maintenance and repair activities are not accurately documented.</td>
<td></td>
</tr>
<tr>
<td>• Measuring vehicle and equipment performance provides a means of controlling costs.</td>
<td></td>
</tr>
<tr>
<td><strong>Staffing and Human Resource Management</strong></td>
<td>• Average pay rates for the Equipment Operations Division staff are comparable to other western state DOTs.</td>
</tr>
<tr>
<td>• Crosscutting overall management issues.</td>
<td>• Four 10-hour workweeks are popular with staff, but can create coverage issues and increase overhead costs.</td>
</tr>
<tr>
<td></td>
<td>• Mechanics feel that they would be more effective with training and updated tools and equipment.</td>
</tr>
<tr>
<td></td>
<td>• Vehicle maintenance facilities may be improved in some areas.</td>
</tr>
</tbody>
</table>
### Administration and Management Recommendations

**Recommendation III-1:** Establish a regional equipment business manager function, responsible for the lifecycle management of locally assigned equipment. Roles and responsibilities are to:

- Actively manage fleet and equipment once it is assigned to regions to provide maximum service to the region for the lowest possible cost.
- Manage the level of resources required in the region, including staff, vehicles, equipment, and facilities.
- Manage Equipment Operations Division staff located in the region.
- Refine the roles and responsibilities of staff.
- Evaluate and optimize the workload and schedule for maintenance shops.
- Work closely with Area Engineers and Maintenance Supervisors.

**Recommendation III-2:** Transition the function and staffing of the Central Shops to support the requirements of a lifecycle management approach.

- As heavy duty mechanical needs continue to decline with younger fleet, transition Central Shops away from a statewide heavy-duty function and toward a decentralized Region 2 support function.
- Maintain certain statewide capability to service specialty equipment as necessary.
- Ensure only cost effective outfitting is undertaken by UDOT.

**Recommendation III-3:** Develop a working group to coordinate information systems and manage CARS enhancements and modifications suitable for UDOT needs.

- Eliminate wherever possible duplication between CARS (task, timekeeping and parts order reporting) and timekeeping and financial transaction reporting through other systems (payroll system, FINET, etc.).
- Utilize existing capabilities of CARS including parts management and warranty tracking.
- Ensure that maintenance and repair task codes for use with CARS accurately reflect actual tasks in the field.

**Recommendation III-4:** Return to standard 5x8 workdays for mechanical staff given the inherent inefficiencies with 4x10 shifts.

**Recommendation III-5:** Evaluate specific needs for career advancement, training, tools and computers for regional and district staff mechanics.

- Develop training and promotion criteria for career advancement.
- Develop a mentoring program for lead, journeyman, and apprentice mechanic staff.
- Encourage ASE certification of staff mechanics.
- Evaluate specific needs for tools and computers, and training for staff mechanics.
- Employ best practices from other states.
F. Equipment Acquisition, Utilization, and Replacement – Findings and Recommendations

Findings and recommendations for the equipment acquisition, utilization, and replacement business area are summarized in Exhibit E-3.

### Exhibit E-3: Findings and Recommendations on Equipment Acquisition, Utilization, and Replacement

<table>
<thead>
<tr>
<th>Area and Issues Addressed</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment Acquisition</strong></td>
<td>• The Equipment Operations Division has a systematic and effective approach for equipment acquisition.</td>
</tr>
<tr>
<td></td>
<td>• UDOT lacks standardized policies and procedures for selection and assignment of State Fleet vehicles.</td>
</tr>
<tr>
<td></td>
<td>• State purchasing rules result in a specification-driven procurement process to select the low-bidder.</td>
</tr>
<tr>
<td>• What is the decision-making structure regarding type of unit? How are specifications determined?</td>
<td></td>
</tr>
<tr>
<td>• What policy and procedures exist to determine vehicle allocation?</td>
<td></td>
</tr>
<tr>
<td><strong>Equipment Replacement</strong></td>
<td>• Fleet and equipment replacement has been constrained by acquisition funding levels.</td>
</tr>
<tr>
<td>• How effective are current replacement strategies and planning?</td>
<td></td>
</tr>
<tr>
<td><strong>Lifecycle Management</strong></td>
<td>• Opportunities exist for improving lifecycle cost management as part of equipment acquisition.</td>
</tr>
<tr>
<td>• How effective are current replacement strategies and planning?</td>
<td>• The low-bid process results in a lack of standardized sets of equipment.</td>
</tr>
<tr>
<td></td>
<td>• There are opportunities to reduce costs by expanding fleet acquisition considerations beyond initial purchase price.</td>
</tr>
<tr>
<td></td>
<td>• Consideration of broad-based costs beyond purchase price (including maintenance, operating, disposal costs, and salvage value) in replacement planning provides a means to economize fleet operations.</td>
</tr>
<tr>
<td></td>
<td>• Care needs to be taken in applying a lifecycle cost management approach.</td>
</tr>
</tbody>
</table>
### Area and Issues Addressed

<table>
<thead>
<tr>
<th>Cost Recovery</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>• How well is cost recovery achieved?</td>
<td>• UDOT will benefit from improved fleet and equipment cost recognition and cost recovery by changing its rate structure.</td>
</tr>
<tr>
<td>• How well is the dual rate structure working?</td>
<td>• Revenue mileage reported for maintenance and light-duty equipment is less than actual, due to reporting problems.</td>
</tr>
<tr>
<td></td>
<td>• Internal Service Funds, or revolving funds, provide fleet managers the ability to replace vehicles in a timely manner.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distribution of Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Is the fleet distributed appropriately to optimize the use of equipment?</td>
</tr>
<tr>
<td>• Should some specialized/heavy vehicles that are underutilized be assigned to Central Shops?</td>
</tr>
<tr>
<td>• Some specialized equipment is subject to low utilization rates.</td>
</tr>
<tr>
<td>• Seasonal use and compressed work calendars impact the ability to centralize equipment.</td>
</tr>
<tr>
<td>• An emerging trend for seasonally used or underutilized equipment is to acquire such equipment through short-term rental agreements.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State Fleet</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Does UDOT get good service through State Fleet?</td>
</tr>
<tr>
<td>• Is UDOT getting value for money for vehicles used through State Fleet?</td>
</tr>
<tr>
<td>• Economic growth in Utah and changes in operating requirements have created additional equipment needs.</td>
</tr>
<tr>
<td>• UDOT may benefit from privatization of vehicle disposal.</td>
</tr>
<tr>
<td>• UDOT is benefiting from leasing State Fleet light-duty vehicles.</td>
</tr>
</tbody>
</table>

### Equipment Acquisition, Utilization, and Replacement Recommendations

**Recommendation IV-1:** Within existing statutory authority, base procurement decisions on lifecycle management considerations (acquisition costs, maintenance costs, standardization, reliability, modifications required, and resale value of different equipment brands).

- Design and implement a fleet and equipment procurement model that responds to UDOT’s business objectives established through Recommendation II-1.
- If necessary, seek appropriate statutory changes to base procurement decisions on lifecycle management considerations.
- Utilize best practices from other states in the design of the procurement model (as listed in Appendix A).

**Recommendation IV-2:** Strengthen light-duty vehicle acquisition procedures to promote standardization of vehicle type and level of outfitting by job function.
Recommendation IV-3: Transition to an equipment and vehicle cost recovery model identifying all costs associated with utilization.

- Fully implement the proposed dual rate structure for applicable equipment to improve cost recovery.
- Determine legislative requirements to shift to full cost recovery by permanent funding through an Internal Service Fund (ISF).
- Develop new procedures for ensuring operators complete accurate logs of vehicle utilization, especially mileage records to reduce negative reporting variances.

Recommendation IV-4: As part of the recommended regional equipment business management function roles and responsibilities:

- Ensure the best possible level and distribution of fleet and equipment based on need and lifecycle cost.
- Consider rental options for seasonal and low utilization equipment.

Recommendation IV-5: Develop long-term fleet and equipment funding plan in conjunction with highway maintenance management and planning activities.

- Develop plan to address the relationship between maintenance activities and equipment procurement.
- Determine long-term fleet and equipment needs and funding requirements based on preferred lifecycle management approach.
- Examine merits of more frequent turnover to reduce maintenance costs.
- Determine the long-term impacts of population growth, growth in lane miles and changing maintenance standards in Utah on fleet and equipment needs.
- Increase acquisition of multiple use equipment to reduce costs and increase utilization.
- Evaluate current and future maintenance facility needs and develop improvement strategy.

Recommendation IV-6: Use private auctions for vehicle disposal where expected cost savings warrant.

G. Equipment Maintenance and Repair – Findings and Recommendations

Findings and recommendations for the equipment maintenance and repair business area are summarized in Exhibit E-4.
Exhibit E-4: Findings and Recommendations on Equipment Maintenance and Repair

<table>
<thead>
<tr>
<th>Area and Issues Addressed</th>
<th>Findings</th>
</tr>
</thead>
</table>
| Preventive Maintenance                 | • Compared to best practices, UDOT expenditure of resources toward preventive maintenance is in line with industry standards.  
• UDOT is unique, with operators performing preventive maintenance.  
• The Equipment Operations Division lacks control over preventive maintenance activities undertaken by the Maintenance Division.  
• Equipment Operations Division mechanics have noted a wide variation in care and attention to vehicles.  
• UDOT currently maintains around 50 percent of its State Fleet vehicles. |
| Mechanic Utilization                   | • Mechanic utilization rates, billable hours versus overhead, are below departmental goals and industry benchmarks.  
• Mechanics complete work orders on non-UDOT equipment.  
• Direct labor fluctuates seasonally, as well as due to weather conditions.  
• Indirect time is spent by mechanics completing administrative functions.  
• UDOT mechanics have a low direct labor ratio, compared to other state department of transportation mechanics. |
| Maintenance Outsourcing                | • UDOT outsources little maintenance work.  
• Vehicle outfitting leads to significant time passing between delivery and placement into service. |

- The appropriate level of preventive maintenance provided by operators.  
- The appropriate mix of state versus privately provided maintenance.  
- The amount of vehicle outfitting undertaken by UDOT.

- Is there “downtime” in the region shops?  
- Can mechanic utilization be increased?
### Area and Issues Addressed

<table>
<thead>
<tr>
<th>Area</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Warranty Recovery</strong></td>
<td></td>
</tr>
<tr>
<td>- Warranty recovery.</td>
<td></td>
</tr>
<tr>
<td>- Warranty recovery has not been a priority for the Equipment Operations Division.</td>
<td></td>
</tr>
<tr>
<td>- An accurate warranty management system or process has not been implemented.</td>
<td></td>
</tr>
<tr>
<td>- Shop supervisors consider the warranty approval process to be burdensome.</td>
<td></td>
</tr>
<tr>
<td>- A best practice in warranty management involves starting the warranty when the equipment begins service.</td>
<td></td>
</tr>
</tbody>
</table>

### Equipment Maintenance and Repair Recommendations

**Recommendation V-1:** As part of the recommended regional equipment business management function roles and responsibilities:
- Develop and enforce standards for preventive maintenance of vehicles and equipment, regardless of location, age, and utilization of the items.
- Reengineer practices for recording mechanics time, ensure proper task codes, reduce duplicative effort, and simplify.
- Ensure proper management and maintenance of region/district State Fleet motor pools.
- Assist regions and districts in managing warranty claims and reimbursements from vendors.

**Recommendation V-2:** Establish headquarters warranty facilitator function to assist regions and districts to maximize warranty reimbursements.
- Work with State Fleet to fully utilize CARS for tracking warranty work for vehicles and equipment.

**Recommendation V-3:** Continue to pursue possible take over of State Fleet vehicle maintenance management and repair.

### H. Parts Procurement and Supply – Findings and Recommendations

Findings and recommendations for the parts procurement and supply business area are summarized in Exhibit E-5.
Exhibit E-5: Findings and Recommendations on Parts Procurement and Supply

<table>
<thead>
<tr>
<th>Area and Issues Addressed</th>
<th>Findings</th>
</tr>
</thead>
</table>
| Parts Procurement and Supply | • UDOT has significant opportunity for improving the efficiency of parts procurement and supply processes.  
• Interviews with UDOT staff indicate a lack of understanding of Equipment Operations Division needs by Procurement Services.  
• Current spending authority levels require unnecessary review.  
• Best practices from other states include using information technology, and vendor consolidation or outsourcing of parts management. |
| Are UDOT’s inventory and warehousing practices cost effective? |  
Is UDOT carrying specialized inventory? |

| Recommendation VI-1: With the Procurement Division, reengineer the parts procurement and supply processes supporting central, regional, and district repair shops. |
|---------------------------|----------|
| Implement best practices from other states in the areas of information technology and vendor consolidation or outsourcing of parts management.  
Integrate existing capacity in CARS to make improvements to inventory management.  
Establish function to facilitate parts procurement and supply at UDOT headquarters.  
As part of the recommended regional equipment business manager function roles and responsibilities, support regional and district mechanics by coordinating parts procurement and supply with headquarters.  
Change the spending authority review process to increase the range and upper limits for parts purchase costs. |
I. Introduction

This document presents the final report of a performance audit of UDOT Equipment Operations Division. The audit examines business areas, processes, and practices of the Equipment Operations Division of UDOT in order to identify potential opportunities for improvement. In addition, the audit identifies some emerging trends in contemporary fleet management practices that can better position UDOT to become more efficient and effective.

A. Audit Issues

As part of audit initiation, a series of interviews were conducted with senior management to identify audit issues. During these interviews and as part of subsequent discussions, senior management at UDOT raised the following two overarching issues to address as part of this audit:

• **What are the opportunities for significantly improving the efficiency and effectiveness of fleet management through different business models?**
  This issue addresses UDOT’s overall business practices regarding acquisition, replacement planning, and maintenance of fleet and equipment.

• **How does UDOT’s fleet management model compare to contemporary best practices and industry trends?**
  This issue directs the audit to evaluate the emerging industry trends and best practices used by other agencies to determine their applicability to UDOT and to elevate their potential for realizing significant business benefits.

In addition, issue identification defined the following questions that were evaluated through the audit.

1. **Overall Management and Organization**

• What are the goals and the mission of Equipment Operations Division?
• How efficient and effective are UDOT’s overall management, business model, and practices?
• How does UDOT compare to industry best practices?
• Is the organization of Equipment Operations Division appropriate to address its function?
• Is the function well managed, and are the right resources available where and when they are needed?
• What is the reporting structure and management accountability for fleet costs?
• Does central Equipment Operations Division have the appropriate role in the statewide program?

2. Equipment Acquisition and Lifecycle Management Practices
• What is the decision-making structure regarding procurement?
• How are specifications determined?
• How effective are current replacement strategies and planning?
• What policy and procedures exist to determine who gets to use which type of vehicle?
• Is the fleet distributed appropriately to optimize the use of equipment?
• Should some specialized/heavy vehicles that are underutilized be assigned to the Central Shops?

3. Vehicle Rate Structure and Ownership
• How well is the dual rate structure working?
• What is the appropriate mix for state ownership versus leasing alternatives?
• Does UDOT get good service through the State Fleet?
• Is UDOT getting value for money for vehicles used through the State Fleet?

• There is concern that there is “downtime” in the region shops which is increasing costs and driving up rental rates. If employees are not utilized, they charge time to the equipment fund, which drives up rates. Can billable hours be increased?
• Is the mix of state maintenance versus private maintenance appropriate?
• Are the Central Shops needed?

5. Warehousing and Inventory
• Are UDOT’s inventory and warehousing practices cost effective?
• Is UDOT carrying specialized inventory that is tying up capital?
B. Methodology and Approach

To meet the objectives of this audit, the study approach included four primary methodologies designed to carry out quantitative and qualitative analyses. The methodologies and approach for completing the performance audit included:

- **Clarification and definitions of the questions to be answered by the audit.**
  
  To ensure that the audit stayed focused and addressed the most important questions regarding fleet management, a series of issue identification interviews were held with Equipment Operations Division management and UDOT senior management to precisely define the questions that would be researched and answered by the audit.

- **Visits to UDOT Regions and Districts.**
  
  Interviews were conducted with Equipment Operations Division staff at headquarters and in the field, as well as with vehicle operators, and warehouse and procurement staff. All interviews were conducted with a structured interview guide that ensured consistency of the information gathered. The interviews were used to obtain data and information sources, identify and determine perspective on the issues addressed by the audit, and provide a control mechanism to ensure that data and information used in the analysis were reliable and relevant.

- **Collecting and analyzing data.**
  
  Data analysis was completed, based on information provided by UDOT Equipment Operations Division, from the financial and asset management information systems. Data from the following sources was used in this audit:
  
  - Computerized Automotive Resource System (CARS).
  - Equipment Management System (EMS).
  - Financial Information Network (FINET).
  - Maintenance Management System (MMS).

- **Benchmarking UDOT fleet equipment management practices.**
  
  Dye Management Group, Inc. completed a benchmarking analysis, examining the operational and physical differences between UDOT’s fleet equipment management functions to similar functions performed by equipment managers for several state DOTs. A survey of other large public fleets was completed, in order to understand the emerging trends in public and private fleet management, including alternative business models for acquisition, maintenance and repair, parts procurement, training, and vehicle and equipment disposal. Dye Management Group, Inc. compiled best practices from telephone interviews with managers from several statewide and regional fleets, including:
− Arkansas State Highway and Transportation Department.
− Connecticut Department of Transportation.
− City of Decatur, Illinois.
− Illinois Department of Transportation.
− Maine Department of Transportation.
− Mississippi Department of Transportation.
− New York City Office of Fleet Administration.
− New York Department of Transportation.
− Pennsylvania Department of Transportation.
− Pennsylvania Turnpike Authority.
− South Carolina Department of Transportation.
− Virginia Department of Transportation.

In addition, Dye Management Group, Inc. used results from two surveys of activities completed by fleet equipment managers in 10 western states:

− Arizona Department of Transportation.
− California Department of Transportation.
− Colorado Department of Transportation.
− Idaho Transportation Department.
− Montana Department of Transportation.
− Nevada Department of Transportation.
− New Mexico Department of Transportation.
− Oregon Department of Transportation.
− Washington Department of Transportation.
− Wyoming Department of Transportation.
C. Report Organization

The report is presented in the following sections:

II. Overall Management of Equipment Operations Division. This section presents the overall findings and recommendations from a review of UDOT’s current fleet equipment acquisition and management model, compared to contemporary best practices and emerging industry trends.

III. Administration and Management. This section presents an assessment and recommendations for improving UDOT’s overall administration and management of fleet equipment activities, including distribution of resources and administrative support functions.

IV. Equipment Acquisition, Utilization, and Replacement. This section assesses UDOT’s current model for acquiring, using and replacing fleet equipment.

V. Equipment Maintenance and Repair. This section presents the findings and recommendations for improving UDOT’s fleet equipment maintenance and repair activities.

VI. Parts Procurement and Supply. This section assesses Equipment Operations Division’s ability to manage and improve the parts procurement and supply function, primarily managed by UDOT.

Appendix A: Benchmarking Assessment of Fleet Management Best Practices. This appendix documents the results from a benchmarking survey.
II. Overall Management of Equipment Operations Division

This section provides background, findings, and recommendations regarding the overall management of fleet and equipment management at UDOT. UDOT’s current business model is presented and then evaluated against contemporary fleet management practices to identify the opportunities available to UDOT for improving the efficiency and effectiveness of fleet and equipment management. The section is organized into the following subsections:

- Overview of Equipment Operations Division.
- Business areas, activities, and products.
- Business objectives and business model.
- Overall fleet management model and practices.

A. Overview of Equipment Operations Division

Equipment Operations Division is a division within the Operations Group, located at UDOT headquarters in Salt Lake City. The goals of the Equipment Operations Division include improving productivity and timeliness in responding to customers and providing cost effective fleet management service to UDOT. The primary customer of the Equipment Operations Division is the Maintenance Division, also located in the Operations Group of UDOT.

1. Fleet Characteristics

The Equipment Operations Division is responsible for the procurement, financial management, and replacement planning for a fleet of over 4,600 vehicles and miscellaneous pieces of equipment. The fleet consists of some 945 heavy-duty, 920 light and medium-duty vehicles, and 2,775 individual pieces of specialty equipment (snowplows, sweepers, sand spreaders, vegetation spraying equipment, etc.), as well as miscellaneous engineering equipment (transits, levels, gauges, etc.). Exhibit II-1 on the following page illustrates the composition of UDOT’s fleet.
Exhibit II-1: Composition of UDOT Fleet, FY2000

<table>
<thead>
<tr>
<th></th>
<th>Leased</th>
<th>Owned</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedans</td>
<td>188</td>
<td>12</td>
<td>200</td>
</tr>
<tr>
<td>Pickup Trucks</td>
<td>560</td>
<td>36</td>
<td>596</td>
</tr>
<tr>
<td>10 Wheelers</td>
<td>2</td>
<td>465</td>
<td>467</td>
</tr>
<tr>
<td>Med.-duty Trucks</td>
<td>107</td>
<td>92</td>
<td>199</td>
</tr>
<tr>
<td>Heavy Trucks</td>
<td>0</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Backhoes</td>
<td>0</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Graders</td>
<td>2</td>
<td>69</td>
<td>71</td>
</tr>
<tr>
<td>Loaders</td>
<td>2</td>
<td>156</td>
<td>158</td>
</tr>
<tr>
<td>Tractors</td>
<td>0</td>
<td>89</td>
<td>89</td>
</tr>
<tr>
<td>Trailers</td>
<td>0</td>
<td>263</td>
<td>263</td>
</tr>
<tr>
<td>Misc. Equipment</td>
<td>0</td>
<td>419*</td>
<td>419</td>
</tr>
<tr>
<td>Other Equipment</td>
<td>6</td>
<td>2,144*</td>
<td>2,150</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>867</td>
<td>3,775*</td>
<td>4,642</td>
</tr>
</tbody>
</table>

*Includes two pieces of equipment with no ownership designated. Assumed owned.

Source: UDOT, Dye Management Group, Inc. analysis

a. Ownership

UDOT owns and manages the heavy vehicles and equipment. The Utah Department of Administrative Services (DAS), Division of Fleet Operations manages light-duty vehicles. UDOT commonly refers to the DAS and the fleet of light-duty vehicles as the State Fleet. As shown in Exhibit II-2, UDOT leases about 20 percent of its vehicles, primarily sedans and light-duty pickup trucks, from the State Fleet.

Exhibit II-2: UDOT Fleet Equipment and Ownership, FY 2000

<table>
<thead>
<tr>
<th></th>
<th>Vehicles</th>
<th>Equipment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leased from State Fleet</td>
<td>857</td>
<td>10</td>
<td>867</td>
</tr>
<tr>
<td>Owned</td>
<td>616</td>
<td>3,159</td>
<td>3,775</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,473</td>
<td>3,169</td>
<td>4,642</td>
</tr>
<tr>
<td>Leased from State Fleet</td>
<td>58%</td>
<td>0%</td>
<td>19%</td>
</tr>
<tr>
<td>Owned</td>
<td>42%</td>
<td>100%</td>
<td>81%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: UDOT, Dye Management Group, Inc. analysis
2. Expenditures

The Equipment Operations Division currently has budgeted annual expenditures of approximately $17 million, including $5 million for salaries and fringe benefits, $5 million for parts, fuel, and commercial repairs, and $7 million for acquisition of replacement vehicles, shop tools, and communication equipment. The Division’s sources of revenue include the state general fund, the transportation fund, and other dedicated credits.

Exhibit II-3 illustrates that the overall Equipment Operations Division budget has fallen over the past five years by over $2 million. Accounting for inflation, this decrease would be larger. Within the overall budget, expenditures for equipment purchases have increased and decreased for shop facilities and activities.


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Purchases</td>
<td>$6.1</td>
<td>$7.1</td>
<td>$7.4</td>
<td>$7.9</td>
<td>$7.4</td>
</tr>
<tr>
<td>Shops</td>
<td>$11.8</td>
<td>$12.5</td>
<td>$12.6</td>
<td>$7.7</td>
<td>$8.8</td>
</tr>
<tr>
<td>Maintenance Planning</td>
<td>$0.8</td>
<td>$0.8</td>
<td>$0.9</td>
<td>$1.0</td>
<td>$0.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$18.7</strong></td>
<td><strong>$20.4</strong></td>
<td><strong>$20.9</strong></td>
<td><strong>$16.6</strong></td>
<td><strong>$17.1</strong></td>
</tr>
</tbody>
</table>

*Source: UDOT*

3. Organizational Structure

Exhibit II-4, on the following page, illustrates where the Equipment Operations Division resides within the overall UDOT organization. Until a recent reorganization, the Equipment Operations Division was a group within the Maintenance Division. Maintenance Division staff operate the bulk of the Equipment Operations Division’s fleet of vehicles and equipment. Staff from other business areas use the light-duty vehicles to support UDOT business.
Exhibit II-4: Equipment Operations Division within UDOT Organization

To manage the fleet, Equipment Operations Division has over 90 permanent full-time employees, including over 70 shop mechanics situated throughout the state. The distribution of staff is shown in Exhibit II-5.
Exhibit II-5: UDOT Equipment Operations Division Organization

Source: UDOT
Note 1: Parentheses indicate open/vacant positions.
Note 2: Region 2 count includes one Maintenance FTE position for Transport Driver/Mechanic, which is funded by Equipment Operations Division since labor time is charged to equipment.

B. Business Areas, Activities, and Products

Dye Management Group, Inc. developed a business model to provide a framework to organize the analysis of the activities of the Equipment Operations Division. Exhibit II-6 on the following page presents the general business areas, business processes, and some of the key products identified. Although the model resembles an organizational chart, it is designed to display the business areas and their processes regardless of the organizational unit responsible. Organizational units with responsibility for each process are noted in the model.

For each of the Equipment Operations Division business areas, the principal work performed and the responsibilities for performing it are described in turn after Exhibit II-6.
## Exhibit II-6: UDOT Equipment Operations Division Business Model

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator Equipment Operations Manager, Shop Supervisors, Equipment Advisory Committee, Equipment Management Committee</td>
<td>Equipment Operations Manager, Equipment Advisory Committee, Equipment Management Committee</td>
<td>Operators, Shop Mechanics</td>
<td>UDOT Procurement Services</td>
</tr>
</tbody>
</table>

### Business Areas:

#### Administration and Management
- Administer Relevant Policies and Procedures
  - Equipment Operations Manager, Shop Supervisors, Equipment Advisory Committee, Equipment Management Committee

#### Acquisition, Utilization, and Replacement
- Develop Equipment Specifications
  - Equipment Specialist, Equipment Advisory Board

#### Maintenance and Repair
- Manage and Perform Preventive Maintenance
  - Operators, Shop Mechanics

#### Parts Procurement and Supply
- Obtain Parts
  - Shop Supervisors, Shop Mechanics, UDOT, Procurement Services, State Purchasing, Vendors
- Manage Parts Inventory
  - UDOT Procurement Services

#### Key Processes:

<table>
<thead>
<tr>
<th>Administrative Areas</th>
<th>Key Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Products</td>
<td>Key Products</td>
</tr>
<tr>
<td>Administrator Relevant Policies and Procedures</td>
<td>Administer Relevant Policies and Procedures</td>
</tr>
<tr>
<td>Acquire and Replace Equipment</td>
<td>Acquire and Replace Equipment</td>
</tr>
<tr>
<td>Manage and Perform Preventive Maintenance</td>
<td>Manage and Perform Preventive Maintenance</td>
</tr>
<tr>
<td>Manage Parts Inventory</td>
<td>Manage Parts Inventory</td>
</tr>
<tr>
<td>Administration and Management</td>
<td>Administration and Management</td>
</tr>
<tr>
<td>Acquisition, Utilization, and Replacement</td>
<td>Acquisition, Utilization, and Replacement</td>
</tr>
<tr>
<td>Maintenance and Repair</td>
<td>Maintenance and Repair</td>
</tr>
<tr>
<td>Parts Procurement and Supply</td>
<td>Parts Procurement and Supply</td>
</tr>
</tbody>
</table>

### Key Products:

- **Capital budget (8702).**
- **Operating budget (8703).**
- **Equipment Cost and Exception Report by Regn/Div.**
- **Equipment Master List report.**
- **Equipment usage policies.**
- **Operational policies and procedures.**
- **CARS user documentation.**
- **Rental billings.**
- **Repair billings.**
- **Performance Measurements.**
- **Equipment specifications.**
- **Suggested vendors lists.**
- **Invitations to Bid.**
- **Purchase orders.**
- **State equipment purchasing and rental contracts.**
- **Documentation of equipment receipt and outfitting.**
- **Documentation of equipment assignment - rental contracts.**
- **DAS State Fleet capital and full light vehicle and truck leases.**
- **Documentation of annual equipment inventory.**
- **Equipment Purchase/Work Program report.**
- **Replacement Eligibility report.**
- **Customer satisfaction survey.**
- **Operator certifications.**
- **Documentation of annual requests for new and/or replacement equipment.**
- **Documentation of receipt and disposal of equipment to be replaced.**
- **Inspection documentation.**
- **Repair orders.**
- **Customer satisfaction survey.**
- **Vehicle and parts warranty claims.**
- **Preventative Maintenance Manual.**
- **Equipment jackets.**
- **Vendor maintenance contracts.**
- **Vendor repair contracts.**
- **OSHA 200 safety logs.**
- **State parts purchasing contracts.**
- **Documentation of parts and fluids acquired directly from vendors by mechanics.**
- **Shop purchase orders.**
- **Stock issue requests.**

### Source:
UDOT, Dye Management Group, Inc. analysis
a. **Administration and Management**

This business area provides overall direction to Equipment Operations Division and performs general administrative services including policies and procedures for managing fleet equipment, managing assets, preparing budgets, funding operations, managing facilities, and providing data processing support. Some of the processes in this business area are conducted with the assistance of organizations outside Equipment Operations Division, such as the UDOT Comptroller, the Division of Facilities and Construction Management (DFCM), and the DAS State Fleet.

b. **Acquisition, Utilization, and Replacement**

This business area includes the work activities necessary to develop equipment specifications, acquire and outfit new and replacement equipment, as well as make equipment assignments, train equipment mechanics, monitor equipment utilization, and dispose of equipment. Some of the processes in this business area are conducted with the assistance of organizations outside Equipment Operations Division, such as UDOT Procurement Services, DAS Purchasing, DAS State Fleet, and DAS Division of Surplus Property.

c. **Maintenance and Repair**

The maintenance and repair business area includes the performance of equipment preventative maintenance, inspections, and repairs, as well as quick fix, road call, towing, and field services. This business area initiates and processes warranty claims and manages maintenance and repair outsourcing. Some of the processes in this business area are conducted in conjunction with persons and organizations outside Equipment Operations Division, such as individual equipment operators and various maintenance and repair vendors.

d. **Parts Procurement and Supply**

This business area includes the processes necessary to acquire replacement parts for equipment, manage the parts inventory, and distribute the parts as needed. Many of the processes in this business area are conducted in conjunction with organizations outside Equipment Operations Division, such as UDOT Procurement Services and various parts vendors.
C. Business Objectives and Business Model

Issue Addressed: What are the goals and the mission of the Equipment Operations Division?

1. Business Objectives – Findings

- There are no department-wide business objectives for fleet and equipment management.

The Equipment Operations Division has developed a mission statement that sets their overall business goals. However, at the department-wide level, UDOT has not set overall objectives.

Through a series of interviews and evaluation of documented policies and procedures, the Equipment Operations Division’s business objectives were defined and validated, with UDOT managers, as part of the audit analysis. These business objectives are shown in Exhibit II-7.

Exhibit II-7: Equipment Operations Division Business Objectives

<table>
<thead>
<tr>
<th>Business Areas:</th>
<th>Administration and Management</th>
<th>Acquisition, Utilization, and Replacement</th>
<th>Maintenance and Repair</th>
<th>Parts Procurement and Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Business Objectives:</td>
<td>Maximize efficient and effective use of resources.</td>
<td>Provide quality equipment.</td>
<td>Perform quality repairs.</td>
<td>Achieve quick turnaround.</td>
</tr>
<tr>
<td></td>
<td>Manage staff resources to meet Division and Department-level performance goals.</td>
<td>Achieve best value for price.</td>
<td>Maintain low maintenance costs.</td>
<td>Supply quality parts.</td>
</tr>
<tr>
<td></td>
<td>Apply known best management practices.</td>
<td>Maintain state-of-the-art knowledge.</td>
<td>Provide superior customer service.</td>
<td>Seek best parts pricing through vendor contracts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide superior customer service.</td>
<td>Minimize mechanic downtime and repair comebacks.</td>
<td>Maintain adequate and effective inventories.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supply the right equipment for the job.</td>
<td>Maximize warranty recoveries.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Optimize shop response time.</td>
<td></td>
</tr>
</tbody>
</table>

D. Overall Fleet Management Model and Practices

Issue Addressed: How efficient and effective are UDOT’s overall management, business model, and practices?

Each of the business areas presented in Exhibit II-6 is addressed respectively in the following major sections of this report. At the overall management level, an important issue for UDOT senior management is whether UDOT’s current fleet and equipment
management model enables the agency to accomplish its overall business objectives. The overall business objectives for fleet and Equipment Operations Division are:

- Maximize efficient and effective use of resources.
- Manage staff resources to meet Division and Department-level performance goals.
- Apply known best management practices.

1. Overall Management Model – Findings

- The efficiency and effectiveness of UDOT’s overall fleet management business model are constrained by the current requirements and practices governing equipment acquisition, management, and replacement.

  Within the constraints of the current business model, the audit finds that, in general, Equipment Operations Division activities are well managed. There are a number of significant barriers to improving the efficiency and effectiveness of fleet management at UDOT that arise from the current management model. These barriers arise as a consequence of the low-bid procurement model and the infrequent equipment replacement.

  The Equipment Operations Division business activities, as detailed in Exhibits II-6 and II-7, are constrained by the current statutory requirements of the low-bid process and the historical approach that has been taken to vehicle replacement. Vehicle replacement practices have in turn been impacted by the availability of funds for vehicle replacement.

- Low-bid acquisition requirements only consider initial price and create a non-standard fleet.

  The current acquisition process does not allow consideration of lifecycle operating and maintenance costs, salvage value, and disposal costs. It also does not allow for standardization.

- Little or no lifecycle management.

  Low-bid procurement in conjunction with fiscal constraints and a policy that has focused on replacing equipment at the end of the useful service life, tends to increase the maintenance work that is required. This approach does not place management emphasis on lifecycle cost considerations.

- Maintenance costs are increased due to procurement and replacement requirements and practices.

  The overall management and performance of all types of maintenance is more costly with non-standard equipment. The procurement process does not allow maintainability to be considered as part of the price. Maintenance costs are only considered when repairs are required.
• **Limited cost recognition for equipment use.**

  Until UDOT’s move towards a dual rate charge-back structure there has been limited vehicle-specific cost recognition.

  Overall findings regarding the current model for vehicle and equipment lifecycle management are shown in Exhibits II-8 and II-9 on the following pages.
Exhibit II-8: UDOT’s Current Model for Vehicle and Equipment Management

- **Low-Bid Procurement and Infrequent Replacement Strategy**
  - Equipment downtime
  - Low salvage from equipment at disposal
  - 9% of salvage price retained by Surplus Property

- **Internal Outfitting**
  - More training required for non-standard equipment

- **Internal Maintenance**
  - Preventive, warranty management, repairs
  - Central Shops
    - Major maintenance
    - More maintenance expenses as equipment ages
    - More training required for non-standard equipment
  - More maintenance expenses as equipment ages

- **Parts Management**
  - Procurement, inventory, distribution and warranty management
  - Negative impacts on parts from lack of standardization
  - Keeping equipment longer requires more parts
  - Increased downtime due to poor MIS.

- **Training**
Exhibit II-9: Findings Regarding Overall Management Model

**Acquisition and Replacement**
Procurement of equipment through a low-bid system – little consideration of factors beyond initial purchase price.
Equipment replaced when it has reached the end of its useful life.

**Disposal**
At end of useful life, sent to the Division of Administrative Services for auction.
Disposal value is low.

**Cost Recognition**
Partially self-supporting charge-back system that recovers indirect and direct costs, but does not fully fund acquisition.
Poor linkages between user behavior and costs of equipment usage.

**Maintenance**
Little consideration of maintenance expenses until equipment needs maintenance.
Low bid system means many different brands of equipment, some requiring greater maintenance and training expenses.
Keeping equipment throughout its entire useful life means heavier and more expensive types of maintenance as the equipment ages.

**Parts Management**
Little consideration of parts expenses until parts needed.
Low bid system means many brands of equipment, requiring greater parts and training expenses.
Keeping equipment throughout its entire useful life requires greater and more expensive parts.
2. Overall Fleet Management Model – Recommendations

Recommendation II-1: Establish department-wide business objectives and statewide accountability structure for fleet and equipment management.

Vehicles and equipment are managed, maintained and used department-wide. The intent of this recommendation is for UDOT senior management to establish business objectives to guide the overall management of fleet and equipment operations. The recommendation involves specifying the statewide accountability structure and responsibilities for accomplishing department-wide objectives.

Recommendation II-2: Transition to a lifecycle management approach for the procurement and management of UDOT’s fleet through:

- Establishing the capability for and undertaking approaches to equipment procurement that addresses lifecycle costs.
- Undertaking lifecycle management across the Equipment Operations Division’s business areas.
- Developing an equipment business management function in the regions.
- Moving toward true cost recognition in the management and use of equipment.

The overall thrust of these recommendations and the key components of the recommended fleet and equipment management model are shown in Exhibit II-10 on the following page. The intent of the recommendation is to establish an approach to equipment procurement and management that considers the relationships between all the business functions currently performed by the Equipment Operations Division.

These management recommendations are based upon the findings from this audit that the broader consideration of lifecycle costs, from acquisition, maintenance and repair, and disposal, to the equipment evaluation period, will provide fleet managers with the opportunity to make better equipment selections, as well as provide effective management of capital assets.
Exhibit II-10: Recommended Fleet and Equipment Management Model

**Acquisition and Replacement**
Procurement of equipment through a variety of methods aimed at reducing lifecycle costs.
Equipment replacement strategy follows the lifecycle cost formula, which considers expected future operating and repair costs and disposal value.

**Cost Recognition**
Charge-back system recovers all fleet costs.
Depreciation rate fully funds capital replacement.
Clear linkages between user behavior and costs of equipment usage.

**Maintenance**
Maintenance expenses are considered before acquisition and throughout the equipment life.
Majority of maintenance expenses are preventative maintenance and warranty work.
When maintenance expenses are expected to become heavy, feedback from maintenance helps to plan equipment replacement.

**Disposal**
Disposal value is considered before acquisition and throughout the equipment life.
Disposal value helps drive replacement decisions.
Some equipment is disposed when value is high, other equipment is kept until the end of its useful life.

**Parts Management**
Parts management is considered before acquisition and throughout the equipment life.
Most required parts are expected and kept in inventory or easily available from vendors.
Parts management helps to plan equipment replacement.
III. Administration and Management

This section presents the audit results that address Equipment Operations Division administration and management, focusing on its efficiency and effectiveness in managing the resources supporting vehicle and equipment management.

A. Background

The administration and management business area of the Equipment Operations Division provides overall direction and performs general administrative services including establishing policies and procedures, asset management, budget preparation, operations and equipment funding, facilities management, information systems support, and staff management. The Equipment Operations Division conducts some of these business processes in conjunction with other entities within UDOT, as well as the State, including: the UDOT Comptroller’s Office, and the DAS Division of Facilities Construction and Maintenance, and the State Fleet data processing staff.

The processes within administration and management include:

- **Policies/Procedures and Administration.**
  Equipment Operations Division is responsible for developing statewide guidelines for acquisition, operation, maintenance, repair, replacement, and disposal of equipment within UDOT. These guidelines are developed by the Equipment Operations Division Manager, Shop Supervisors, the Equipment Advisory Committee, and the Equipment Management Committee. Equipment Specialists develop specifications, based on product data and research, availability, and operator requirements and needs.

- **Asset Management.**
  Asset management includes assessing every aspect of the equipment lifecycle from acquisition to disposal. Activities include managing where equipment is used, how much is equipment used, and how much the equipment costs to operate. Asset management is the responsibility of the Equipment Operations Division Manager, the Equipment Advisory Committee, and the Equipment Management Committee.

- **Prepare Budgets.**
  Appropriated revenue for the purchase of UDOT equipment comes from three sources: the General Fund, the Transportation Fund, and dedicated credits. The Equipment Operations Division Manager, in cooperation with the UDOT Comptroller’s Office, prepares UDOT’s equipment purchase work program for each fiscal year. The General Fund provides around $240,000 for communication equipment to be installed in other
agency vehicles. The UDOT Comptroller’s Office determines how much will be provided by the Transportation Fund, and the remainder must come from dedicated credits, received from the sale of surplus equipment. The amount of dollars for each region/districts portion of the acquisition budget is based on the distribution of equipment within each region and district.

- **Fund Operations.**

Operations are funded through a charge-back rental system in which the Division charges an hourly rental rate for equipment use. The Equipment Operations Division Manager works in cooperation with the UDOT Comptroller’s Office to determine operations funding. Equipment Operations Division is in the process of implementing a dual-rate structure for recovering vehicle operating costs from users.

- **Fund New and Replacement Equipment.**

The Equipment Operations Division Manager, in cooperation with UDOT’s Comptroller’s Office, each year determines the total funds available for equipment acquisition, in the Capital Budget. These funds come from vehicle usage rate changes, prior year carryover, and the Transportation Fund. Planning for replacement is based on age, utilization of vehicles, and region/district need. Replacement is generally “in-kind”; additions to the fleet must be justified and require region director sign-off before acquisition. The Fleet Equipment Replacement Work Program is reviewed and approved by the Equipment Management Committee prior to commitment to acquire new equipment.

- **Facilities Management.**

Equipment Operations Division oversees administrative offices, motor pool services, and major fleet repair facilities. The Division coordinates the management of these facilities with the DAS Division of Facilities Construction and Management and UDOT Maintenance.

- **Provide Information Systems Services.**

Equipment Operations Division utilizes several separate information systems to support maintenance and management of UDOT’s fleet. The primary system used for fleet management is the Computerized Automotive Resource System (CARS), a commercially available fleet management software tool developed by Peregrine Systems under the name FleetAnywhere, adapted for use by State Fleet. UDOT is mandated by law to use CARS. UDOT’s equipment is managed as an add-on feature to CARS.

The Financial Information Network (FINET) is a mainframe system that tracks financial and accounting information on inventory, labor, parts fuel, and fluids. The Gascard collects information on fuel purchases made, and the P-Card assists in procurement of parts by shop supervisors.
B. Resource Allocation and Staffing

Issue Addressed: Is the function well managed, and are the right resources available where and when they are needed?

1. Findings

- **Equipment Operations Division’s resources are adequately distributed to meet requirements, and are in line with comparable state departments of transportation.**

An issue evaluated in the audit is determining whether the Equipment Operations Division has appropriately distributed resources to meet UDOT requirements. In order to address this issue, the level and distribution of Equipment Operations Division staff and equipment resources were analyzed and compared to benchmark states.

The business model for the Equipment Operations Division consists of four separate distinct areas of business. Administration and management is the oversight function. Equipment acquisition and operation is the major functional area that involves obtaining and identifying rental expenses for equipment. Equipment maintenance and repair, and internal parts procurement functions are primarily performed in the regions and districts, where maintenance and repair takes place. The following points illustrate that Equipment Operations Division’s resources are adequately distributed to meet requirements:

- **The Equipment Operations Division manages and administers vehicle and equipment acquisition and maintenance support activities throughout Utah.**

Equipment Operations Division provides high quality customer service for equipment management. Region and district staff relies extensively on Equipment Operations Division equipment specialists for specification development and replacement planning and budgeting.

The distribution of regional and district equipment, and personnel is presented in Exhibit III-1 on the following page.
Exhibit III-1: UDOT Regional and District Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
<th>Region 4</th>
<th>UDOT-wide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lane-miles</td>
<td>2,660</td>
<td>3,291</td>
<td>2,585</td>
<td>2,340</td>
<td>2,561</td>
</tr>
<tr>
<td>Equipment Operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division Mechanics</td>
<td>9</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Vehicles*</td>
<td>233</td>
<td>319</td>
<td>216</td>
<td>153</td>
<td>153</td>
</tr>
<tr>
<td>Vehicles per Mechanic</td>
<td>26</td>
<td>46</td>
<td>27</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Lane-miles per vehicle</td>
<td>11</td>
<td>10</td>
<td>8</td>
<td>15</td>
<td>17</td>
</tr>
</tbody>
</table>

Source: UDOT; Dye Management Group, Inc. analysis.
Note(*): Common vehicles used by Maintenance Division (i.e., Sedans, Pickups, Medium-Duty Trucks, and 10-Wheelers).

The exhibit indicates mechanics in Regions 1, 2, and 3 are responsible for maintaining more vehicles than their counterparts in Region 4. However, the exhibit also shows that Region 4 vehicles must cover more territory. Further analysis reveals that Region 4 vehicles have higher average utilization for the same vehicle types. This is an indicator that the Region 4 equipment are subject to greater utilization, and therefore require increased levels of maintenance, compared to Region 1, 2, and 3 vehicles.

UDOT’s overall staffing levels are in line with benchmark state departments of transportation.

Exhibit III-2 presents data from the Western States fleet manager’s survey. Comparing UDOT fleet management activities to other western state DOTs shows UDOT’s mechanics to vehicles ratio is slightly higher than that of other states. However, the number of staff classified in supervisory positions is lower than the overall average.
Exhibit III-2: Ratio of Vehicles and Equipment to Fleet Management Staff for 11 Western States (Year 2000 data)

<table>
<thead>
<tr>
<th>State</th>
<th>Maintenance Technicians</th>
<th>Supervisors</th>
<th>Parts Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ</td>
<td>120 to 1</td>
<td>17 to 1</td>
<td>22 to 1</td>
</tr>
<tr>
<td>CA</td>
<td>30 to 1</td>
<td>317 to 1</td>
<td>138 to 1</td>
</tr>
<tr>
<td>CO</td>
<td>36 to 1</td>
<td>267 to 1</td>
<td>133 to 1</td>
</tr>
<tr>
<td>ID</td>
<td>69 to 1</td>
<td>470 to 1</td>
<td>N/A</td>
</tr>
<tr>
<td>MT</td>
<td>55 to 1</td>
<td>341 to 1</td>
<td>341 to 1</td>
</tr>
<tr>
<td>NM</td>
<td>81 to 1</td>
<td>167 to 1</td>
<td>148 to 1</td>
</tr>
<tr>
<td>NV</td>
<td>63 to 1</td>
<td>N/A</td>
<td>7 to 1</td>
</tr>
<tr>
<td>OR</td>
<td>82 to 1</td>
<td>62 to 1</td>
<td>63 to 1</td>
</tr>
<tr>
<td>WA</td>
<td>28 to 1</td>
<td>312 to 1</td>
<td>312 to 1</td>
</tr>
<tr>
<td>WY</td>
<td>30 to 1</td>
<td>100 to 1</td>
<td>3000 to 1</td>
</tr>
<tr>
<td>UT</td>
<td>51 to 1</td>
<td>306 to 1</td>
<td>N/A*</td>
</tr>
<tr>
<td>Avg:</td>
<td>59 to 1</td>
<td>236 to 1</td>
<td>463 to 1</td>
</tr>
<tr>
<td>Med.</td>
<td>55 to 1</td>
<td>287 to 1</td>
<td>138 to 1</td>
</tr>
</tbody>
</table>

Source: UDOT, Western State Equipment Managers Survey, Dye Management Group, Inc. analysis

Note(*): UDOT Parts staff are located in the Procurement Division.

- Overall, the size of UDOT’s fleet (standardized for lane miles) is close to the average across benchmark states.

Overall, the allotment of UDOT’s vehicles and equipment compares to that of other western states. Exhibit III-3 shows that vehicle responsibility, in terms of lane-miles to cover, is slightly higher in Utah than in other western states. For heavy-duty equipment, UDOT’s equipment has slightly less lane-mile responsibility than those of other western states.
Exhibit III-3: Relative Responsibilities of Vehicle and Equipment for 10 Western States (Year 2000 data)

<table>
<thead>
<tr>
<th>State</th>
<th>Vehicles*</th>
<th>Equipment**</th>
<th>Lane-miles of Roadway</th>
<th>Lane-miles per Vehicle</th>
<th>Lane-miles per Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ</td>
<td>2,011</td>
<td>827</td>
<td>17,415</td>
<td>8.7</td>
<td>21.1</td>
</tr>
<tr>
<td>CO</td>
<td>557</td>
<td>1,788</td>
<td>28,000</td>
<td>50.3</td>
<td>15.7</td>
</tr>
<tr>
<td>ID</td>
<td>1,192</td>
<td>605</td>
<td>11,800</td>
<td>9.9</td>
<td>19.5</td>
</tr>
<tr>
<td>MT</td>
<td>859</td>
<td>1,366</td>
<td>25,000</td>
<td>29.1</td>
<td>18.3</td>
</tr>
<tr>
<td>NM</td>
<td>862</td>
<td>1,003</td>
<td>13,320</td>
<td>15.5</td>
<td>13.3</td>
</tr>
<tr>
<td>NV</td>
<td>2,067</td>
<td>1,065</td>
<td>31,135</td>
<td>15.1</td>
<td>29.2</td>
</tr>
<tr>
<td>OR</td>
<td>1,485</td>
<td>1,070</td>
<td>18,245</td>
<td>12.3</td>
<td>17.1</td>
</tr>
<tr>
<td>WA</td>
<td>1,744</td>
<td>1,178</td>
<td>17,975</td>
<td>10.3</td>
<td>15.3</td>
</tr>
<tr>
<td>WY</td>
<td>1,088</td>
<td>525</td>
<td>16,460</td>
<td>15.1</td>
<td>31.4</td>
</tr>
<tr>
<td>UT</td>
<td>950</td>
<td>985</td>
<td>16,000</td>
<td>16.8</td>
<td>16.2</td>
</tr>
<tr>
<td>Total</td>
<td>12,815</td>
<td>10,412</td>
<td>195,350</td>
<td>15.2</td>
<td>18.8</td>
</tr>
</tbody>
</table>

Note(*): Vehicles includes sedans, vans, light trucks, and medium-duty trucks.
Note(**): Adjusted to only include heavy-duty trucks, backhoes, loaders, bulldozers, graders, tractors, and trailers.

It should be noted that geographic and environmental conditions have an effect on the level of lane-mile responsibility. For example, some states, such as Utah, place great importance on maintaining clear roads during the winter.

- **Regional allocation of resources is based on distribution of equipment.**

The audit did not evaluate whether the existing fleet adequately meets UDOT’s business needs. In general, equipment needs will depend on the maintenance level of service. They will be addressed as part of a different audit. This audit evaluated how effectively the current fleet is managed.

UDOT’s vehicle procurement process involves regional staff developing a list of requirements, based on each region’s available budget. Requirements are identified through maintenance plans (maintenance activities, snowplowing requirements, etc.) and discussions between Equipment Operations Division and UDOT staff in each region. Exhibit III-4 illustrates the distribution and responsibility (in lane-miles of roadway) of commonly used vehicles in each UDOT region.
## Exhibit III-4: Geographic Distribution and Lane-miles of Responsibility for Selected Vehicles

<table>
<thead>
<tr>
<th></th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
<th>Region 4</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Richfield</td>
<td>Price</td>
<td>Cedar City</td>
</tr>
<tr>
<td>Inventory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Sedans</td>
<td>22</td>
<td>34</td>
<td>84</td>
<td>10</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>- Pickup Trucks</td>
<td>93</td>
<td>151</td>
<td>84</td>
<td>59</td>
<td>55</td>
<td>51</td>
</tr>
<tr>
<td>- Med.-Duty Trucks</td>
<td>40</td>
<td>42</td>
<td>30</td>
<td>23</td>
<td>25</td>
<td>22</td>
</tr>
<tr>
<td>- 10 Wheelers</td>
<td>78</td>
<td>92</td>
<td>82</td>
<td>62</td>
<td>61</td>
<td>58</td>
</tr>
<tr>
<td>Lane-miles</td>
<td>2,660</td>
<td>3,291</td>
<td>2,585</td>
<td>2,340</td>
<td>2,561</td>
<td>2,425</td>
</tr>
<tr>
<td>Lane-miles per Vehicle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Sedans</td>
<td>121</td>
<td>97</td>
<td>129</td>
<td>234</td>
<td>197</td>
<td>173</td>
</tr>
<tr>
<td>- Pickup Trucks</td>
<td>29</td>
<td>22</td>
<td>31</td>
<td>40</td>
<td>47</td>
<td>48</td>
</tr>
<tr>
<td>- Med.-Duty Trucks</td>
<td>67</td>
<td>78</td>
<td>86</td>
<td>103</td>
<td>104</td>
<td>112</td>
</tr>
<tr>
<td>- 10 Wheelers</td>
<td>34</td>
<td>36</td>
<td>32</td>
<td>38</td>
<td>42</td>
<td>42</td>
</tr>
</tbody>
</table>

Source: UDOT, Dye Management Group, Inc. analysis

Note: Vehicles assigned to Region 4 Headquarters are distributed to the three Districts.

The exhibit illustrates that the distribution of equipment is not even across all the regions and districts. This is primarily due to the geographic conditions and operator requirements. For example, Regions 2 and 3, with large urban areas utilize more sedans to support maintenance and construction activities. Region 4 is much more vast and primarily rural and mountainous; the preference in Region 4 would be with four-wheel drives and other heavy-duty vehicles. The exhibit shows with fewer pickups in Region 4, those that are located in that region will be utilized more (average more miles in the same period) and need higher levels of maintenance or replacement, than the counterparts in Regions 1, 2, and 3.
C. Organization

Issues Addressed:

Is the organization of the Equipment Operations Division appropriate to address its function?

What is the reporting structure and management accountability for costs?

1. Findings

- The Equipment Operations Division has limited control over factors related to lifecycle management of equipment.

Overall, the organization of the Equipment Operations Division is effective for performing the business activities detailed in Section II. However, the major opportunity area for improvement arises from the general finding that once the equipment is delivered to the regions, the Equipment Operations Division has limited control over the equipment and is not involved directly in the lifecycle management.

- The Equipment Operations Division lacks control over preventive maintenance, region/district non-preventive maintenance activities, and other activities undertaken by Maintenance staff.

Utah and Arizona are unique in that vehicle operators (Maintenance personnel) are responsible for several preventive maintenance tasks and minor repairs to equipment. Maintenance charges all costs for this work back to the Equipment Operations Division budget. The time expended by operators is charged to Equipment Operations Division, but is performed and supervised by Maintenance Division staff, without review or approval by Equipment Operations Division. It is not clear as to what level operators can perform repairs, and some problems have been noted. For example, excessive costs have occurred when maintenance has been completed on equipment (e.g., $3,500 of welding was performed on a $1,500 trailer). In addition, there is potential for operators to charge time to preventive maintenance when they have downtime, because it helps their overall budget.

- The Equipment Operations Division sets regional/district vehicle and equipment budgets for staff time; however, local Maintenance managers supervise Equipment Operations Division staff.

Equipment Operations Division identifies the budget for shop and equipment repairs and modifications. The budget is based on the amount of equipment in the district, on historical needs, and on the Snow Plan. Area maintenance managers supervise the mechanic staff in the regions and districts, including performance plans. Consequently, Equipment Operations Division has little or no control over
operation and maintenance expenditures and can do nothing to affect productivity.

- **Some states have decentralized fleet and Equipment Operations Division and have regional equipment managers.**

Once turned over to the regions and districts, the vehicles effectively become their responsibility. The Equipment Operations Division maintains equipment with an operating budget, but does not provide lifecycle management of the equipment, ensuring they are properly maintained. The operation budget essentially returns the rental monies to the region/district for operating the equipment.

### D. Central Shops

**Issue Addressed: Is Central Shops needed?**

An issue raised by UDOT senior management dealt with determining the appropriate role of the Central Shop complex. Utah’s centralization of light-duty vehicle acquisition and management with the State Fleet has reduced Central Shops work.

1. **Findings**

- **Overall, the Central Shop complex is playing a decreasing role in statewide maintenance.**

The role of Central Shops is changing. State Fleet responsibility for light-duty vehicles has eliminated the need for the Auto Shop (although this may change if UDOT takes over maintenance and repair of State Fleet vehicles). Some 60 percent of the work performed at Central Shops is for Region 2. The primary work now performed is major repair and customization or outfitting. This work will likely decrease with the younger fleet of “10-wheelers” and any reductions in outfitting through use of alternative procurement strategies recommended in this audit. The opportunity to use the Auto Shop facility as a Region 2 mechanical shop was a good decision. Region 2’s previous space was inadequate for efficient and effective maintenance activities.

- **According to the UDOT Fleet Manager, 50 to 60 percent of the work performed at Central Shops is in support of Region 2.**

This finding can be strengthened by further analysis of Central Shops work order hours billed by region/district to which equipment is assigned. Issues with Equipment Operation’s information systems have prevented such analysis at time of writing.
- **Long repair turnaround times due to distance and other factors reduce demand for Central Shops.**

  In interviews, staff at regions and districts outside of Region 2 have stated that, unless the piece of equipment can be withdrawn from service for a long period of time, their preference is to complete repairs in the region/district instead of sending it to Central Shops. Long turnaround times for Central Shops repairs are noted as the reason for the preference toward local repair.

- **The recommended transition to lifecycle management will further change the Central Shops statewide functions and reduce staffing needs.**

  Exhibit III-5 describes the current staffing allocation and functions performed by Central Shops. The likely impact on the work performed by implementing a lifecycle management approach is described.

### Exhibit III-5: Central Shops Staffing By Function

<table>
<thead>
<tr>
<th>Central Shops Functions</th>
<th>Allocated Staffing</th>
<th>Current Management Approach</th>
<th>Lifecycle Management Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck Shop (7 FTEs)</td>
<td></td>
<td>• Performs statewide heavy mechanical work - primarily on 10-wheeled trucks.</td>
<td>• Requirement for heavy mechanical work reduced with younger fleet and alternate procurement and maintenance practices (such as leasing, purchase/buy-back and vendor maintenance contracts).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Some Region 2 support requirement likely remains for minor to medium repair work beyond that which can be handled by Region 2 roving mechanics currently located at Central Shops.</td>
</tr>
<tr>
<td>Heavy Duty Shop (8 FTEs)</td>
<td></td>
<td>• Performs statewide heavy mechanical work on heavy equipment (such as loaders, bulldozers, graders, etc.) and specialty equipment (such as pavers, sweepers, stripers, etc.).</td>
<td>• Requirement for heavy mechanical work reduced with younger equipment and alternate procurement and maintenance practices (such as renting, leasing, purchase/buy-back and vendor maintenance contracts).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Where cost effective, required heavy repair work for regions/districts can be outsourced to vendors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Statewide capability for managing and performing heavy mechanical work on specialty equipment (such as pavers, sweepers, stripers, etc.) where vendor support is not adequate.</td>
</tr>
<tr>
<td>Weld Shop (10 FTEs)</td>
<td></td>
<td>• Performs welding, fabrication, and machine shop function.</td>
<td>• Requirement for heavy fabrication reduced with younger equipment and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

05011r12 kk.doc
170210-16.11
Utah Department of Transportation
Performance Audit Fleet and Equipment Management
Central Shops Functions

<table>
<thead>
<tr>
<th>Allocated Staffing</th>
<th>Current Management Approach</th>
<th>Lifecycle Management Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Installs snow plow hitches on 10-wheeled trucks and performs other outfitting such as truck box installation and modifications.</td>
<td>• Outsourcing of equipment outfitting.</td>
</tr>
<tr>
<td>Auto/Service (6 FTEs)</td>
<td>• Manages and provides limited preventive and light repair to the central motor pool.</td>
<td>• Some emergency welding capability likely required to support Region 2.</td>
</tr>
<tr>
<td>Prep Shop (2 FTEs)</td>
<td>• Performs vehicle inspection, outfitting and preparation duties. • Outfitting includes light bars, distance meters, tool boxes, etc.</td>
<td>• Function remains and responsibility may increase if UDOT assumes management and maintenance responsibility for State Fleet vehicles. • Outfitting requirement may be reduced with vendor outfitting of vehicles and equipment. • Inspection and preparation for service function remains.</td>
</tr>
</tbody>
</table>

- **Other western states have decentralized equipment maintenance activities.**
  
  Due to their expanse, many western states have pushed complex maintenance activities out into regional area. For example, Oregon Department of Transportation has instituted highly decentralized equipment maintenance practices and has shifted all mechanics into roving positions. UDOT has applied this method to some extent, with roving mechanics working out of some shops, while other mechanics are based only at the shops.

E. **Management Information**

**Issues Addressed:** A number of overall management issues are addressed.

1. **Findings**

- **Several drawbacks exist with Equipment Operations Division information technology and support.**

  An overall management issue relates to the effectiveness of the current information technology systems used by the Equipment Operations Division. Specifically, are there redundancies in information systems and/or opportunities to use technology more effectively.

  Operational drawbacks exist with the current information technology used by Equipment Operations Division:
- **CARS is not integrated with UDOT’s financial management system.**
  CARS is used to manage details of equipment management, including maintenance work, while the financial information management system, FINET, is used for managing payroll. Some areas of these systems should be integrated. For example, purchase orders must be documented and entered into both systems. In addition, timekeeping procedures and data are not fully integrated. Duplicate entry takes time and provides opportunity for error. Mechanics in some regions reported that they spend one hour per day recording time and tasks, reducing mechanics’ overall direct utilization.

- **Legacy equipment data was not captured when CARS was implemented.**
  Before CARS, UDOT used the mainframe-based Equipment Management System (EMS) to track equipment. Vehicle history data was not transferred from EMS to CARS. For example, some vehicle repair histories are only available on hard copy in file cabinets. Also, some data provided by State Fleet to UDOT for CARS is incorrect, such as vehicle number codes and locations.

- **Some CARS functions are not fully utilized by UDOT staff.**
  For example, system capabilities, such as managing warranties, parts, warehousing, and timekeeping are not used to the extent possible. CARS does not adequately manage preventive maintenance data, because operators perform most preventive maintenance work, and the detailed maintenance data for individual equipment is only kept in UDOT’s Maintenance Management System (MMS), not CARS. MMS only provides aggregate maintenance data to CARS. In addition, the warranty information is not always completed or updated within the CARS.

- **Maintenance and repair activities are not accurately documented.**
  Examination of CARS and discussions with field mechanics indicate that CARS does not reflect the true state of some equipment maintenance and repair activities. Some task codes for heavy-duty work are not in the system. In addition, task codes may be too general or too specific, but do not describe tasks accurately. Mechanics use the “miscellaneous” work code when there is no suitable code to describe what work they performed on a vehicle.

- **Measuring vehicle and equipment performance provides a means of controlling costs.**
  Organizations maintaining fleets of vehicles and equipment are turning to more sophisticated tools to monitor equipment wear and tear, as well as productivity. The Arizona Department of Transportation (ADOT) is examining Mack Truck’s INFOMAX software, which measures 50 highway
operating and driving parameters (e.g., engine over-speed occurrences, hard braking, max road speed, fuel consumption, etc.). However, despite this analysis, ADOT considers that the best way to control equipment costs are through operator training, involvement, and monitoring. California and New Mexico are completing similar studies and analyses.
F. Staffing and Human Resource Management

Issue Addressed: Crosscutting overall management issues.

1. Findings

- Average pay rates for the Equipment Operations Division staff are comparable to other western state DOTs.

UDOT mechanic pay rates are within the range of pay for similar positions at other western state DOTs. Exhibit III-6 presents the relative range for selected job categories.

### Exhibit III-6: Comparison in Wages for Select Job Categories, FY2000 ($millions)

<table>
<thead>
<tr>
<th>Job Category</th>
<th>Utah Low</th>
<th>Utah High</th>
<th>Western State Average Low</th>
<th>Western State Average High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journeyman Machinist</td>
<td>$12.37</td>
<td>$15.80</td>
<td>$14.53</td>
<td>$17.67</td>
</tr>
<tr>
<td>Journeyman Mechanic</td>
<td>$12.04</td>
<td>$17.61</td>
<td>$12.26</td>
<td>$16.28</td>
</tr>
<tr>
<td>Journeyman Welder</td>
<td>$12.37</td>
<td>$15.80</td>
<td>$13.08</td>
<td>$17.71</td>
</tr>
<tr>
<td>Lead Mechanic</td>
<td>$12.71</td>
<td>$18.59</td>
<td>$13.59</td>
<td>$17.72</td>
</tr>
<tr>
<td>Shop Supervisor</td>
<td>$13.42</td>
<td>$19.63</td>
<td>$14.25</td>
<td>$20.41</td>
</tr>
</tbody>
</table>

*Source: UDOT, Dye Management Group, Inc. analysis*

The exhibit illustrates that UDOT pay rates are competitive with other states. A comparison with private sector pay-rates in Utah would be more effective in determining the gap between UDOT and industry norms. Interviews with Equipment Operations Division staff indicate that UDOT’s salary scale for entry and journeyman level mechanics is lower than the private sector. However, there are other benefits associated with UDOT employment. Interviewees reported that it is increasingly difficult for UDOT to compete against the private sector for mechanics; compared to private firms, pay is lower, and equipment, facilities, and tools are often outdated.

Two weaknesses associated with the pay rates for UDOT mechanics are presented.

- **UDOT mechanic pay raises are generally tied to legislative cost of living increases and rarely to merit.**

Pay raises are limited by legislative discretion, and do not occur with any regularity or predictability. Some of the mechanics have remained within the same step that they were hired. In addition, regional and district shops
have difficulty hiring journeyman-level staff because the starting pay range is low relative to private sector wages.

- **An aging workforce creates human resource management issues.**
  
  Many mechanics have been in the Department for 15 years or more. One danger of an aging workforce is the lack of knowledge and skills to handle problems associated with modern equipment. Unless addressed, this can result in lower productivity, less capability, and greater risk of injuries on the job. Another problem is the inability to pass on their skills and experience to apprentices before they retire. An organization without an established knowledge management program will have difficulty managing and solving the problems it faces in the future. Pennsylvania Department of Transportation reports that it is establishing a “knowledge management Web site” where the department will compile everything it knows about maintaining their equipment to share among its staff. Also, the Web site will have a chat function where counties can buy and sell equipment among themselves.

- **Four 10-hour workweeks are popular with staff, but can create coverage issues and increase overhead costs.**
  
  An issue identified during the course of this audit is the merit of 4×10 hour work schedules at maintenance facilities, even during slow periods, when an insufficient workload warranted having staff on duty for the entire shift.

  UDOT’s maintenance shops and the Equipment Operations Division repair shops work on two schedules, based on the time of year:

  - Four 10-hour days are the norm during slow periods and during the winter months.

  - Five 8-hour days are typical during the peak periods and during the summer.

  There are a number of disadvantages to UDOT from four 10-hour days. Overhead costs increase, due in part because lead mechanics end up acting as supervisors during some shifts. Also, during the slow periods, with 10-hour shifts, additional non-productive time is incurred by staff due to lack of work, while still fulfilling a 40-hour week. Management and development of staff schedules to cover the shops during the slow periods also takes time.

- **Mechanics feel that they would be more effective with training and updated tools and equipment.**
  
  Audit analysis included evaluation of the training, tools, and equipment afforded to mechanics. Workgroups with mechanics in the regions and districts provided insight into needs for training, tools and equipment. The following conclusions are drawn:
Skill-based certification exams for UDOT staff are not uniformly administered.

Vehicle operators can receive certification for skills and capabilities from the National Institute for Certification in Engineering Technologies (NICET). Successful completion of these exams is linked to pay increases. However, the Equipment Operations Division does not provide comparable pay linked training and certification to mechanics.

Mechanics do not receive sufficient training in the areas of electronics, hydraulics, brakes, electronics, and emissions.

Most training is completed on-the-job, and there is no documented training schedule for mechanics. Also, many mechanics cited that they received condensed vendor training on new equipment, and might get one day to cover five days worth of material. Mechanics universally felt that training in the areas of modern electronics, hydraulics, brakes, electronics, and emissions would be most useful in increasing job efficiency and effectiveness.

Most mechanics lack computer access and generally do not understand CARS or cost reports.

Generally shop supervisors and lead mechanics have access to computer terminals. In most cases mechanics do not have access to a common computer terminal. Mechanics do not see the outcome of their task reporting activities; they also lack understanding of the CARS system and cost reports. Also, because mechanics lack computer access, they generally cannot take advantage of timesaving CD-ROM repair and parts manuals.

The Department may be lagging in providing state of the art equipment for mechanics to perform their duties in a cost-effective manner.

At the Central Shops, as well as at many regional and district shop locations, much of the equipment is old and outdated. A significant amount of equipment has been purchased as surplus from other organizations and is in many cases more than 20 years old. For example, mechanics stated that there is a lack of state-of-the-art welding equipment (e.g., TIG welders and plasma burners). In addition, modern electronic engine diagnostic equipment is needed.

Best practices applied by other state DOTs include leveraged buying, salary and non-salary incentives for mechanics to receive training.

Training, for both mechanics and operators, is important both to extending vehicle and equipment life and to developing and maintaining a skilled workforce. However, many fleet managers reported that training expenses are the first item cut when budgets are tight.
The following best practices have been identified:

- New York State and Pennsylvania Departments of Transportation leverage their buying power and value as large customers to obtain free training from manufacturers.
- Many fleets require a certain number of operator and mechanic training in all bid specifications.
- Some state departments of transportation provide salary incentives to complete training. For example, South Carolina Department of Transportation provides a five percent salary increase to workers who receive a commercial driver’s license or a welding certificate. All training and certification costs are paid by the department. Pennsylvania Department of Transportation has two levels of equipment operator, based on the variety of equipment the operator is licensed to operate. There is an eight percent difference in salary between the two levels.
- Other DOTs provide non-monetary training incentives to complete training. The City of Decatur, Illinois is unable to provide salary incentives to workers who complete training courses. However, the city pays for training, certifications, and applicable college courses. The maintenance division also applied for and received the Automotive Service Excellence (ASE) Blue Seal of Excellence award, which means that at least 75 percent of the division’s mechanics are certified by ASE. The designation is a source of pride for the city workers.

- **Vehicle maintenance facilities may be improved in some areas.**

In the course of the audit, and in addition to reviewing the appropriate role of the Central Shop complex, site visits to maintenance shops in Regions 1, 2, 3, and Richfield, Price, and Cedar City provided an opportunity to view the conditions of those equipment maintenance facilities. The following observations are presented:

- **Some maintenance sheds lack sufficient space to repair and store trucks.**

Observations at repair facilities illustrated that in some cases, trucks are too large to fit within maintenance garage spaces, and are partially exposed to the elements while being repaired. This is especially the case at some older maintenance sheds.

- **Some shops have insufficient lifting capacity.**

A consequence of larger maintenance vehicles is a need for higher capacity cranes and winches in the shops to assist during repair activities. However,
nearly all Regional and District shops, and the Central Shop complex, do not have sufficient lifting capacity to properly maintain the equipment.

- Central Shops’ layout is not optimal.

While a thorough workflow analysis was not completed, examination of the layout of the Central Shop facilities indicates shop layout could be improved. Currently the Machine Shop personnel are located contiguous to the Prep Shop, away from the Fabrication/Weld Shop area. Noise and dirt filters between the shops, hampering work conditions. In addition, mechanics noted that a fresh coat of paint, as was applied to the walls in Region 1 shop facilities, would improve the working environment.

G. Recommendations

This section presents recommendations for improving fleet and equipment administration and management based on the audit findings in this business area.

Recommendation III-1: Establish a regional equipment business manager function, responsible for the lifecycle management of locally assigned equipment. Roles and responsibilities are to:

- Actively manage fleet and equipment once it is assigned to regions to provide maximum service to the region for the lowest possible cost.
- Manage the level of resources required in the region, including staff, vehicles, equipment, and facilities.
- Refine the roles and responsibilities of region mechanical staff.
- Evaluate and optimize the workload and schedule for maintenance shops.
- Work closely with Area Engineers and Maintenance Supervisors.

This recommendation will ensure the optimal mix, usage and maintenance of fleet and equipment based on a lifecycle management approach once the equipment is assigned to a region. Exhibit III-7 shows how the region fleet and equipment business management function optimizes key input to highway maintenance activities.
Exhibit III-7: Region Fleet Business Management Function

UDOT Maintenance Activities

Input

Fleet Size and Mix

Output

Maintenance Level of Service

Materials $ Input

Labor $ Input

Performance Audit Fleet and Equipment Management
Utah Department of Transportation

11-2010-16.11
050112 KE.doc
Recommendation III-2: Transition the functions and staffing of the Central Shops to support the requirements of a lifecycle management approach.

- As heavy-duty mechanical needs continue to decline with the recent introduction of a younger fleet, transition Central Shops away from a statewide heavy-duty function and toward a decentralized Region 2 support function.
- Maintain certain statewide capability to service specialized equipment as necessary.
- Ensure only cost effective outfitting is undertaken by UDOT.

This recommendation is transitional based on implementation of the recommended lifecycle management approach. Under this approach, it is expected that average fleet age will continue to be reduced and this, combined with alternate procurement approaches, may significantly reduce the needs for a statewide heavy-duty repair function. It is recommended that UDOT ultimately transition toward establishing the Central Shops as a Region 2 support function with perhaps minimal statewide specialty services provided.

In addition, the overall management recommendations will reduce the amount of outfitting work, further reducing demand for Central Shops services.

Recommendation III-3: Develop a working group to coordinate information systems and manage CARS enhancements and modifications suitable for UDOT needs.

- Eliminate wherever possible duplication between CARS (task, timekeeping and parts order reporting) and timekeeping and financial transaction reporting through other systems (payroll system, FINET, etc.).
- Utilize existing capabilities of CARS including parts management and warranty tracking.
- Ensure that maintenance and repair task codes for use with CARS accurately reflect actual tasks in the field.

This recommendation is intended to integrate existing information systems to reduce redundancies and to utilize CARS to its fullest potential to improve fleet and Equipment Operations Division, administration and management.

Recommendation III-4: Return to standard 5 x 8-hour workdays for mechanical staff given the inherent inefficiencies with 4 x 10-hour shifts.

The audit findings determined that there are no compelling reasons why UDOT should continue the use of 4x10 shifts for mechanical staff.
Recommendation III-5: Evaluate specific needs for career advancement, training, tools and computers for regional and district staff mechanics.

- Develop training and promotion criteria for career advancement.
- Develop a mentoring program for lead, journeyman, and apprentice mechanic staff.
- Encourage ASE certification of staff mechanics.
- Evaluate specific needs for tools and computers, and training for staff mechanics.
- Employ best practices from other states.

This recommendation is intended to address universal concerns amongst mechanical staff regarding a lack of career ladder, training, tools, and computer resources. There is significant opportunity to draw on best practices from other states.
IV. Equipment Acquisition, Utilization, and Replacement

This section presents an audit analysis of the Equipment Operations Division’s acquisition, utilization, and replacement practices. Recommendations to improve existing practices are included at the end of the section.

A. Background

This business area includes the work activities necessary to acquire and outfit new and replacement equipment, as well as make equipment assignments, monitor equipment utilization, and dispose of equipment. Some of the processes in this business area are conducted with the assistance of organizations outside Equipment Operations Division, such as UDOT Procurement Services, DAS Purchasing, DAS State Fleet, and DAS Division of Surplus Property.

The Department owns over 80 percent of the fleet and equipment it uses. The remaining 20 percent, which are mostly sedans and light-duty pickups, are leased from State Fleet. The backbone of the UDOT maintenance fleet consists of over 460 tandem axle trucks, commonly referred to as 10-wheelers. These vehicles provide the versatility needed to complete a variety of maintenance jobs.

Key processes in this business area include:

- **Develop equipment specifications.**

  Three Equipment Specialists within the Equipment Operations Division are responsible for developing specifications for equipment. Each specialist is assigned to one region and one district (in Region 4) and works collaboratively to develop specifications for new equipment. This work requires specialists to be familiar with current industry standards and costs. New specifications are based on previous specifications and new requirements established by the operators. Equipment Specialists attempt to balance the needs and requests from each region with the statewide need for standards.

- **Prioritize vehicle needs.**

  Equipment Specialists balance the needs of each region and district with the statewide need for fleet standardization, all within the constraints of budget limitations. Equipment Specialists work with the regions and districts to audit the current inventory of equipment. Using a cost and exception report as a basis, the need for replacement or new vehicles is identified. Region and District managers develop a
prioritized list of vehicles needing replacement, in accordance with the proposed budget.

- **Acquire and replace equipment.**
  Once equipment specifications are completed, UDOT completes a bid and proposal process, culminating in purchasing from the lowest bidder. State Fleet handles the purchasing process for light-duty vehicles. The final procurement process for UDOT-owned vehicles and equipment is completed through UDOT’s Procurement Division.

  Once the vehicles are purchased, they are transported to Equipment Operations Division for a quality control review to ensure compliance with specifications, necessary documentation, and in many cases modification before they are delivered to the regions and districts.

- **Equipment outfitting.**
  Outfitting consists of installing equipment specific to user requirements on vehicles that enables them to perform UDOT work. Outfitting may include heavy-duty tasks (such as installing plows or plow racks, truck boxes, etc.) completed by the Truck and Weld shops, or light-duty tasks, such as installing light bars, distance meters, and other small items on vehicles, completed by the Prep Shop.

- **Assign equipment and monitor utilization.**
  Once equipment is outfitted, it is assigned to a region or district. Equipment Operations Division maintains an inventory of the equipment and their locations. Equipment Operations Division utilizes its fleet management system, CARS, to monitor equipment use and repairs. CARS is managed and operated by the State Fleet.

- **Manage central motor and rental pools.**
  UDOT operates a short-term rental motor pool at its Salt Lake City headquarters complex. The pool includes sedans, pickups, and vans, as well as some 4x4 units. The Central Shops’ Service Station Supervisor handles dispatch and management of the Motor Pool, as well as a small shop and fuel station. Reservations are taken on a first-come, first-serve basis, but reservations can be made in advance. Vehicles are typically used to meet the needs of many of the administrative and support unit staff located at headquarters that do not have assigned vehicles.

- **Dispose of equipment.**
  Utah’s Division of Surplus Property handles the sale or auctioning of surplus equipment owned by the state. UDOT currently disposes of equipment at the end of its useful life. The Prep Shop removes any specialized UDOT equipment before auction or direct sale. A nine percent fee is charged by Surplus Property for equipment handling and auction services.
B. Equipment Acquisition

Issues Addressed:

What is the decision-making structure regarding type of unit? How are specifications determined?

What policy and procedures exist to determine vehicle allocation?

1. Findings

- The Equipment Operations Division has a systematic and effective approach for equipment acquisition.

As presented in the background section above, Equipment Operations Division maintains a systematic approach to vehicle acquisition. Employees in the regions reported that they continually receive good customer service in the development of specifications.

  - Vehicle operators are somewhat less involved in the acquisition process.

    Regional and district management generally feel the acquisition process is inclusive of regional and district needs; however, vehicle operators have stated that what equipment is needed versus what is acquired is not always determined appropriately. Efforts are being made on the part of Equipment Operations Division to increase user input to the acquisition process.

- UDOT lacks standardized policies and procedures for selection and assignment of State Fleet vehicles.

Although vehicle specifications are well formulated, there is no set standard by which State Fleet vehicles are assigned and outfitted according to function within the Department. The current process provides leeway in what options are available on vehicles and the assessment of type of vehicle. For example, some engineering project managers may be assigned sedans, while others receive pickups with significant upgrades (light bars, distance meters, etc.).

The selection sheet for State Fleet vehicles lists options and accessories available for new vehicles, including upgrade items such as light bar, toolbox, and distance meter. When the region/district equipment committee makes its selection, it is up to that committee to select and outfit the vehicle, often with user input on needs. The issue is that there is a lack of definition and uniformity in the type of vehicle and level of accessories and outfitting according to job function within the Department. For example, no set vehicle and corresponding level of options and outfitting is set out for job function such as construction project manager, surveyor, inspector, etc. This creates a variance in vehicles between staff and may also create public perception issues.
• State purchasing rules result in a specification-driven procurement process to select the low-bidder.

Purchasing requirements require UDOT to select the low-bid as long as all specifications are met. Following procurement and purchasing rules is complicated by the technical complexity of the specifications. Rarely do all responses meet all specification requirements, and those responses that do not meet specification are not immediately eliminated. In addition, Equipment Specialists feel the bid specification process is delayed by the Purchasing Agents from the Procurement Services. State Purchasing conducts an additional review of the specifications, but rarely makes any substantive changes, due to the technical nature of the specifications.

C. Equipment Replacement

Issue Addressed: How effective are current replacement strategies and planning?

1. Findings

• Fleet and equipment replacement has been constrained by acquisition funding levels.

While gains have been made in reducing the average age of the 10-wheeler fleet, more frequent fleet and equipment turnover is largely constrained by stagnant acquisition funding levels for the past several years. Supporting findings are presented below.

− Equipment Operations Division’s equipment acquisition funding has declined in real terms since 1997.

As presented in Exhibit IV-1, analysis of historical funding levels coupled with data on the existing fleet indicates that UDOT has not been sufficiently funded to replace equipment. While the State Fleet took over acquisition of light vehicles, UDOT’s Equipment purchasing budget has remained fairly stable. However, with the completion of current construction projects, equipment needed for maintenance will inevitably grow significantly.

### Exhibit IV-1: Equipment Acquisition Budget, FY1997 – 2001 ($ millions)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Acquisition Funding</td>
<td>$6.1</td>
<td>$7.1</td>
<td>$7.4</td>
<td>$7.9</td>
<td>$7.4</td>
</tr>
</tbody>
</table>
Equipment Operations Division has not been able to replace all the vehicles that have reached planned replacement life.

Exhibit IV-2 presents analysis on the replacement needs of some selected UDOT-owned vehicles and equipment.

**Exhibit IV-2: Current Replacement Costs for UDOT-Owned Equipment Fleet**

<table>
<thead>
<tr>
<th>Vehicles</th>
<th>Inventory</th>
<th>Number Past Replacement Criteria</th>
<th>Percent Past Replacement Criteria</th>
<th>Current Cost to Replace (SM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Wheelers</td>
<td>465</td>
<td>53</td>
<td>11.4%</td>
<td>$4.3</td>
</tr>
<tr>
<td>Backhoes</td>
<td>19</td>
<td>2</td>
<td>10.5%</td>
<td>$0.1</td>
</tr>
<tr>
<td>Graders</td>
<td>69</td>
<td>18</td>
<td>26.1%</td>
<td>$2.4</td>
</tr>
<tr>
<td>Heavy Trucks</td>
<td>11</td>
<td>5</td>
<td>45.5%</td>
<td>$0.3</td>
</tr>
<tr>
<td>Loaders</td>
<td>156</td>
<td>43</td>
<td>27.6%</td>
<td>$3.0</td>
</tr>
<tr>
<td>Med.-duty Trucks</td>
<td>92</td>
<td>23</td>
<td>25.0%</td>
<td>$1.4</td>
</tr>
<tr>
<td>Pickup Trucks*</td>
<td>36</td>
<td>30</td>
<td>83.3%</td>
<td>$1.7</td>
</tr>
<tr>
<td>Sedans*</td>
<td>12</td>
<td>12</td>
<td>100.0%</td>
<td>$0.3</td>
</tr>
<tr>
<td>Tractors</td>
<td>89</td>
<td>17</td>
<td>19.1%</td>
<td>$1.0</td>
</tr>
<tr>
<td>Trailers</td>
<td>263</td>
<td>58</td>
<td>22.1%</td>
<td>$2.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,212</strong></td>
<td><strong>261</strong></td>
<td><strong>21.5%</strong></td>
<td><strong>$17.0</strong></td>
</tr>
</tbody>
</table>

*Source: UDOT, Dye Management Group, Inc. analysis.

*Note(*): Could be replaced by leasing from State Fleet.

The exhibit shows that more than 1200 items are past their service life (in terms of UDOT-documented criteria of years of service). Over 10 percent of the current 10-wheeler fleet has exceeded the planned replacement period. In addition, there are sedans and pickup trucks that UDOT should have eliminated from the inventory and replaced with comparable vehicles leased through State Fleet.

**UDOT has made progress in reducing the age of the fleet.**

As shown in Exhibit IV-3 there has been a steady reduction in the age of 10-wheelers. This should reduce out-of-warranty maintenance work and costs.
Exhibit IV-3: Average Age of Selected Vehicles in UDOT Inventory, 1996 - 2000

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Wheelers</td>
<td>8.42</td>
<td>8.10</td>
<td>8.11</td>
<td>7.37</td>
<td>6.50</td>
</tr>
<tr>
<td>Passenger cars</td>
<td>4.30</td>
<td>3.88</td>
<td>3.39</td>
<td>2.94</td>
<td>3.10</td>
</tr>
<tr>
<td>Pickups</td>
<td>4.27</td>
<td>3.98</td>
<td>3.20</td>
<td>2.99</td>
<td>3.40</td>
</tr>
</tbody>
</table>

Source: UDOT

UDOT has been able to reduce the total value of the fleet requiring replacement.

Exhibit IV-4, below presents the comparison of the total value of inventory due for replacement between 1996 and 2001. The figure for 2001 includes all UDOT-owned vehicles and equipment, including miscellaneous and other equipment (e.g., nuclear gauges, theodolites, etc.).

Exhibit IV-4: Estimated Fleet Replacement Costs, Then Year Dollars in Millions


The exhibit illustrates that the total value of vehicles and equipment due for replacement has decreased by more than 48 percent over the last five years, from $52.0 million (quoted in a review of fleet operations), to almost $27.0
million calculated, based on replacement criteria and individual unit costs, provided by UDOT.

- New vehicle replacement criteria will be required as part of the move toward a lifecycle management approach.

Replacement criteria are used by most equipment managers, based on the durability and type of work performed. As UDOT moves to a lifecycle equipment management approach, new vehicle replacement criteria will need to be implemented. The criteria will likely be driven by average fleet age targets.

D. Lifecycle Management

Issue Addressed: How effective are current replacement strategies and planning?

1. Findings

- Opportunities exist for improving lifecycle cost management as part of equipment acquisition.

Improved lifecycle management addresses ways to reduce fleet and equipment costs over the entire life of equipment. This will reduce long run cost of fleet and equipment services to the Department. UDOT awards annual contracts for vehicles and equipment through a low-bid procurement process. This creates barriers to efficient fleet management. The principal barriers are discussed below.

- UDOT’s requirement for low-bid procurement does not take into account lifecycle maintenance costs, reliability, modifications required, and resale value of different equipment brands.

This means, for instance, that if it is known that one brand of equipment has significantly lower long run maintenance costs and/or a higher salvage value, this information cannot be factored into the purchase decision due to the low-bid requirement.

Some state departments of transportation reported that while they are unable or unwilling to consider factors other than initial purchase price at bid time, they incorporate into their bid specifications features that may cost more, but extend the life of their equipment. Pennsylvania Department of Transportation requires some equipment to include automatic lubing. Pennsylvania Turnpike Authority noted that management tries to specify the highest quality equipment (with larger engines and better drive trains) at the outset in order to increase equipment lifetime and reduce breakdowns.
More frequent turnover of equipment can reduce maintenance costs.

Like UDOT, most surveyed state departments of transportation rarely replace their equipment. However, private rental fleet operators typically use a fleet replacement strategy in which equipment is replaced before or just after warranty coverage expires. The primary advantage in more frequent turnover is lower maintenance expenses. Best practices for maintenance is to devote the majority of overall expenses on preventive items; any extraordinary repairs should be covered under manufacturer warranty. Opportunity savings occur when equipment is disposed of before major owner-financed maintenance costs are incurred. In addition, the equipment also has much higher salvage value at the end of the warranty period than at the end of its service life.

The low-bid process results in a lack of standardized sets of equipment.

Low-bid means that every time equipment is procured (every one or two years) a different vendor may be the successful low-bidder. This results in a fleet that may consist of several different brands of equipment, as is the case with UDOT. A lack of standardized equipment decreases mechanic familiarity, increasing maintenance time and costs. In addition, reduced standardization means increased levels of differentiated parts in inventory to handle the disparate vehicles and equipment in the fleet. Conversely, statewide vehicle standardization may result in equipment that is less capable of doing the work because of reduced functionality. Exhibit IV-5 illustrates the number of different vendors that have supplied equipment to UDOT.

Exhibit IV-5: Equipment Inventory and Suppliers

<table>
<thead>
<tr>
<th>Type</th>
<th>Inventory</th>
<th>Vendors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backhoes</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>Graders</td>
<td>71</td>
<td>8</td>
</tr>
<tr>
<td>Pickups</td>
<td>596</td>
<td>5</td>
</tr>
<tr>
<td>Trucks</td>
<td>199</td>
<td>7</td>
</tr>
<tr>
<td>Heavy Trucks</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>10-Wheelers</td>
<td>467</td>
<td>4</td>
</tr>
<tr>
<td>Sedans and Passenger Vans</td>
<td>200</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: UDOT, Dye Management Group, Inc. analysis.

The exhibit illustrates there is significant variation in the number of vendors providing vehicles and equipment to UDOT.
There are opportunities to reduce costs by expanding fleet acquisition considerations beyond initial purchase price.

Exhibit IV-6 outlines some alternative fleet acquisition methods.

### Exhibit IV-6: Alternative Acquisition Models

<table>
<thead>
<tr>
<th>Models</th>
<th>Description</th>
<th>Benefits</th>
<th>Drawbacks</th>
</tr>
</thead>
</table>
| **Lease or Lease-purchase** | • Vendors bid on contract to provide equipment for a set term (usually five years) for equal periodic payments.  
• Lease may include an option to purchase at the end of the term. | • Small initial cash outlay.  
• Less maintenance cost.  
• Ability to acquire newer technology.  
• Fixed, predictable payments.  
• Flexible terms. | • Can be expensive over equipment lifetime.  
• Devotes operating expenses to capital.  
• No ownership during lease term. |
| **Purchase-Buyback** | • Vendors submit two bid prices: an initial sale price and a price that they will pay to buy the equipment back after a set period.  
• Typically used for high resale level equipment such as backhoes, excavators, and bulldozers. | • Less maintenance expense.  
• Ability to partially or fully recoup purchase costs.  
• Some DOTs have reportedly recouped 97 percent or more of their initial acquisition expenses.  
• Ability to acquire newer technology. | • May need legislative change.  
• Need vendor buy-in.* |
| **Best value** | • Department establishes factors it will consider in addition to initial purchase price (e.g. ease of integration into existing fleet, vendor reputation, expected maintenance costs, etc.)  
• Department may decide to pay a premium for more advantageous bids or proposals. | • Ability to evaluate and make selections based on lifecycle costs.  
• Flexibility in selection. | • Can be complicated and time consuming preparation and evaluation process.  
• May not be legal in Utah for certain purchases. |
| **Collaborative Purchasing** | • Department combines with other states or regions to negotiate prices with vendors.  
• Department then has access to contracts under the negotiated terms. | • Low prices generated from increased buying power.  
• Eliminates some procurement expenses. | • Buying power already large.  
• Inflexible terms may make costly modifications necessary.  
• Time and money to establish collaborative.  
• Local vendors are negative about buyback portion of contracts. |
| **Multi-year Contracts** | • Vendors bid on contracts to provide equipment for more than one year. | • Greater standardization (lower training and parts expenses).  
• Eliminates procurement expenses in off years. | • More complicated to evaluate bids or proposals.  
• May not be legal in Utah for certain purchases. |

Source: Dye Management Group, Inc. analysis  
Note(*): After Kentucky changed its laws to allow purchase-buyback, vendors boycotted the program.
Purchasing of used equipment should also be considered during the acquisition process, since prices may be lower, while the quality of the individual equipment may be quite high. Connecticut Department of Transportation recently bought six used trucks from a bankrupt local department store. The department routinely buys used fleet trucks from Ryder. The used trucks usually cost between $20,000 and $25,000 and have between 200,000 and 250,000 miles. The department spends about $5,000 to put the trucks on the road again, and the trucks last another 200,000 miles or 10 years. The investment has been very cost effective for the state.

- **Consideration of broad-based costs beyond purchase price (including maintenance, operating, disposal costs, and salvage value) in replacement planning provides a means to economize fleet operations.**

UDOT uses a traditional equipment replacement schedule, based on operating equipment until the end of its service life, with minimal revenue generated from the sale of salvage equipment. This strategy requires a large number of mechanics with a comparably sized network of parts and repair facilities to provide frequent and extensive repairs for vehicles over the course of their service life.

Faced with mechanic shortages and the pressure of a profit or loss environment, some private and public sector fleets have adopted a lifecycle approach to equipment acquisition and management. This approach seeks to replace equipment when the lifecycle cost of ownership is minimum, as measured by the following equation:

\[
\text{Lifecycle Cost} = \frac{\text{Total Utilization (miles, hours)}}{\text{(Purchase Costs + Operating Costs + Repair Costs) – Salvage Value}}
\]

The equation provides a means to measure the utility of an individual piece of equipment, if detailed cost data is maintained. Compared to traditional equipment replacement programs, use of the lifecycle approach may result in more frequent equipment replacement, with increased capital requirements. However, as the fleet requires fewer repairs (with many repairs covered by manufacturer warranties), savings typically offset increased capital funding. Additionally, with higher equipment availability from a newer fleet (due to less downtime), fleets usually need fewer units to accomplish their mission. This combination of factors results in reduced staffing and facility needs, which further supports the lifecycle replacement approach.

Exhibit IV-7 presents a comparison in UDOT’s current approach and a lifecycle management approach to equipment acquisition.
# Exhibit IV-7: Comparison in UDOT’s Current to a Lifecycle Cost Management Approach to Equipment Acquisition

<table>
<thead>
<tr>
<th>Cost Recognition</th>
<th>Current Approach</th>
<th>Lifecycle Management Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Partially self-supporting charge-back system that recovers indirect and direct costs, but does not fully fund acquisition.</td>
<td>• Charge-back system recovers all fleet costs.</td>
</tr>
<tr>
<td></td>
<td>• Poor linkages between user behavior and equipment utilization costs.</td>
<td>• Depreciation rate fully funds capital replacement.</td>
</tr>
<tr>
<td></td>
<td>• Poor linkages between user behavior and equipment utilization costs.</td>
<td>• Clear linkage between user behavior and equipment utilization costs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acquisition and Replacement Strategy</th>
<th>Current Approach</th>
<th>Lifecycle Management Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Procurement of equipment through a low-bid approach, little consideration of factors beyond initial purchase price.</td>
<td>• Procurement of equipment through a variety of methods aimed at reducing lifecycle costs.</td>
</tr>
<tr>
<td></td>
<td>• Equipment replaced when it has reached the end of its useful service life.</td>
<td>• Equipment replacement strategy considers lifecycle costs, planned future operating costs and salvage value.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maintenance</th>
<th>Current Approach</th>
<th>Lifecycle Management Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Little consideration of maintenance expenses until needed.</td>
<td>• Maintenance expenses are considered before acquisition and monitored/planned through service life.</td>
</tr>
<tr>
<td></td>
<td>• Low bid system means many different brands of equipment, requiring greater maintenance and training expenses.</td>
<td>• Majority of maintenance expenses expended through preventive and warranty work.</td>
</tr>
<tr>
<td></td>
<td>• Keeping equipment throughout its entire useful life means heavier and more expensive types of maintenance over time.</td>
<td>• Large maintenance costs are used for planning equipment replacement.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parts Management</th>
<th>Current Approach</th>
<th>Lifecycle Management Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Little consideration of parts expenses until needed.</td>
<td>• Parts management considered during equipment evaluation and acquisition, as well as during service life.</td>
</tr>
<tr>
<td></td>
<td>• Low-bid systems means many brands of equipment, requiring greater parts and training expenses.</td>
<td>• Inventory control and parts utilization tracking utilized to ensure only frequently used parts are kept on hand.</td>
</tr>
<tr>
<td></td>
<td>• Keeping equipment throughout its entire useful life requires greater and more expensive parts.</td>
<td>• When high valued parts are anticipated, feedback from parts management helps to plan equipment replacement.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disposal</th>
<th>Current Approach</th>
<th>Lifecycle Management Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• At end of service life, equipment is sent to the Division of Surplus Property and auctioned off.</td>
<td>• Disposal value is considered before acquisition and through equipment service life.</td>
</tr>
<tr>
<td></td>
<td>• Disposal/salvage value is low.</td>
<td>• Disposal value helps drive replacement decisions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Some equipment is disposed when value is high, other equipment is kept until the end of its useful life.</td>
</tr>
</tbody>
</table>

Source: Dye Management Group, Inc. analysis.
• Care needs to be taken in applying a lifecycle cost management approach.
  One risk reported by other agencies of moving toward lifecycle costs when
  procuring new equipment is that a significant amount of data evaluation can be
  necessary to compute lifecycle cost. It is important that the approach taken not be
  so overly complex that the benefits are overrun by the costs and time involved in
  calculating lifecycle costs.

E. Cost Recovery

Issues Addressed:
How well is cost recovery achieved?
How well is the dual rate structure working?

1. Findings

• UDOT will benefit from improved fleet and equipment cost recognition and
  cost recovery through changing its rate structure.
  UDOT has been undertaking work to improve the level of cost recognition
  achieved by the current rate structure and the proposed dual rate structure.
  Equipment Operations Division has proposed implementing a dual rate structure
  for cost recovery of fleet Equipment Operations Division. Under this plan, two
  rates would be charged for operating equipment: a fixed rate and a variable rate.
  Fixed rates would be applied to equipment in terms of a monthly assigned rental
  rate, regardless of how much an individual item of equipment is used, and would
  cover overhead and depreciation. Variable rates would be applied to equipment
  according to the metering scheme for each, covering fuel, repair, and insurance
  costs.
  
  The current rate structure has the following outcomes:

  – Does not favor cost-effective use or provide incentives for users to modify
    behavior to reduce costs.
  – Does not recover all equipment replacement costs (i.e. the depreciation rate
    is below a full replacement depreciation rate).
  – Results in cross-subsidization of services between users and regions
    because rates are based on statewide average usage rates.

  Several key findings illustrate how improving cost recognition and cost recovery
  through the proposed dual rate structure benefit UDOT:
− The dual rate structure will improve cost recovery on low usage vehicles.
Rental costs will be charged even when a piece of equipment is not being used; vehicles allotted a monthly rental fee provide revenue to Equipment Operations Division, regardless of how often the vehicles are used. Since low usage vehicles are charged the same rate as highly used vehicles under the current rate structure, low usage vehicles subsidize high usage vehicles.

− The dual rate structure will help equipment turnaround.
Low-use vehicle operators would recognize the higher costs they are incurring and would reconsider the utility of retaining the equipment. Staff would evaluate needs and consider cutting the low-usage equipment and vehicles from departmental, divisional, regional, or district requirements.

− The current rental rate structure does not fully recover acquisition and Equipment Operation costs.
A dual rate structure is one method to help improve cost recovery. However, the proposed dual rate structure covers only indirect and variable costs, but not full replacement costs.

• Revenue mileage reported for maintenance and light-duty vehicles is less than actual, due to reporting problems.
The Equipment Operations Division receives revenue and funding by leasing equipment to other parts of the Department; the Division’s primary customer is the Maintenance Division. Revenue is generated based on vehicle utilization (e.g., cost per hour, day, or mile basis). From data collected from Gascard and FINET, it appears that the Equipment Operations Division is not collecting all possible costs from the Maintenance Division.

A comparison of the mileage logs for Gascard and FINET data shows a negative variance. Gascard totals indicate nearly 4.3 million miles driven, while FINET data shows only 3.8 million, a variance of 500,000 miles. This difference is paid for out of the Equipment Operations Division’s budget. This, in turn, is captured through increased rates charged for equipment. This distorts true cost recognition.

Indirectly, drivers that correctly record any report mileage and other utilization effectively are subsidizing those individuals who do not correctly record vehicle utilization.
Internal Service Funds, or revolving funds, provide fleet managers the ability to replace vehicles in a timely manner.

Internal Service Funds (or revolving funds) capture indirect, variable, and full equipment replacement costs in the rental rates charge to vehicle operators. A study by the U.S. General Accounting Office issued in 1994 found that states that funded fleet management and acquisition through an internal service fund were likely to maintain a fleet replacement schedule. The study stated that “having to fund fleet operations through annual appropriations may have limited agencies’ ability to replace their vehicles in an economical manner. These problems occurred because funding for replacements could not always be predicted.” In addition to promoting accountability and cost effective use of vehicles, the advantages of using an internal service fund includes the ability to “fully fund timely fleet replacement, recover costs, and identify fleet operating costs, through the rental rates charge to operators.”

A comparison of the current and proposed dual rate cost recovery model is presented in Exhibit IV-8 on the following page. The comparison illustrates the benefits and drawbacks of each cost structure.
### Exhibit IV-8: Comparison of Cost Recovery Models

<table>
<thead>
<tr>
<th>Description</th>
<th>UDOT Cost Recovery Models</th>
<th>Proposed Dual Rate Structure</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Structure</strong></td>
<td>Partial self-supporting charge-back system that recovers fleet costs through equipment usage charges.</td>
<td>Partially self-supporting charge-back system that recovers fleet costs through equipment usage charges.</td>
<td>Move to true cost recognition model: charge-back system that recovers all fleet and equipment costs (including full replacement) through equipment usage charges.</td>
</tr>
<tr>
<td></td>
<td>Recovers indirect (overhead and depreciation) and direct (fuel, oil, parts, labor, and commercial repair) costs.</td>
<td>Recovers indirect costs (overhead and depreciation) through a flat per month fee.</td>
<td>Uses full replacement depreciation rate to capitalize acquisition of new equipment at end of lifecycle.</td>
</tr>
<tr>
<td></td>
<td>Usage rates based on per hour, per day, per month, or per mile used to recover maintenance, fuel, and other operating costs.</td>
<td>Recovers direct costs (fuel, oil, parts, labor and commercial repair) through a usage fee (per hour, per day, per month, or per mile).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uses “true” depreciation rate as opposed to full replacement depreciation rate.</td>
<td>Uses “true” depreciation rate as opposed to full replacement depreciation rate.</td>
<td></td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td>System is known and understood by UDOT.</td>
<td>Reduces cross-subsidization problem by charging a flat monthly fee paid whether equipment used or not.</td>
<td>Reduces need for subsidization by general fund for provision of fleet resources.</td>
</tr>
<tr>
<td></td>
<td>Maintenance management system (MMS) set up to handle the usage charges.</td>
<td>Provides better incentive for efficient equipment decisions by charging fixed fee.</td>
<td>Ensures the timely replacement of capital assets.</td>
</tr>
<tr>
<td></td>
<td><strong>Drawbacks</strong></td>
<td>Requires Departmental acceptance and change.</td>
<td>Requires Departmental acceptance and change.</td>
</tr>
<tr>
<td></td>
<td>Current system does not favor cost-effective consumption or provide incentives for users to modify behavior to reduce costs.</td>
<td>How to distribute the “fixed” component across maintenance activities.</td>
<td>May require legislative change.</td>
</tr>
<tr>
<td></td>
<td>Does not recover all equipment replacement costs.</td>
<td>Does not recover all equipment replacement costs.</td>
<td>Accumulated revenues for replacement can be targeted for other purposes when funding is limited.</td>
</tr>
<tr>
<td></td>
<td>Results in cross-subsidization of services between users and regions because rates based on statewide average usage rates.</td>
<td></td>
<td>Would increase equipment rental rates over current levels (for non State Fleet equipment).</td>
</tr>
</tbody>
</table>

*Source: UDOT, Dye Management Group, Inc. analysis.*
F. Distribution of Equipment

Issues Addressed:
Is the fleet distributed appropriately to optimize the use of equipment?
Should some specialized/heavy vehicles that are underutilized be assigned to the Central Shops?

1. Findings

- Some specialized equipment is subject to low utilization rates.
  Audit analysis considered whether certain specialized low utilization equipment could be centralized. Equipment falls into two general categories, specialized and multi-purpose. Specialized equipment fill specific roles, completing such functions as sealing pavement cracks, spreading asphalt, or spraying weed-killing compounds.

  Exhibit IV-9 presents UDOT vehicles and equipment with significantly low utilization rates.
### Exhibit IV-9: UDOT Vehicles and Equipment with Total Annual Utilization of 250 Hours or Less, FY 2000

<table>
<thead>
<tr>
<th>Class Description</th>
<th>Inventory</th>
<th>Total Metered Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grader W/Gardner Mixer</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Flail Mower</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Hydraulic Power Pack</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Tow Rake</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Router/Sign Letter</td>
<td>1</td>
<td>34</td>
</tr>
<tr>
<td>Portable Cut-Off Saw</td>
<td>1</td>
<td>39</td>
</tr>
<tr>
<td>Snowplow/One-Way Funnel Typ</td>
<td>2</td>
<td>57</td>
</tr>
<tr>
<td>Boom Mower</td>
<td>4</td>
<td>87</td>
</tr>
<tr>
<td>Compressor/Up To 100 Cfm</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>Snowplow/V-Blade</td>
<td>4</td>
<td>92</td>
</tr>
<tr>
<td>Pump/All</td>
<td>30</td>
<td>95</td>
</tr>
<tr>
<td>Steam Clean W/Sandblast Att</td>
<td>7</td>
<td>116</td>
</tr>
<tr>
<td>Plow Rotary Hydrostatic</td>
<td>1</td>
<td>118</td>
</tr>
<tr>
<td>Rotary Plow</td>
<td>5</td>
<td>120</td>
</tr>
<tr>
<td>Mixer/Small Pugmill</td>
<td>7</td>
<td>125</td>
</tr>
<tr>
<td>Asphalt Paver</td>
<td>1</td>
<td>127</td>
</tr>
<tr>
<td>Vegetation Mgmt/Turf Seeder</td>
<td>2</td>
<td>128</td>
</tr>
<tr>
<td>Sand Blaster</td>
<td>6</td>
<td>132</td>
</tr>
<tr>
<td>Drill/Multi-Purpose/300 Ft</td>
<td>1</td>
<td>146</td>
</tr>
<tr>
<td>Roller/Self-Prop/Up To 3 To</td>
<td>4</td>
<td>147</td>
</tr>
<tr>
<td>Asphalt Spreader/Tailgate</td>
<td>3</td>
<td>176</td>
</tr>
<tr>
<td>Earth Saw/Digger/Boring Mac</td>
<td>1</td>
<td>182</td>
</tr>
<tr>
<td>Asphalt Maintainer/Lee Boy</td>
<td>4</td>
<td>186</td>
</tr>
<tr>
<td>Deflectometer</td>
<td>1</td>
<td>193</td>
</tr>
<tr>
<td>Traffic Control/Cone Wheel</td>
<td>2</td>
<td>194</td>
</tr>
<tr>
<td>Mixer</td>
<td>7</td>
<td>213</td>
</tr>
<tr>
<td>Theodolites and Transits</td>
<td>62</td>
<td>238</td>
</tr>
<tr>
<td>Loader/Track Type</td>
<td>1</td>
<td>246</td>
</tr>
<tr>
<td>Paint Filter System</td>
<td>1</td>
<td>250</td>
</tr>
</tbody>
</table>

*Source: UDOT, Dye Management Group, Inc. analysis*

- **Seasonal use and compressed work calendars impact the ability to centralize equipment.**

Specialized equipment is also unique, typically operating on a seasonal basis (e.g., crack sealers/asphalt pavers in the warm months, snowplows and sand/salt spreaders during the winter season). Multi-purpose equipment can perform more than one function throughout the year (e.g., loaders working construction sites in the summer months and loading salt spreaders during the winter).
Exhibit IV-10: Selected Equipment Average Utilization per Year (Hours), FY2000

<table>
<thead>
<tr>
<th></th>
<th>Backhoes</th>
<th>Graders</th>
<th>Loaders</th>
<th>Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 1</td>
<td>210</td>
<td>234</td>
<td>281</td>
<td>152</td>
</tr>
<tr>
<td>Region 2</td>
<td>202</td>
<td>262</td>
<td>276</td>
<td>156</td>
</tr>
<tr>
<td>Region 3</td>
<td>153</td>
<td>183</td>
<td>260</td>
<td>125</td>
</tr>
<tr>
<td>Richfield</td>
<td>148</td>
<td>181</td>
<td>212</td>
<td>144</td>
</tr>
<tr>
<td>Price</td>
<td>165</td>
<td>299</td>
<td>136</td>
<td>159</td>
</tr>
<tr>
<td>Cedar City</td>
<td>181</td>
<td>163</td>
<td>190</td>
<td>185</td>
</tr>
<tr>
<td>Central</td>
<td>144</td>
<td>257</td>
<td>138</td>
<td>198</td>
</tr>
</tbody>
</table>

Source: UDOT, Dye Management Group, Inc. analysis

UDOT maintenance staff use the equipment during the same periods. If these specialized pieces of equipment were centralized, then additional resources would be required to transport them between Central and work sites, or shift them from one work site to another. Equipment centralization would effectively reduce the overall utilization of the equipment.

Other equipment is necessary to have on hand for contingency and emergency situations. The Department must have the ability to handle incidents without waiting a long period for the equipment to arrive (such as when a culvert or drainage area is flooding or overflowing).

- **An emerging trend for seasonally used or underutilized equipment is to acquire such equipment through short-term rental agreements.**

Pennsylvania Department of Transportation and the Pennsylvania Turnpike Authority rent extra sweepers and catch basin cleaners seasonally, when demand for the equipment is high. Renting equipment that is infrequently used allows the department to avoid paying for idle equipment time and storage. Rentals also save on maintenance costs; most maintenance should be covered by the equipment owner. Finally, rental equipment may give the department access to technology it may not afford to purchase. One disadvantage of renting is that equipment may not be available in emergencies.
G. State Fleet

Issues Addressed:

Does UDOT get good service through State Fleet?

Is UDOT getting value for money for vehicles used through State Fleet?

1. Findings

- **UDOT is benefiting from leasing State Fleet light-duty vehicles.**

  The State Fleet took over management and administration of light-duty vehicles from several state agencies that were previously responsible for managing their own fleet of vehicles, mostly passenger vehicles and light trucks. Duplicative functions, such as purchases, asset management, maintenance, and vehicle disposal, are now centralized within the State Fleet. Economies of scale in purchasing and maintenance have been realized by all state agencies using this facility.

  A number of interviewees at UDOT expressed concern about the rates being charged for State Fleet vehicles. This concern is misplaced. The rates arise from the rate the Equipment Operations Division charges. This is high on a per mile basis in order to cover the other costs when the vehicle is not in service. The rate charges from the State Fleet compare very favorably to other states. It is unlikely that UDOT could match or undercut the cost of light-duty vehicles available through the State Fleet.

  Findings from examining the cost and level of service provided by State Fleet revealed:

  - **The State Fleet has allowed UDOT to focus on replacing its aged 10-wheeler fleet.**

    UDOT has used available replacement funding resources for needed modernization of its fleet of heavy-duty equipment, such as 10-wheeled trucks, the workhorse of the Department’s maintenance vehicle fleet.

    The average age of major vehicle types in the UDOT fleet has decreased from 1996 to 2000. In addition, a result of the creation of the State Fleet includes the development of younger fleet of light-duty vehicles.

  - **Operating costs for light-duty vehicles are in line with other western states.**

    As presented in Exhibit IV-11, analysis of operating costs for light-duty vehicles used by UDOT and other western state departments of
transportation indicates that the State Fleet costs compare favorably to those in other states.

Exhibit IV-11: Operating Cost Comparisons of Western State Light-Duty Vehicles, 2000

Source: UDOT, Western States Equipment Managers, Dye Management Group, Inc. analysis

- **There are some drawbacks to using the State Fleet.**

  A drawback of using leased light-duty vehicles is the inability to significantly customize these vehicles to UDOT’s needs. For example, it was noted by UDOT vehicle operators that the Dodge 4WD pickup trucks sit too high off the ground to facilitate maintenance work; step-ups must be added to ease entry to the vehicles, and the height to lift equipment into the back was greater than on previous models.

  Another drawback of utilizing the State Fleet centers around the ability to obtain proper maintenance in remote locations. The time spent by operators taking the vehicles for maintenance by the servicing agents is excessive, compared to having the vehicles maintained by Equipment Operations Division staff and facilities.
• Economic growth in Utah and changes in operating requirements have created additional equipment needs.

There are significant long-term trends or shifts that will affect the Department’s vehicle and equipment requirements in future. Two issues have created additional fleet equipment needs for UDOT.

− Economic growth in Utah has affected UDOT’s ability to maintain the current transportation infrastructure.

Total lane-miles have increased, especially in metropolitan areas, to support overall growth and in the Salt Lake City region for the 2002 Winter Olympics. As the total lane-miles of transportation infrastructure has increased, the inventory of equipment needed to maintain the infrastructure has concurrently increased. If equipment needs are not met, then productivity of the current fleet must improve in order to maintain current productivity levels.

− New productivity standards for road maintenance equipment have driven the need for multi-functional and more productive equipment.

For example, UDOT needs equipment with the ability to handle heavy traffic control devices, such as concrete jersey barriers. In the past, UDOT acquired equipment that was limited in its capability to perform some functions required by Maintenance (e.g., loaders that were incapable of lifting jersey barriers).

• UDOT may benefit from privatization of vehicle disposal.

The cost involved in disposing of vehicles and equipment at the end of their useful life is a part of the lifecycle cost. Any savings in this area would benefit the Department.

− Utah’s Division of Surplus Property is responsible for disposing of state-owned property.

The agency does not receive an appropriation from the state to operate the program. Rather, the program is funded solely from service and handling charges passed back to the originating agencies that owned the property. The agency charges UDOT nine percent of the value of the vehicles handled by the agency and sold as surplus. A survey of other transportation department fleet managers indicates that the nine percent UDOT pays is not unusual. For example, Maine Department of Transportation surrenders 15 percent of disposal proceeds to the state agency that aids in auctioning surplus equipment.

− Some other states have chosen to outsource vehicle disposal to private auction service providers at a lower rate.

The Pennsylvannia Turnpike Authority pays approximately 2.5 percent of its disposal proceeds for the services of a private auctioneer. This illustrates that potential savings are possible.
H. Recommendations

This section presents recommendations for improving fleet and equipment acquisition, utilization, and replacement based on the audit findings in this business area.

Recommendation IV-1: Within existing statutory authority, base procurement decisions on lifecycle management considerations (acquisition costs, maintenance costs, standardization, reliability, modifications required, and resale value of different equipment brands.)

- Design and implement a fleet and equipment procurement model that responds to UDOT business objectives established through Recommendation II-1.
- If necessary, seek appropriate statutory changes to base procurement decisions on lifecycle management considerations.
- Utilize best practices from other states in the design of the procurement model (as listed in Appendix A).

The awarding of contracts for vehicles and equipment through a low-bid procurement process creates barriers to efficient fleet management. This recommendation is intended to reduce fleet and equipment costs by basing procurement decisions on lifecycle management considerations. There is significant opportunity to draw on best practices from other states.

Recommendation IV-2: Strengthen light-duty vehicle acquisition procedures to promote standardization of vehicle type and level of outfitting by job function.

This recommendation is intended to provide increased uniformity and standardization amongst the light-duty fleet in terms of the type of vehicles and assigned by job function and the associated amount of outfitting. It is expected that this recommendation will review the size and type of vehicle required by staff, provide controls that will ensure the required equipment is purchased, and present a more uniform fleet in terms of public image.

Recommendation IV-3: Transition to an equipment and vehicle cost recovery model identifying all costs associated with utilization.

- Fully implement the proposed dual rate structure for applicable equipment to improve cost recovery.
- Determine legislative requirements and evaluate whether to shift to full cost recovery by permanent funding through an Internal Service Fund (ISF).
- Develop new procedures for ensuring operators complete accurate logs of vehicle utilization, especially mileage records to reduce negative reporting variances.

True cost recognition will help to ensure efficient and effective decisions on equipment acquisition and usage. This recommendation is intended ensure long-term funding and financial viability of Equipment Operations Division within UDOT.
Recommendation IV-4: As part of the recommended regional equipment business management function roles and responsibilities:

- Ensure the best possible level and distribution of fleet and equipment based on need and lifecycle cost.
- Share and pool specialized equipment with other regions where feasible.
- Rent seasonal and low utilization equipment wherever feasible and cost effective.

This recommendation is to formalize, as part of the region equipment business management function, the role of ensuring that the level and distribution of fleet and equipment in a region is optimal and based on the lifecycle management approach. The function should also look for opportunities to share equipment with low utilization with other regions, or rent it.

Recommendation IV-5: Develop long-term fleet and equipment funding plan in conjunction with maintenance planning activities. Must address the business objectives established by Recommendation II-1.

- Develop plan to address the relationship between maintenance activities and equipment procurement.
- Determine long-term fleet and equipment needs and funding requirements based on preferred lifecycle management approach.
- Examine merits of more frequent turnover to reduce maintenance costs.
- Determine the long-term impacts of population growth, growth in lane-miles and changing maintenance standards in Utah on fleet and equipment needs.
- Increase acquisition of multiple use equipment to reduce costs and increase utilization.
- Evaluate current and future maintenance facility needs and develop improvement strategy.

This recommendation is intended to ensure that fleet and equipment needs are anticipated and planned for in the long term. This plan should reflect the impacts of following the recommended lifecycle management approach. This includes ensuring funding for future needs and anticipating population growth and growth in lane miles. The plan should be undertaken as part of maintenance planning activities and needs to address the relationship between maintenance activities and equipment procurement.

Recommendation IV-6: Use private auctions for vehicle disposal where expected cost savings warrant.

The Department may benefit from cost savings by using private auctions to dispose of vehicles and equipment.
V. Equipment Maintenance and Repair

This section presents the results of the audit analysis of the business functions involved with preventive and non-preventive maintenance and repair of the vehicles and equipment in UDOT’s inventory or leased from the State Fleet.

A. Background

This business area includes the performance of equipment preventative maintenance, inspections, and repairs, as well as quick-fix, road call, towing, and field services. This business area also handles the initiation and processing of warranty claims as well as managing maintenance and repair outsourcing. Some of the processes in this business area are conducted in conjunction with State Fleet or contracted service centers to perform maintenance services. In addition, vehicle operators perform a significant amount of the preventive maintenance on their assigned vehicles. Key processes include:

• Manage and Perform Preventive Maintenance.

Preventive maintenance refers to performing the tasks indicated by the equipment manufacturer according to a prescribed schedule. Strict adherence to this schedule ensures that equipment operates at maximum efficiency with minimum breakdowns for the longest period possible, with the highest salvage value for the equipment at time of disposal.

UDOT’s preventive maintenance manual lists a variety of equipment and outlines the maintenance requirements for each. The manual also identifies requirements for daily equipment checks and for three levels of preventative maintenance schedules. Vehicle operators have primary responsibility to ensure A-level preventive maintenance is completed. B- and C-level maintenance responsibilities are jointly held between the vehicle operator and mechanics.

• Complete Inspections.

The assigned operators are expected to conduct daily inspections before, during, and after operation of any equipment. These inspections are done primarily with safe operation of the equipment in mind. C-level maintenance includes the annual state required safety inspection and is required for any equipment requiring a state safety inspection. C-level maintenance must be performed by the assigned operator and a certified mechanic.
• **Perform Quick Fix Services.**
  Operators assigned to individual vehicles perform most of the quick-fix work, in order to keep the equipment in service. Several region and district shops send roving mechanics to area maintenance sheds to address specified problems. Roving mechanics also may perform scheduled circuits through a region or district to expedite quick-fix repairs when operators cannot address problems.

• **Perform Major Repairs.**
  Most major repairs are performed by region/district shops on an as-needed basis. These shops are only limited in their capability to complete the work based on the type of technically advanced tools and equipment available. Work that region or district-level shops cannot complete, such as alignments, engine overhauls, etc., is sent to the Central Shops in Salt Lake City or to local commercial repair facilities.

• **Process Warranty Claims.**
  Equipment shop supervisors are responsible for identifying warranty work and submitting claims. Warranty work is typically completed by UDOT mechanics; claims must be approved by Equipment Operations Division and the vendor before reimbursement is made.

• **Perform Road Calls and Field Services.**
  Several regions and districts assign roving mechanics that go out to a shed or on the road to expedite equipment repair. Some have a designated weekly route; others work on an on-call basis.

• **Manage Contractual Maintenance Activities.**
  Regional and district shop supervisors determine what work should be outsourced. While Equipment Operations Division maintains several on-call contracts for some work (e.g., painting, steel fabrication), it outsources work that requires specialized expertise or tools the regions or districts lack. Additionally, work may be outsourced when the workload at a local shop is such that the work cannot be completed quickly.
B. Preventive Maintenance

Issues Addressed:
The appropriate level of preventive maintenance provided by operators.
The appropriate mix of state versus privately provided maintenance.
The amount of vehicle outfitting undertaken by UDOT.

1. Findings

- Compared to best practices, UDOT expenditure of resources toward preventive maintenance is in line with industry standards.

Exhibit V-1 presents analysis of UDOT preventive maintenance performance measures.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct labor hours by Equipment Operations Division mechanics</td>
<td>97,360</td>
</tr>
<tr>
<td>Percent attributed to preventive maintenance (20% of direct labor hours)*</td>
<td>19,472</td>
</tr>
<tr>
<td>Preventive maintenance hours (from MMS)</td>
<td>30,400</td>
</tr>
<tr>
<td>Total preventive maintenance hours</td>
<td>49,872</td>
</tr>
<tr>
<td>Total maintenance hours</td>
<td>77,888</td>
</tr>
<tr>
<td>Ratio of preventive maintenance to total maintenance</td>
<td>64%</td>
</tr>
<tr>
<td>Approximate regional/district maintenance staff FTEs</td>
<td>660</td>
</tr>
<tr>
<td>Equivalent FTEs for preventive maintenance</td>
<td>14.6</td>
</tr>
<tr>
<td>Approximate PM hours per maintenance employee per month</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Source: UDOT, Dye Management Group, Inc. analysis.
Note: *Estimated.

One indicator of sufficient fleet vehicle preventive maintenance is the ratio of scheduled maintenance to unscheduled repair. A typical performance target is a 60 to 70 percent preventive maintenance-to-repair ratio. As indicated in Exhibit V-1, the ratio for preventive maintenance to total maintenance is 64 percent. This number is in line with industry standards.

- UDOT is unique in operators performing preventive maintenance.

An issue raised by UDOT senior management involves concern over control and accountability for preventive maintenance activities. Responsibility for vehicle preventive maintenance is shared between staff mechanics and operators. This is unique from other western states except Arizona; most other states require that a mechanic complete all repairs including the preventive maintenance. For UDOT,
the current assignment of responsibilities works well. It provides operators with the responsibility for the upkeep of “their” equipment.

- **The Equipment Operations Division lacks control over preventive maintenance activities undertaken by the Maintenance Division.**

Review of role, responsibilities and workflow for this business area revealed there is a lack of clear definition regarding responsibility and accountability for preventive maintenance in some areas.

The Equipment Operations Division does not have the authority to reject or disapprove of time and expenses charged to preventive maintenance by Maintenance staff. In addition, there have been cases where no one is managing a particular region’s pool of State Fleet vehicles. With no staff to oversee vehicle upkeep, the vehicles do not receive the required or proper maintenance to ensure efficient and effective operation.

It should also be noted equipment that is loaned between sheds often does not receive proper preventive maintenance. Preventive maintenance for non-assigned equipment is documented on a record “yellow jacket” that stays with each piece of equipment.

- **Equipment Operations Division mechanics have noted that a wide variation in care and attention to vehicles.**

Many mechanics believed operators completed preventive maintenance inconsistently. In interviews, mechanics cited the lack of proper greasing as a major problem. Mechanics also cited a lack of proper cleaning of equipment after road-salting operations, which caused considerable damage to vehicles’ electrical wiring systems.

- **UDOT currently maintains around 50 percent of its State Fleet vehicles.**

In remote locations, vendors may not be available to complete the preventive maintenance and repair work for State Fleet vehicles. Consequently, UDOT shop staff will complete preventive maintenance work on state vehicles. This can be a burdensome process because the mechanics require prior approval to complete any maintenance work on State Fleet vehicles. When an emergency repair is necessary, UDOT will complete the work, but typically does not recover the costs for these repairs from State Fleet.

Recent developments with State Fleet possibly privatizing its fleet management function have created an opportunity to potentially take over management and maintenance of UDOT vehicles leased from State Fleet.
C. Mechanic Utilization

Issues Addressed:
Is there “downtime” in the region shops?
Can mechanic utilization be increased?

1. Findings

- Mechanic utilization rates, billable hours versus overhead, are below departmental goals and industry benchmarks.

An important issue for UDOT senior management is mechanic utilization, in terms of total maintenance and repair hours versus overhead. The Department has set a performance goal of 70 percent direct labor billability for mechanics. Private sector shops generally set performance goals of 80 percent or more. Exhibit V-2 and Exhibit V-3, present Fiscal Year 2000 labor hour distributions, for Central Shops and regional shops, respectively.

Exhibit V-2: Central Shops Distribution of Labor Hours Charged, FY2000

Source: UDOT
Note: Does not account for clearing account activities for other Utah State agencies. Service Station administers the UDOT motor pool. Those hours are billed to indirect labor.
These exhibits illustrate that all but the Region 3 shop did not meet the Department’s goal of 70 percent billability. The principal reasons these shops did not meet the goal include:

- **Mechanics complete work orders on non-UDOT equipment.**
  Mechanics’ responsibilities include completing maintenance work on non-UDOT (e.g. state patrol, avalanche, etc.) vehicles. This work (accounted for through clearing accounts with the other agencies) has been charged to indirect labor accounts.

- **Direct labor fluctuates seasonally as well as due to weather conditions.**
  Mechanics complete work as necessary and when equipment is available. Some equipment is not available to perform maintenance when road clearing or construction activities take greater priority. Consequently, mechanics may have to wait until time is available to complete the work.

- **Indirect time is spent by mechanics completing administrative functions.**
  Interviews with mechanics indicate that they spend a significant amount of time entering data into UDOT information systems. Shop staff indicated that one to two hours per day might be used to enter data into CARS. In addition, mechanics’ parts procurement activities may accumulate indirect labor hours.
While some mechanics charge data entry and parts procurement time directly to work orders, others charge these activities to indirect labor.

- **UDOT mechanics have a low direct labor ratio, compared to other state department of transportation mechanics.**

Exhibit V-4 presents a comparison of mechanics’ direct labor for several western states.

**Exhibit V-4: Direct Labor Ratio for Vehicle and Equipment Mechanics**

<table>
<thead>
<tr>
<th>State</th>
<th>Percent Direct Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon</td>
<td>84%</td>
</tr>
<tr>
<td>New Mexico</td>
<td>80%</td>
</tr>
<tr>
<td>California</td>
<td>76%</td>
</tr>
<tr>
<td>Arizona</td>
<td>65%</td>
</tr>
<tr>
<td>Montana</td>
<td>65%</td>
</tr>
<tr>
<td>Washington</td>
<td>63%</td>
</tr>
<tr>
<td>Alaska</td>
<td>61%</td>
</tr>
<tr>
<td>Utah</td>
<td>54%*</td>
</tr>
</tbody>
</table>

*Source: UDOT, Dye Management Group, Inc. analysis
Note(*): Does not account for clearing account activities for other Utah State agencies.

The exhibit illustrates that UDOT’s direct labor is low compared to other western states. Care needs to be taken interpreting these data because the low direct labor in the Central Shops may be responsible for driving UDOT’s ratio down in comparison to other states.

**D. Maintenance Outsourcing**

**Issue Addressed:** Is the mix of state maintenance versus private maintenance appropriate?

**1. Findings**

- **UDOT outsources little maintenance work.**

Exhibit V-5 summarizes Equipment Operations Division level of maintenance outsourcing for FY 2000. The exhibit illustrates that UDOT’s in-house expenditures for maintenance activities account for 93 percent. Consequently, there is little room for increasing the amount of in-house repair work.
Exhibit V-5: In-House and Outsourced Work Orders, FY 2000

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Cost ($Ms)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house</td>
<td>$6.49</td>
<td>93%</td>
</tr>
<tr>
<td>Outsourced</td>
<td>$0.50</td>
<td>7%</td>
</tr>
<tr>
<td>Total</td>
<td>$6.99</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: UDOT, Dye Management Group, Inc. analysis

Equipment Operations Division outsources only $500,000 in maintenance repair work to commercial vendors, seven percent of the total work completed. This indicates that moving more repair work in-house would not increase direct hours significantly. In addition, in some areas of the state, it may be difficult to outsource repair work, due to the limited number of local commercial repair establishments.

- **Vehicle outfitting leads to significant time passing between delivery and placement into service.**

  An issue for UDOT senior management has been the extent to which UDOT performs outfitting of vehicles. Outfitting may include heavy-duty tasks (such as installing plows or plow racks, truck boxes, etc.) completed by the Truck and Weld shops, or light-duty tasks, like installing light bars, distance meters, and other small items on vehicles, completed by the Prep Shop.

  At UDOT, many vehicles are not put in service until the Prep Shop or Weld Shop outfits them. On a short-term warranty, vehicles are sitting idle for a significant portion of the warranty.

  - **Most fleet managers outsource vehicle outfitting.**

    Rather than customizing equipment after delivery, most fleets require in their bid specifications that the vendor to perform the outfitting. Requiring vendors to perform all outfitting reduces turn-around time; when the equipment is delivered, it is ready to put on the road. Cost comparisons may also show that outsourcing outfitting saves the department money. Ceasing in-house outfitting operations may impact staffing levels. Two examples of costs saving associated with vendor furnished outfitting are:

      - Texas Department of Transportation saved $227,800 annually by outsourcing the outfitting of herbicide rigs.
      - Tacoma, Washington cut the time it takes to put a police vehicle on the road by 25 percent by requiring its vendor to handle the outfitting of cruisers.
E. Warranty Recovery

Issues Addressed: Warranty recovery.

1. Findings

- **Warranty recovery has not been a priority for the Equipment Operations Division.**

  An issue raised during the course of the audit was the extent to which UDOT is recovering available warranty claim funds for warranty work undertaken by the Department. UDOT signs warranty agreements with vendors and suppliers that begin with the purchase or delivery date.

- **An accurate warranty management system or process has not been implemented.**

  It is generally the responsibility of Shop Supervisors to identify and track warranty work. However, this work is usually only identified for a vehicle or piece of equipment based on the personal knowledge of the supervisor. CARS could be used more effectively to identify warranty work and coverage. The absence of a warranty tracking system allows vendors the opportunity to make the final decision as to whether a repair job is covered by warranty.

- **Shop supervisors consider the warranty approval process to be burdensome.**

  Under the current process, while it is the responsibility of the shop supervisor to identify warranty-eligible work, warranty work must be pre-approved by Equipment Operations Division, in order to be reimbursed. Shop supervisors do not always complete the paperwork for reimbursement because there is a probability the job may not qualify. In addition, shop supervisors receive no monetary benefit for completing warranty work. Reimbursements do not return to the region/district. For example, only $15,000 was recovered in FY2000.

- **A best practice in warranty management involves starting the warranty when the equipment begins service.**

  In its bid specifications, Maine Department of Transportation (MDOT) provides that warranties do not begin until the equipment is in use. If the department needs to outfit or distribute the equipment, the lag time between delivery and use does not reduce warranty time. MDOT reports that vendors complied with this requirement. This is a problem that UDOT experiences.
F. Recommendations

This section presents recommendations for improving fleet and equipment maintenance and repair activities based on the audit findings in this business area.

Recommendation V-1: As part of the recommended regional equipment business management function roles and responsibilities:

- Develop and enforce standards for preventive maintenance of vehicles and equipment, regardless of location, age, and utilization of the items.
- Reengineer practices for recording mechanics’ time, ensure proper task codes, reduce duplicative effort, and simplify.
- Ensure proper management and maintenance of region/district State Fleet motor pools.
- Assist regions and districts in managing warranty claims and reimbursements from vendors.

The purpose of this recommendation is, through the regional equipment business management function, to actively manage and implement changes as necessary to ensure that equipment maintenance and repair activities are as efficient as possible.

Recommendation V-2: Establish headquarters warranty facilitator function to assist regions and districts to maximize warranty reimbursements.

- Work with State Fleet to fully utilize CARS for tracking warranty work for vehicles and equipment.

This recommendation is intended to increase the importance of warranty management and reimbursement within UDOT. The benefits of implementing this function are expected to significantly outweigh the costs.

Recommendation V-3: Continue to pursue possible take over of State Fleet vehicle maintenance management and repair.

The Department can increase mechanic utilization rates through increased maintenance activities associated with taking over maintenance of State Fleet vehicles.
VI. Parts Procurement and Supply

This section presents the results of the audit analysis that addressed parts procurement and supply functions supporting Equipment Operations Division. While Procurement Services itself was not audited, how parts are procured and supplied to Equipment Operations Division as an end user was evaluated. Recommendations for improving the business area are included at the end of the section.

A. Background

This business area includes the processes necessary to acquire replacement parts for equipment, manage the parts inventory, and distribute parts as needed. Many of the processes in parts procurement and supply are conducted in conjunction with organizations outside Equipment Operations Division, including UDOT’s Procurement Services and various parts vendors.

Procurement Services conducts most purchasing activities for UDOT and manages a central warehouse in Salt Lake City. Central, regional, and district warehouses are used mainly for stocking basic preventive maintenance items (lubricants, filters, and other fluids). Equipment Operations Division staff located in the regions and districts manage small inventories of their own separate from the central warehouse.

B. Parts Procurement and Supply

Issues Addressed:

Are UDOT’s inventory and warehousing practices cost effective?

Is UDOT carrying specialized inventory?

1. Findings

UDOT has significant opportunity for improving the efficiency of parts procurement and supply processes.

Issues raised in the course of auditing the parts procurement and management functions of Equipment Operations Division include:

- The efficiency and effectiveness of the current parts procurement and supply function.

- Best practices in parts procurement and supply applied by other fleet Equipment Operations Division.
Parts procurement and supply as it impacts Equipment Operations Division is an important issue for UDOT senior management. Overall, findings from interviews and site visits show that UDOT can significantly improve the efficiency and effectiveness of parts procurement and supply.

- **Interviews with UDOT staff indicate a lack of understanding of Equipment Operations Division needs by Procurement Services.**

  The UDOT warehouse only stocks relatively standard items, such as oil and filters, but does not carry parts and supplies most used by the mechanics. Regional and district maintenance shops keep a supply of common parts, such as alternators, starters, wiper motors. In field shops, most parts are obtained from a local vendor that has developed a credible working relationship with UDOT mechanics. Other parts can be obtained within one day by overnight delivery. The utility of the central warehouse is also decreased because the warehouse inventory system uses different stock numbers than those used by Equipment Operations Division mechanics.

- **Current spending authority levels require unnecessary review.**

  The current spending authority limits for UDOT shop supervisors require excessive review. In addition, the limits have become outdated due to inflation in parts costs. The current spending authority is illustrated below in Exhibit VI-1.

### Exhibit VI-1: Current Spending Authority

<table>
<thead>
<tr>
<th>Part Cost</th>
<th>Spending Authority</th>
</tr>
</thead>
</table>
| Less than $500     | • No bids are required.  
                     | • Receive at least two (2) price quotes via telephone from vendors/suppliers.     |
| $500 to $1,000     | • Receive at least two (2) formal bids from vendors.  
                     | • Shop supervisor has approval authority.                                         |
| $1,000 to $2,000   | • Receive at least two (2) formal bids from vendors.  
                     | • Equipment Specialists or Equipment Operations Division Manager must approve.    |
| Greater than $2,000| • Receive at least three (3) formal bids.  
                     | • Equipment Operations Division Manager must approve.  
                     | • UDOT senior management must approve.                                           |
Under the current spending authority, it is difficult for mechanics and supervisors to purchase parts. For example, for 10-wheelers and other heavy trucks, most repairs require purchasing parts that total more than $2,000. Consequently, mechanics spend considerable time obtaining approvals in following procedures, which delay repairs.

The use of credit cards and purchase orders with higher spending limits has allowed some departments to reduce these expenditures. While UDOT has recently adopted a purchasing card (P-card) to assist supervisors in expediting parts acquisition, the card is still limited to supervisors and purchasing thresholds have not been adjusted. Under these constraints, the P-card’s effectiveness is limited.

- **Current purchasing processes require duplicate data entry and paperwork.**
  Mechanics cite processing time and a high level of paperwork as barriers to using the Department’s warehousing facility. UDOT’s current process requires entry of procurement data into both CARS and FINET.

- **Non-standard or off-brand equipment can cause parts acquisition delays.**
  The lack of standardization of vehicles and equipment requires UDOT to stock different vendors’ parts, increasing the inventory carrying charges. Off-brand equipment can result in higher prices for parts as well as longer delivery times.

- **Studies indicate that up to 70 percent of procurement resources are consumed to acquire three percent of the parts procured.**
  In response, many fleet administrators have recognized that advantages exist in facilitating smaller parts purchases. A “just-in-time” inventory approach provides opportunity for managing inventories and reducing purchasing activities. The Texas Department of Transportation implemented a successful pilot program by using commercial transportation companies to provide distribution to a multi-district area from a single warehouse location. Through a combination of small package, commercial freight, and truckload carriers, the pilot program provided scheduled deliveries direct to each ordering location. An additional benefit was the ability to shift employees’ time to core functions.

- **Best practices from other states include using information technology and vendor consolidation or outsourcing of parts management.**
  A review of parts procurement in other large fleets indicates the following best practices:
- **Parts consignment and long-term parts contracts.**
  Mack Trucks provides parts for the Pennsylvania Department of Transportation’s (PennDOT) stock room. However, PennDOT does not pay for the parts until they are actually used. The City of Decatur uses a similar consignment arrangement for batteries.

  Some vendors offer longer-term parts contracts with guaranteed availability and delivery schedules.

- **Contracting out some or all of parts management functions.**
  Outsourcing parts procurement and management enables fleet managers to access private sector creativity to manage and distribute parts. It also shifts the burden of stocking a diverse array of parts onto the contractor. Training costs, warranty management, and implementation of a computerized inventory management system all become the vendor’s responsibility.

- **Consolidating parts procurement contracts.**
  Due to economies of scale, vendors need a certain level of purchasing commitment in order to offer volume discounts. Agencies that consolidate parts procurement into a few vendor contracts are more likely to realize volume discounts than agencies that spread parts procurement among many vendor contracts. Besides saving money by buying parts in bulk, consolidating vendors saves time and money that would be spent initiating separate procurements. With all parts procured from a few vendors, the department should also realize more standardization.

  Changing the current contracting model may require removing legal barriers. Existing vendors would probably resist any consolidation that does not include them. Finally, Utah’s geography may make statewide consolidation difficult. Consolidating parts vendors by region or district may be an available alternative.

- **Automating parts management using barcode technology to maintain a real-time parts inventory.**
  In automated systems, parts are scanned (e.g., with a wand) upon delivery, then again when they are expended for a work order. Several systems take automation one step further and integrate a procurement function. Under these systems, the department sets trigger levels for each inventory item, whereby a purchase order (or an online purchase) is automatically processed to replenish the stock.

  Automated parts management systems cut data entry time, reduce overstocking, ease warranty management, eliminate the need for tedious manual inventory counts, and greatly reduce counting error. Integrating
procurement not only saves time, effort, and paperwork, it also helps establish a more direct relationship between use and purchase of parts.

Startup costs, including purchase, installation, and training are high. However, several departments have recouped their initial investments in increased productivity and reduced equipment downtime. The Jacksonville Florida Transit Authority recently experienced significant increases in efficiency by moving to an automated parts management system.

- **Procuring parts using a just-in-time inventory management approach.**

  Some parts departments have forgone maintaining significant parts inventories in favor of contracting with vendors to supply certain parts just-in-time for needed repairs. This strategy has reduced associated inventory carrying costs, including warehouse space and the risk of parts obsolescence. The key to managing parts supply using just-in-time delivery management is the vendor/client supply chain relationship. Vendors that provide just-in-time service often must spend time analyzing the department’s parts supply chain processes.

  Just-in-time delivery does not work in all cases. Some survey responses indicated that rural areas have trouble with just-in-time parts contracts. Those surveyed suggested that parts were infrequently delivered on time and the contract prices were high, about a 30 percent premium on parts.

- **Procuring parts online.**

  Online parts procurement encompasses three general methods of procurement:

  1. **Obtaining competitive quotes from vendor web sites.** In lieu of faxing or calling vendors for quotes, some agencies check list prices from vendor web sites. Agencies can bookmark pages of list prices from various dealers and check several before deciding to purchase from the most advantageous vendor.

  2. **Purchasing directly from secure vendor web sites.** Some agencies have established direct online purchasing relationships with vendors or dealerships from which they have procured equipment. Direct purchasing through vendor web sites is especially effective when the department must procure proprietary parts.

  3. **Online reverse auctions.** In an online reverse auction, the department provides detailed specifications to vendors. (The department also may elect to pre-qualify vendors.) At a specified time, vendors log on to a secure website where the auction takes place in real time. Each bid is posted for all vendors to see, though bidder identities are usually
masked by assigning nicknames. As the auction progresses, bidders offer lower prices to supply the specified items. A contract award to the lowest bidder is completed at the end of the auction period.

Purchasing parts online streamlines the procurement process, saves paperwork, and empowers more direct purchasing from the users of the end product. Ordered items are shipped directly to the site ordering, relieving the department from the burden of picking up or distributing parts.

Drawbacks include the up-front costs of training and implementation. Customer service for some online companies could be a problem, but that could be mitigated by pre-qualifying parts suppliers before purchasing from them online. While costs savings may be likely, adding delivery charges to some items may increase the cost of purchasing some parts. The bulk of online procurement’s savings are from reduced time spent on procurement. For example, a private 65-vehicle fleet in Virginia recently saved $25,000 in its first year of online purchasing by eliminating procurement costs.

C. Recommendations

This section presents recommendations improving fleet and equipment parts procurement and supply based on the audit findings in this business area.

Recommendation VI-1: With the Procurement Division, reengineer the parts procurement and supply processes supporting central, regional, and district repair shops.

• Implement best practices from other states in the areas of information technology and vendor consolidation or outsourcing of parts management.

• Integrate existing capacity in CARS to make improvements to inventory management.

• Establish function to facilitate parts procurement and supply at UDOT headquarters.

• As part of the recommended regional equipment business manager function roles and responsibilities, support regional and district mechanics by coordinating parts procurement and supply with headquarters.

• Reengineer the spending authority review process, increasing the range and upper limits for parts purchase costs.

This recommendation is intended to increase the importance within the Department of parts procurement and supply as an input to efficient and effective fleet and equipment management. UDOT has significant opportunity to better utilize existing information systems and draw on best practices from other states.
Appendix A: Benchmarking Assessment of Fleet Management Best Practices

A. Methodology and Survey Subjects

Dye Management Group, Inc. completed a benchmarking assessment of fleet management best practices to identify alternative business models for acquisition, outfitting, maintenance and repair, and parts procurement. All benchmarking interviews were conducted via telephone with a structured interview guide that ensured consistency of the information gathered. Fleet equipment operators from the following jurisdictions were contacted:

- Arkansas State Highway and Transportation Department.
- Connecticut Department of Transportation.
- City of Decatur, Illinois.
- Illinois Department of Transportation.
- Maine Department of Transportation.
- Mississippi Department of Transportation.
- New York City Office of Fleet Administration.
- New York Department of Transportation.
- Pennsylvania Department of Transportation.
- Pennsylvania Turnpike Authority.
- South Carolina Department of Transportation.
- Virginia Department of Transportation.

B. Equipment Acquisition

While many large fleets, including UDOT, acquire equipment through a low-bid process, several fleets have begun to experiment with alternate acquisition strategies that take into account more criteria than initial purchase price. Exhibit A-1 illustrates some of the benefits and drawbacks of equipment acquisition strategies found in other fleets.
## Exhibit A-1: Alternative Acquisition Models

<table>
<thead>
<tr>
<th>Description</th>
<th>Benefits</th>
<th>Drawbacks</th>
</tr>
</thead>
</table>
| **Lease or Lease-purchase** | • Vendors bid on contract to provide equipment for a set term (usually five years) for equal periodic payments.  
• Lease may include an option to purchase at the end of the term. | • Small initial cash outlay.  
• Less maintenance cost.  
• Ability to acquire newer technology.  
• Fixed, predictable payments.  
• Flexible terms. | • Can be expensive over equipment life.  
• Devotes operating expenses to capital.  
• No ownership during lease term. |
| **Purchase-Buyback** | • Vendors submit two bid prices: an initial sale price and a price that they will pay to buy the equipment back after a set period.  
• Typically used for high resale level equipment such as backhoes, excavators, and bulldozers. | • Less maintenance expense.  
• Ability to partially or fully recoup purchase costs.  
• Some DOTs have reportedly recouped 97 percent or more of their initial acquisition expenses.  
• Ability to acquire newer technology. | • May need legislative change.  
• Need vendor buy-in.* |
| **Best value** | • Department establishes factors it will consider in addition to initial purchase price (e.g., ease of integration into existing fleet, vendor reputation, expected maintenance costs, etc.).  
• Department may decide to pay a premium for more advantageous bids or proposals. | • Ability to evaluate and make selections based on lifecycle costs.  
• Flexibility in selection. | • Can be complicated and time-consuming preparation and evaluation process.  
• May not be legal in Utah for certain purchases. |
| **Rentals** | • Vendors bid on contracts to provide temporary use of equipment. | • Cost effective for low use equipment.  
• Less maintenance cost (maintenance provided by owner).  
• Ability to acquire newer technology.  
• Less space occupied year-round. | • No access to equipment in an emergency.  
• Commonly used seasonal items may need to be reserved far in advance to avoid extra charges. |
| **Collaborative Purchasing** | • Department combines with other states or regions to negotiate prices with vendors.  
• Department then has access to contracts under the negotiated terms. | • Low prices generated from increased buying power.  
• Eliminates some procurement expenses. | • Buying power already large.  
• Inflexible terms may necessitate costly modifications.  
• Time and money to establish collaborative.  
• Local vendors are negative about buyback portion of contracts. |
| **Multi-year Contracts** | • Vendors bid on contracts to provide equipment for more than one year. | • Greater standardization (lower training and parts expenses).  
• Eliminates procurement expenses in off years. | • More complicated to evaluate bids or proposals.  
• May not be legal in Utah for certain purchases. |

*Source: Dye Management Group, Inc. analysis*

*Note(*): After Kentucky changed its laws to allow purchase-buyback, vendors boycotted the program.*
1. Purchase-Buyback in Practice

- Louisiana Department of Transportation (LDOT) has operated a purchase-buyback program since the early 1990s. LDOT provides in its bid specifications that it may select either the lowest bid for purchase or the lowest one-year cost, taking into account the bidder’s buyback price. Between 1992 and 1998, LDOT spent $11.9 million and recovered $11.4 million, a 96 percent recovery rate.

- Arkansas State Highway and Transportation Department (AHTD) has used purchase-buyback since 1988. Every year, AHTD purchases mowing tractors and backhoes by soliciting a purchase price and an optional vendor repurchase price. AHTD promises to perform preventive maintenance on the equipment in return for the option to sell the equipment back after one year. The department reports that it recoups its initial investment and sometimes makes money on the transaction.

- The City of Decatur, Illinois uses purchase-buyback for all its construction equipment: loaders, graders, and backhoes. It requests three prices from all bidders: a purchase price, a buyback price after two years (or 2,000 hours), and a buyback price after five years (or 5,000 hours). When the city awards a contract, it chooses either the two-year or five-year buyback option. However, when the period has elapsed, the city can elect to keep the equipment. The city has been able to switch equipment between departments so that equipment that is nearing its limit is transferred to a department with lower equipment utilization rates.

2. Leasing and Lease-Purchasing in Practice

- The Connecticut and Pennsylvania Departments of Transportation both frequently use lease-purchases due to tight budgets that prevent more purchasing. Pennsylvania reports that it uses lease-purchases in order to tap into vendor financing and avoid debt.

3. Best Value Purchasing in Practice

- Connecticut Department of Transportation uses an RFP process where compatibility with existing fleet is one evaluation criteria. The department considers future maintenance and parts expenses by taking into account the current maintenance knowledge and the parts already in stock.

- The City of Decatur, Illinois uses a hybrid low-bid process: in its bid specifications, the city provides that maintenance costs will be considered along with initial purchase price. On a recent purchase of sweepers, the city selected a higher bid because it compared the historical maintenance costs of the two lowest bidders and found that the second-lowest bidder’s maintenance costs were significantly lower.
• South Carolina Department of Transportation similarly occasionally rejects low-bids based on lifecycle costs. The department’s fleet manager records per-mile costs and uses them to justify rejection of low-bidders. However, the practice has been criticized by the department’s procurement officials.

4. Multiyear Contracts in Practice

• Virginia Department of Transportation uses options to extend equipment contracts if both parties are agreeable.

• South Carolina Department of Transportation purchases all equipment in two-year contracts, which has led to better standardization.

5. Vehicle and Equipment Rentals in Practice

• The Arkansas State Highway and Transportation Department rents equipment needed in emergencies – such as heavy cranes used in bridge repairs.

• Maine Department of Transportation rents about $3 million to $6 million of equipment per year for heavy ditching and other tasks that would cause tremendous wear on owned equipment.

• Virginia Department of Transportation avoids overstocking equipment by renting when all other equipment is in use.

• The City of Decatur, Illinois rents equipment when available equipment is down; it hopes to move toward more rentals because some owned equipment is underutilized.

6. Online Equipment Purchases in Practice

• Pennsylvania Department of Transportation (PennDOT) uses a private company to help it run reverse auctions where it purchases large orders of dump trucks and crew cabs online. In a reverse auction, an agency provides detailed specifications to bidders. (The agency may elect to pre-qualify bidders.) The auction progresses with bidders offering lower prices for items that fit the specifications set by the agency. According to PennDOT, the program has been very successful and should soon expand to other equipment.
C. Outfitting

Although UDOT’s Prep Shop outfits department vehicles after they are delivered, most fleets require vendors to outfit vehicles before delivery. Exhibit A-2 lists benefits and drawbacks of internal versus vendor outfitting.

Exhibit A-2: In-House Versus Outsourced Outfitting

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In-house</strong></td>
<td></td>
</tr>
<tr>
<td>• Control over final product.</td>
<td>• Lag time and reduced productivity between equipment</td>
</tr>
<tr>
<td></td>
<td>delivery and equipment readiness.</td>
</tr>
<tr>
<td></td>
<td>• Reduction of effective warranty period</td>
</tr>
<tr>
<td></td>
<td>• Staff diverted from maintenance duties.</td>
</tr>
<tr>
<td><strong>Vendor Outfitting</strong></td>
<td></td>
</tr>
<tr>
<td>• Reduced turnaround time.</td>
<td>• Higher direct costs.</td>
</tr>
<tr>
<td>• Staff devoted to core maintenance</td>
<td>• May reduce competition if vendors are unable or</td>
</tr>
<tr>
<td>duties.</td>
<td>unwilling to perform outfitting.</td>
</tr>
<tr>
<td>• May be more cost effective when</td>
<td></td>
</tr>
<tr>
<td>all factors are taken into account.</td>
<td></td>
</tr>
</tbody>
</table>

1. Vendor Outfitting in Practice

- Virginia Department of Transportation performs less than one percent of outfitting in-house.
- New York State Department of Transportation determined that it was not cost effective to perform outfitting in-house, so the department tries to put as much as possible in their contracts.
- South Carolina Department of Transportation (SCDOT) outsources outfitting in order to provide a cheaper, more consistent installation. SCDOT found that in-house operations provided inconsistent welding on outfits. (It currently only adds dump bodies and utility beds in-house.)
- Maine Department of Transportation requires most vendors to provide heavy outfitting so that it can concentrate on its heavy maintenance and repair program.
- Connecticut Department of Transportation requires vendors to perform all outfitting, even the application of reflective tape, in order to have the entire package under warranty.

D. Maintenance and Repair

Fleet managers have come to different conclusions about the appropriate level of maintenance and repair outsourcing. Levels of outsourcing run from three percent of all maintenance for Maine Department of Transportation to almost complete privatization for the New York City Office of Fleet Administration. Most surveyed state DOTs reported
using private contractors for work that requires expensive equipment or expertise that often cannot be maintained in-house cost efficiently. Exhibit A-3 illustrates the benefits and drawbacks to in-house and outsourced maintenance and repair.

**Exhibit A-3: In-House Versus Outsourced Maintenance and Repair**

<table>
<thead>
<tr>
<th>Explanation</th>
<th>Benefits</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Maintenance (preventive, repair, overhauls, etc.) is primarily performed by department employees. | • May be more cost effective.  
• Control over timing of maintenance and repair.  
• Pride of ownership in performing own maintenance. | • Difficulty in attracting and retaining mechanics.  
• Responsible for training costs and strategy.  
• (UDOT) Responsible for effective management of parts and inventory.  
• Some repairs will still have to be outsourced. |

| Outsourced Maintenance and Repair | Vendors bid to manage all or part of vehicle maintenance, including vehicle and equipment maintenance, warranty management, and parts management.  
• In a public/private competition, public employees are permitted to submit a proposal to keep the work in-house. | Contracts, even with a winning public employee team, may guarantee a certain percentage of savings in the first year.  
• One contract and invoice.  
• If customized reporting is part of the contract, it could aid in lifecycle cost analyses.  
• Provides more dynamic career options for retained employees. | Evaluation and selection process difficult and complex.  
• Lots of costs may be outside the contract.  
• Likely to face opposition from existing workers (somewhat less opposition if public-private competition). |

1. **Outsourced Maintenance in Practice**
   - In 1995, New York City’s Office of Fleet Administration privatized the maintenance operations of most of its fleet. Savings estimates range from between $1,200 and $2,200 per vehicle. Downtime has been cut substantially.
   - Connecticut Department of Transportation has outsourced oil changes. It not only frees its maintenance staff for heavier repairs, it also frees the department of the responsibility to dispose of the hazardous material.

E. **Parts Management**

Parts management, including inventory management and parts procurement, is a critical function of fleet operations. Fleets have tried a variety of methods to ensure that parts management operates efficiently and effectively. Exhibit A-4 illustrates some emerging trends in parts management.
### Exhibit A-4: Parts Management Emerging Trends

<table>
<thead>
<tr>
<th>Explanation</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| **Consolidate parts vendors** | - Rather than purchasing parts from multiple vendors, multiyear contracts are awarded to a few vendors per region. | - Bulk discounts.  
- Eliminates multiple procurement processes.  
- Fewer vendor relationships to manage. | - Resistance from current vendors.  
- More vulnerable to contractor failure.  
- May impact variety of parts supply.  
- Legal barriers. |
| **Outsource parts management** | - Vendors bid on a contract to both supply and manage parts. | - One contract, one invoice.  
- Could improve warranty management.  
- Decrease cost of inventory carry.  
- Mitigates lack of vehicle standardization.  
- Could be more cost effective. | - Anecdotal evidence indicates it may be less cost effective.  
- More vulnerable to contractor failure.  
- Vulnerable if no competition in the future (especially if contractor is allowed to become “indispensable”). |
| **Automated parts management** | - With barcode-scanning technology, each part has a barcode is scanned into the computer when delivered or used.  
- Automated purchasing allows the computer to automatically initiate a purchase order or online procurement when it senses inventory reaching a pre-determined level. | - Real-time, accurate inventory without tedious manual inventory.  
- Easier warranty tracking.  
- Reporting capabilities can aid in lifecycle cost analyses and evaluation of vendor reliability.  
- Less wasted warehouse space. | - Startup costs (purchase, installation, training.). |
| **Online parts procurement** | - Includes making smaller online purchases from selected vendors, obtaining competitive quotes from vendor web pages, and/or online auctions. | - Wide selection of items.  
- Streamlined procurement process.  
- Delivery to site.  
- Detailed product descriptions often accompany online ordering information. | - Startup costs (training, implementation, purchase of any specialized software.). |
| **Purchasing discretion** | - For small and medium dollar value purchases, staff are given authority and power to procure parts from local vendors. | - Fast acquisition, reduced downtime.  
- Reduces procurement processing expenses. | - Requires establishing system, including oversight to prevent abuse. |
1. Consolidation of Parts Vendors in Practice

- New York State Department of Transportation has tried to consolidate parts vendors. For example, one parts vendor has a contract for 32 items.

2. Outsourced Parts Management in Practice

- About one-third of the Virginia Department of Transportation’s parts management for both heavy equipment and passenger vehicles is outsourced to NAPA. NAPA’s contract requires that 80 percent of requested parts be in stock. The department reports that cost savings have been inconclusive, but that the contracts have been successful in eliminating manpower, inventory costs, and warehouse space. The program, which began as a pilot project, will probably be expanded to the entire state.

- The City of Chicago’s Department of Fleet Management signed a contract with NAPA in 2000. The agreement requires NAPA to provide 85 percent of required parts upon demand and 95 percent by 7:30 the next morning. The deal also requires NAPA to use the City’s existing inventory until it has been expended.

- Texas Department of Transportation uses an onsite vendor in its San Antonio district to manage parts operations. The vendor uses less space than the previous operations used, equipment downtime due to unavailable parts has been reduced, and the Department only has to process one biweekly invoice rather than many vendor purchase orders. The Texas Comptroller has estimated $376,320 yearly savings on purchase order processing alone. A consultant for the department estimated that expansion of the program would net over $5 million in first year savings and $3 million in savings in subsequent years.

3. Automated Parts Management in Practice

- The City of Decatur, Illinois uses barcode-scanning technology for its parts, which has enabled the city to reduce its overall inventory by 60 percent (from $235,000 to $140,000). Time spent taking inventory has been substantially reduced, and the inventory variance has been reduced from tens of thousands of dollars to a couple of thousand dollars.

- Maine Department of Transportation uses barcode-scanning technology that requires parts to be assigned to particular work orders. Inventory is kept in real-time, and a reordering system has been established where purchase orders are printed when inventory reaches target levels. Purchase orders are checked before being called in, to ensure that antifreeze is not ordered in the middle of the summer, for example.
4. **Online Parts Procurement in Practice**

- Arkansas State Highway and Transportation Department purchases parts online from NAPA, as well as from dealers with whom they have equipment contracts. They report that online procurement has been successful in eliminating some levels of procurement. With more direct contact between the mechanic and the supplier, fewer errors occur.

5. **Purchasing Discretion in Practice**

- Pennsylvania Department of Transportation repair shops carry Visa cards that can be used for no-bid parts purchases with local vendors for up to $3,000.

- South Carolina Department of Transportation (SCDOT) uses credit cards with variable spending limits for parts purchases. Supervisors can use up to $1,500; mechanics can spend up to $500. SCDOT also uses $1,500 open-ended contracts with local vendors.

- Connecticut Department of Transportation (CDOT) allows employees to purchase up to $1,000 in incidental parts purchases from any local vendor that accepts CDOT purchase orders.