

## National Survey of Equipment Management Practices

*Requested by*  
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*The Caltrans Division of Research and Innovation (DRI) receives and evaluates numerous research problem statements for funding every year. DRI conducts Preliminary Investigations on these problem statements to better scope and prioritize the proposed research in light of existing credible work on the topics nationally and internationally. Online and print sources for Preliminary Investigations include the National Cooperative Highway Research Program (NCHRP) and other Transportation Research Board (TRB) programs, the American Association of State Highway and Transportation Officials (AASHTO), the research and practices of other transportation agencies, and related academic and industry research. The views and conclusions in cited works, while generally peer reviewed or published by authoritative sources, may not be accepted without qualification by all experts in the field.*

### **Executive Summary**

#### **Background**

To help inform future decisions related to its equipment management program, Caltrans sought to establish the state of the practice for equipment management across the United States and Canada, including best practices, challenges and alternative approaches among state transportation agencies.

For this investigation, equipment management includes the acquisition, operation, maintenance, repair and disposal of a transportation agency's light- and heavy-duty vehicle fleets and related hardware. It also more broadly includes activities related to fleet management, such as planning and budgeting, human resources and training, and information technology.

#### **Summary of Findings**

To gather information for this investigation, we conducted an online survey of state fleet managers and executive-level staff about their agencies' practices in different areas of equipment management. Twenty-nine individuals representing 26 states and two Canadian provinces responded to the survey.

This Preliminary Investigation presents the survey approach and findings in the following sections:

#### **Survey Audience and Distribution**

The recipients of this survey included all of the individuals listed in AASHTO's 2011 Equipment Reference Book.

#### **Survey Introduction**

The introductory text for the survey, consisting of both a cover email sent to recipients and the introductory screen of the online survey itself, outlines the importance, purpose and organization of the survey.

## Survey Questions and Responses

The survey consisted of 32 questions addressing six main topics:

- Equipment Acquisition.
- Equipment Maintenance and Repair.
- Equipment Operation and Replacement.
- Fleet Information Management.
- Fleet Policy, Financial Management and Business Planning.
- Fleet Human Resources Management.

## Survey Analysis

An analysis of survey findings, including statistics and trends in free response questions, is presented in this section of the Preliminary Investigation. Noteworthy findings, grouped by topic, are summarized below:

### Respondent Information

- For the different areas of equipment management, the most common level of authority among respondents is statewide management and decision making. Approximately 10 percent to 15 percent of respondents have a higher level of oversight authority.

### Equipment Acquisition

- A large majority of respondents said that their agencies' equipment needs are determined in a consistent manner based on established work methods or standards, and a similar number use a process for identifying the most cost-effective means of meeting the need for an asset.
- About two-thirds of respondents indicated that their agencies purchase what they would consider "off-the-shelf" road maintenance equipment.

### Equipment Maintenance and Repair

- Respondents' agencies are largely meeting or exceeding their maintenance and repair requirements in terms of maintenance intervals for different asset classes, breakdown rates, and repair downtime and turnaround time. Mechanic costs and productivity were similarly meeting requirements for a large majority of respondents, but only about half of responding agencies are meeting requirements for mechanic-to-vehicle ratios.
- Preventive maintenance work is performed overwhelmingly in-house, with an average of 81 percent of work performed in-house among respondents. On average, 75 percent of repair work is similarly performed in-house.
- By a factor of 4 to 1 respondents reported that outsourced work is more expensive, and by a factor of 3 to 1 they reported that outsourced work requires more bureaucratic steps.
- The most common issue respondents encounter related to replacement parts is being out of internal stock.
- Half of the respondents said that their agencies internally up-fit new equipment, and most said their agencies internally install specialty equipment and components.

### Equipment Operation and Replacement

- Half of the respondents reported that the average asset age is meeting agency requirements. Eighty percent of respondents said that both the average utilization rate and the average cost per mile are meeting or exceeding requirements.
- Agencies tend to use electronic methods for recording utilization, and data is much more commonly entered into a statewide database rather than a local one.
- On average, 8 percent of respondents' fleets are replaced annually. This figure is significantly exceeded by the percentage overdue for replacement (25 percent).
- Sale or auction of equipment through states' surplus departments is the most common method of equipment disposal. Some respondents noted inefficiencies in this method.

### Fleet Information Management

- Only half of the respondents reported that availability of wireless Internet meets or exceeds their requirements. The remainder of their information technology requirements is largely being met.
- Fleet information technology support is most commonly provided by agencies' information systems departments. The most common management information systems (MIS) functions are maintenance and repair records, fleet inventory, assignment location and assignment history.
- Respondents reported using such advanced technologies as telematics (automatic vehicle location and GPS), bar coding and advanced fuel systems.

### Fleet Policy, Financial Management and Business Planning

- The most common factors that respondents' agencies take into account for fleet asset capital expenditure are future use and need forecasting and life-cycle cost analysis.
- Agencies' equipment needs are funded most commonly through allocation by legislation.
- Five-year trends in personnel, repair and maintenance, and capital expenditure budgets varied considerably. Among respondents:
  - Personnel budget changes ranged from a 30 percent decrease to a 50 percent increase.
  - Repair and maintenance ranged from a 23 percent decrease to a 54 percent increase.
  - Capital expenditures ranged from a 60 percent decrease to a temporary 100 percent increase.

### Fleet Human Resources Management

- Most respondents indicated that their agencies provide operator training in the operation of equipment.
- The most common method of measuring productivity is an internal calculated rate or standard. Several respondents noted that productivity is not currently measured.
- 78 percent of respondents said their agencies had difficulty hiring qualified repair and maintenance staff, and 65 percent said that their agencies had difficulty retaining them.

### **Additional Resources**

Beyond conducting a survey, we compiled selected online resources relevant to this topic:

- The web site of the AASHTO Equipment Management Technical Services Program (EMTSP).
- A June 2012 national conference on equipment management that the EMTSP is co-sponsoring.
- AASHTO's 2011 Equipment Reference Book.
- An NCHRP publication on equipment management research challenges and opportunities.
- A 2006 survey conducted by the Federal Highway Administration (FHWA) and AASHTO focused on highway management systems.
- A 1986 equipment management training video produced by FHWA.

### **Gaps in Findings**

Caution should be taken in drawing conclusions from the statistics presented throughout this Preliminary Investigation because of factors inherent in a survey of this type:

- While the response to this survey was high, it represented only slightly more than half of the U.S. states and just a few Canadian provinces. States that did not respond to the survey could have impacted the overall results, including trends and statistics.
- As with any self-selecting survey (that is, one where respondents are free to decide whether or not to participate), we are likely to have received answers from people with a vested interest in this topic and strong opinions about equipment management. Self-selecting surveys tend to skew results toward the extremes of highly positive answers and highly negative answers.

- It is likely that the answers from any given state are dependent on the individual responding to the survey and his or her agency role and area of expertise. This is particularly true of the more subjective questions in the survey.

Another possible gap in these findings was the limited focus areas of the survey. The NCHRP report *Challenges and Opportunities: A Strategic Plan for Equipment Management Research* (described in detail in the **Additional Resources** section of this Preliminary Investigation) lists 14 areas of equipment management, and within these fully 50 functional areas. It would have been impossible to develop a survey that explored each of these areas in equal detail. Caltrans and the investigators together selected areas of specific interest in developing the survey, and as a result, other areas necessarily were not addressed in similar detail.

### **Next Steps**

The results of this survey will allow Caltrans—or any other state department of transportation (DOT)—to gauge the status of its own fleet management program and processes compared with a large group of its peers. Identifying which challenges are common among other DOTs can be an important tool in informing equipment management and policy decisions.

Based on the survey results, Caltrans may wish to consider targeted follow-up activities in areas of particular concern. This could involve efforts to explore the feasibility of implementing practices described by other state DOTs throughout this survey. Caltrans might also wish to contact individuals who provided specific survey results, including those who share common challenges with Caltrans as well as those who could offer alternative approaches and specific solutions that might be applicable in California.

Likely other state DOTs will be interested in these survey results, and there may be opportunities to share these results at a national level. In particular, Caltrans may wish to present the findings in some summary format at the First National Equipment Fleet Management Conference (<http://www.emtsp.org/national2012/>), to be held in Mobile, AL, June 24-28, 2012. The event is co-sponsored by AASHTO and TRB.

## **Survey Audience and Distribution**

### **Audience**

We sent this survey to every name with an associated email in AASHTO's 2011 Equipment Reference Book (<http://www.emtsp.org/files/2011/05/AASHTO-Equipment-Reference-Book-2011-Format.pdf>):

- Section IIIA, Contacts by State (pages 3-28): 156 names in all 50 states and the District of Columbia.
- Section IIIB, Contacts by Affiliate Member (pages 29-32): 14 names in seven Canadian provinces and Puerto Rico.

As indicated by their job titles, the individuals listed in this reference have high-level state management or oversight authority in the areas of equipment, fleets, procurement, parts, facilities, operations and maintenance.

### **Distribution**

The following email was sent to 170 recipients on May 1, 2012, inviting them to participate in this survey:

**Subject: Caltrans survey on national equipment management practices**

Hello,

The California Department of Transportation invites you to take part in a survey of state and provincial DOT equipment managers and decision makers. Your feedback about your agency's equipment management program will be critical in establishing the state of the art and practice in fleet and asset management. Caltrans' [Division of Research and Innovation](#) is conducting this survey and will publish a synthesis report of the survey findings.

Please [follow this link \(http://www.surveymonkey.com/s/caltrans-em-survey\)](http://www.surveymonkey.com/s/caltrans-em-survey) to take the survey now. We would appreciate your response by Monday, May 14.

Please let me know if you have any questions. Thanks for taking the time to complete this survey.

**Larry Orcutt**

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On May 9, 2012, we reviewed all responses collected to date and sent a reminder email to all original recipients in states and provinces from which we had not received a survey response. The survey closed to additional responses on May 15, 2012.

## Survey Introduction

The introductory text of the online survey follows:

The California Department of Transportation is conducting this survey of state and provincial DOT equipment managers and decision makers to capture the state of the art and practice in fleet management. Your participation will help establish trends and common challenges related to equipment management and reveal best practices for managing DOT fleets in today's economic climate.

Caltrans' [Division of Research and Innovation](#) is coordinating this survey and will publish a synthesis report of the survey findings.

Please let me know if you have any questions. Thanks again for taking the time to complete this survey.

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### **INTRODUCTION**

The final report for NCHRP Project 20-7/Task 309, [Challenges and Opportunities: A Strategic Plan for Equipment Management Research](#) [PDF] broadly defines **Fleet Equipment Management** as including:

- **Asset management**, the acquisition, operation, utilization, upkeep, disposal and replacement of the physical assets that make up a vehicle and equipment fleet.
- **Program management**, the responsibilities, authority, resources, expertise, cooperation and decisions required to furnish assets and asset management services to fleet users.

The NCHRP report presents key areas of equipment fleet management that are “important to the operation of an effective, safe, reliable, economical, and sustainable fleet.” The questions in this survey are roughly grouped by these areas, as shown in Question 2 below.

## Survey Questions and Responses

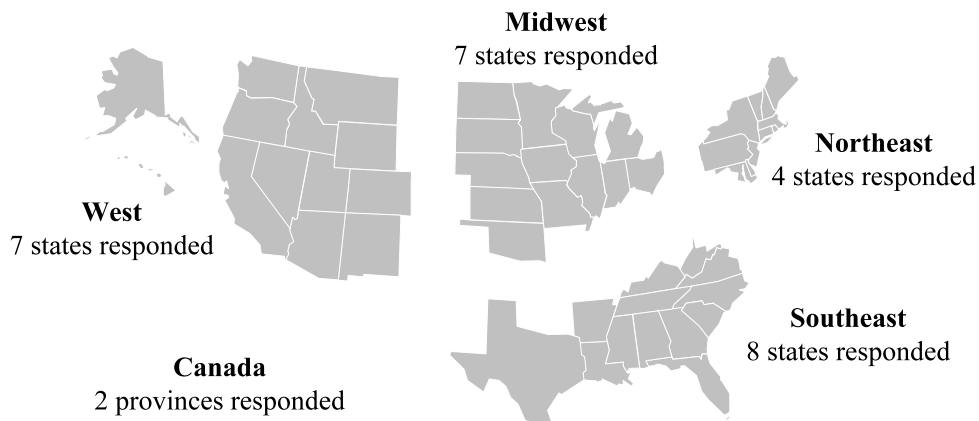
This section includes the complete survey, including the text of the 32 questions as well as all collected responses. The next section, **Survey Analysis**, includes observations, trends and conclusions that can be drawn from these responses.

**\*1. (Required) Please provide your name, organization and title. This information will not be published.**

**Name:** \_\_\_\_\_  
**Organization:** \_\_\_\_\_  
**Title:** \_\_\_\_\_

Twenty-nine individuals responded to this survey. These respondents represent 26 states (one state had multiple respondents) as well as two Canadian provinces.

As noted in the language of Question 1, to help ensure candid responses, the survey indicated that each respondent's name, title and agency would be kept in confidentiality. The map below shows the number of responding states as grouped by the four regions used by AASHTO's EMTSP.



A number of participants later gave permission to list their agencies by name in this report. These include:

- Alabama DOT.
- Colorado DOT.
- Connecticut DOT.
- Florida DOT.
- Idaho Transportation Department (two responses).
- Illinois DOT.
- Montana DOT.
- Nebraska Department of Roads.
- New Brunswick Department of Transportation and Infrastructure.
- North Carolina DOT.
- North Dakota DOT.
- Oklahoma DOT.
- Oregon DOT.
- Pennsylvania DOT.
- South Carolina DOT.
- Texas DOT.
- Utah DOT.
- Vermont Agency of Transportation.
- Virginia DOT.

**2. Please indicate your own role (level of authority) within your agency related to the following areas of fleet equipment management.**

Twenty-nine individuals responded to one or more parts of this question.

	Executive oversight <i>(higher level of authority than state equipment manager)</i>	Statewide management and decision making <i>(authority of state equipment manager or equivalent)</i>	Regional management and decision making	Involved in a nonauthority capacity	Not involved/not applicable	Total respondents
Equipment acquisition	10.3% (3)	82.8% (24)		6.9% (2)		29
Equipment maintenance and repair	14.3% (4)	75.0% (21)	7.1% (2)	3.6% (1)		28
Equipment operation, fueling and utilization	14.3% (4)	67.9% (19)	7.1% (2)	7.1% (2)	3.6% (1)	28
Equipment replacement and disposal	10.7% (3)	85.7% (24)	3.6% (1)			28
Fleet facility infrastructure management	14.3% (4)	32.1% (9)	10.7% (3)	25.0% (7)	17.9% (5)	28
Fleet information management	14.3% (4)	75.0% (21)	3.6% (1)	7.1% (2)		28
Fleet policy, financial management and business planning	17.9% (5)	71.4% (20)		7.1% (2)	3.6% (1)	28
Fleet human resources management	14.3% (4)	42.9% (12)	7.1% (2)	25.0% (7)	10.7% (3)	28
Fleet customer service management	14.3% (4)	67.9% (19)	3.6% (1)		14.3% (4)	28



## SECTION I. EQUIPMENT ACQUISITION

### 3. Are your agency's equipment needs determined in a consistent manner based on established work methods, business practices, allocation methods or formally defined standards?

Twenty-nine individuals responded to this question.

**Yes** 86.2% (25)  
**No** 13.8% (4)

Follow-up: **Please explain.**

Free responses among those who answered "yes":

- 20 year operational database; 10 years using same structure replacement criteria based on sponsored research.
- Age and usage with additional emphasis on older equipment replacement.
- Assuming "your agency's equipment needs" in this question means "the items your agency purchases," our response is as follows: Our agency uses a consistent process to determine what vehicles and equipment to purchase or replace. The department owns and maintains approximately 3,800 licensed (on-road) vehicles and equipment, 2,762 construction/agricultural (off-road) equipment, and 5,685 non-licensed equipment assets/attachments. Throughout each year, the department evaluates the suitability of units in its fleet based age, miles (or hours) of operation, downtime, as well as operating and maintenance costs to identify items that are no longer economical to repair. Additionally, each year each of the seven districts request and fund the subsequent years new and replacement items. Monies for this come from their overall operating budgets. Management reviews and approves their requests before the items are centrally purchased. Factors considered before approving requests are: replacement cycle policies or guidelines; repair versus replacement; subjective input from equipment, maintenance, and field personnel; needs and approved budget funding; contract, rent, or buy analysis, availability of operators, safety and risk, and identified projects.
- Based on established work methods and requirements.
- Connecticut tracks usage and needs of the department to determine equipment needs.
- Each of our county and district organizations annually complete a self developed fleet model that identifies our life cycles, average age and a number of other relevant indices.
- Equipment replacement is the responsibility of the central office headquarters. This process is defined and is consistent from year to year.
- Equipment replacement modeling functionality in the fleet management system.
- For the most part, but final budget submitted to and approved by legislature.
- Highway maintenance standards.
- However the final choice of what gets replaced is decided by the regions.
- I would say it's based on defined standards, snow plan, mowing, number of FTEs (full time employees), etc.
- North Carolina DOT operates from a "revolving fund," i.e., we rent equipment to the field in order to receive funds to cover cost of operating equipment and replacement.
- Operational hours, miles or years of use.
- South Dakota DOT has a policy in place for this.
- The province of New Brunswick has a Vehicle Management Agency (VMA) which procures the provincial fleet. New Brunswick Department of Transportation & Infrastructure (DTI) provides equipment replacement requirements to VMA. DTI submits requirements and procured assets are subject to departmental funding.
- Utilization and replacement schedule.

- We follow replacement criteria set forth.
- We follow set standards in the equipment manual that is updated biannually to ensure improvements in the fleet management system.

Free responses among those who answered “no”:

- Budget driven.
- Mostly on precedent.
- Senior staff currently determines the amount and type of equipment to replace.

**4. Does your agency use a process for identifying the most cost-effective means of meeting the need for an asset (e.g., own versus rent versus reimburse; assigned versus pool)?**

Twenty-nine individuals responded to this question.

**Yes** 79.3% (23)  
**No** 20.7% (6)

Follow-up: **Please explain.**

Free responses among those who answered “yes”:

- All costs are looked at to determine best value to ConnDOT.
- Assets are almost exclusively owned and are assigned regionally and pooled or within the region.
- At present, due to budget constraints, all purchases shall be justified as per needs, rental and ownership.
- Cost analysis.
- Items that are not used for emergency response, are not mission critical, and are not used often are candidates for rental or sub-contracting. Short term equipment rentals from vendors and equipment pool assignments exist throughout the state to minimize equipment purchases and encourage sharing of the items. In some areas, lack of available rental vendors results in decisions to purchase some items.
- Lease versus buy; repair versus replace.
- On an individual county level, rental costs, projected utilization, and cost of ownership are part of the formula used to make that determination. Justifications are required for every piece of equipment that is requested to be purchased.
- Policy.
- Our Vehicle Management Agency establishes the provincial guidelines for all departments, including the Department of Transportation & Infrastructure, which does result in mostly purchased/owned assets and supplements needs through rentals, leases and other arrangements.
- We do a cost analysis.
- We do evaluate which method is the most cost effective.
- We have a fleet program set on the green fleet initiative and purchase vehicles and equipment according to life cycle costs.
- We track utilization and urge divisions to rent equipment that has very low utilization from outside sources.
- Yes, but we are fairly new at this. We are always seeking input from other DOTs as well as the vendor community for new and innovative ways to lower costs and improve utilization.

Free responses among those who answered “no”:

- All are owned, most are permanently assigned.
- Some low use equipment is rented. Most equipment is purchased in lieu of other methods with the exception of our buyback program.
- We are working on leasing now.

**5. Does your agency purchase any of what you would consider to be “off-the-shelf” road maintenance equipment?**

Twenty-nine individuals responded to this question.

**Yes**      65.5% (19)  
**No**        34.5% (10)

**Follow-up: If you answered “yes,” please elaborate on whether such off-the-shelf equipment is modified—either by vendors or agency staff—to make it suitable for agency use.**

Free responses among those who answered “yes”:

- All equipment is modified as needed by vendors and usually this is only the light package.
- At one time we required specific colors, now we accept standard colors. Our specifications are written around industry standard configurations that meet our needs.
- Heavy equipment (graders, backhoes, etc.) that meet our defined specification are considered off-the-shelf; however, our snow plow fleet is procured by component (chassis, box, blades, plow, etc.) and assembled at vehicle management agency facilities.
- Minor modifications are typically necessary.
- Most heavy off road equipment would be considered off-the-shelf. Plow trucks, paint machines, etc., would be modified.
- No modifications as long as equipment meets needs of the department.
- Not modified.
- Off-the-shelf applies to light duty vehicles that are then equipped with some accessories as well as all other equipment types except snowplow trucks. Snowplow trucks are purchased as turnkey ready from a combination of vendors, each vendor providing specific components and accessories.
- Snow plow trucks are upfitted with dump bodies and electronic controlled hydraulic systems for operating the snow plow and chemical spreader.
- Some equipment has minor modifications.
- We look to what is typically available from the manufacturer.
- We purchase as much “off-the-shelf” as we can, including colors. New equipment is received through a central facility where it is inspected for quality assurance and compliance with agency specifications and state and federal standards. All items are stenciled with a property control number and SCDOT decal. Specific warning lights are installed either by the vendor or by SCDOT personnel (whichever is more cost effective). Two-way VHF radios are installed in many vehicles, trucks, and equipment. Bodies are installed on cab-chassis trucks. The majority of vehicles and trucks are upfitted with additional equipment including some or all of the following items: warning lights, two-way radios, distant measuring devices (DMIs), rear vision camera systems, rear object detectors, hydraulic spreader control valve systems, etc. Modifications are made based on district needs and department policies and guidelines. In some instances first aid kits and fire extinguishers are installed.
- We write specifications for equipment that meets the specific needs of NCDOT, but we try our best to stay with “off-the-shelf” as much as possible.

- Wide scope of modification, e.g., for paint, on-road assets are white and off-road are federal yellow.
- Yes, but only in the areas of smaller equipment such as sweepers and personnel vehicles.

Free response among those who answered “no”:

- Modifications are made to meet our specifications when we put the specific piece out to competitive bid.

## SECTION II. EQUIPMENT MAINTENANCE AND REPAIR

### 6. Please rate how well your agency is meeting its requirements in these *asset-related* areas.

Twenty-seven individuals responded to one or more parts of this question.

	Not meeting requirements	Meeting requirements	Exceeding requirements	Total responses
Maintenance intervals for light-duty vehicles (cars, pickups, vans, SUVs)	7.4% (2)	85.2% (23)	7.4% (2)	27
Maintenance intervals for heavy-duty trucks	11.1% (3)	70.4% (19)	18.5% (5)	27
Maintenance intervals for off-road/construction vehicles	11.5% (3)	69.2% (18)	19.2% (5)	26
Asset breakdown rate	13.0% (3)	73.9% (17)	13.0% (3)	23
Asset repair downtime rate	21.7% (5)	65.2% (15)	13.0% (3)	23
Asset repair turn-around time	26.1% (6)	65.2% (15)	8.7% (2)	23
Percentage of parts requisitions filled from inventory	27.3% (6)	68.2% (15)	4.5% (1)	22
Parts requisition fill time	22.7% (5)	63.6% (14)	13.6% (3)	22

**7. Please rate how well your agency is meeting its requirements in these staff-related areas.**

Twenty-three individuals responded to one or more parts of this question.

	Not meeting requirements	Meeting requirements	Exceeding requirements	Total responses
Ratio of mechanics to vehicles	47.8% (11)	52.2% (12)	0.0% (0)	23
Mechanic productivity rate	18.2% (4)	77.3% (17)	4.5% (1)	22
Cost per in-house mechanic labor hour	9.1% (2)	81.8% (18)	9.1% (2)	22

**8. What method does your agency use for determining mechanic staffing levels? (Free response.)**

Twenty-six individuals responded to this question.

- All our maintenance work is privatized.
- Average shop work load.
- Based on the fleet inventory assigned to the shop.
- Budget driven.
- Comparison with other shops.
- Currently mechanic staffing level is standardized in each District for a total quantity of mechanics. The quantity is not based on other factors such as total equipment in each District. This is now creating problems with equipment not being repaired in a timely manner.
- Currently none.
- Depends on number and type of vehicle and equipment at each site.
- Historically authorized number.
- Left to our vehicle management agency to determine.
- Mechanics are provided by another state agency. Historical practices and budgets are determining factors.
- Maintenance Repair Unit (MRU) analysis.
- MRU.
- No defined method.
- None. Staffing levels are set in stone.
- Not sure.
- Number of rolling stock pieces per full time employee.
- Position availability equipment fleet.
- Primarily determined by location (county) and additional resources are allocated in the areas with large quantities of fleet units.
- Staff levels are determined by the number of units in a district.
- Upper management determines full time employee numbers required.
- Vehicle equivalency analysis.
- We have a division and district level staffing program according to the needs of the area.
- We have not performed any staffing to equipment levels.
- We look at a mechanic per equipment scenario.

- We're currently outsourcing about 20 percent of our overall repair costs. So in order to keep with that, we've filled positions to maintain it.

**9. In terms of cost, what percentage of your agency's equipment *preventive maintenance* is performed in-house compared with outsourced? (Free response.)**

Twenty-seven individuals responded to this question.

- 100 percent.
- 100 percent.
- 100 percent in house.
- 100 percent in house.
- Close to 100 percent.
- 99 percent.
- 98 percent.
- 98 percent of our preventive maintenance is done in house.
- A majority, in excess of 95 percent.
- 95 percent.
- 95 percent.
- Approximately 95 percent.
- 90 percent.
- 90 percent.
- 90 percent performed in house.
- Approximately 85-95 percent in-house.
- 85 percent.
- 80 percent.
- 80 percent in house is a good estimate.
- 80 percent.
- 75 percent.
- 75 percent.
- 60 percent in-house, 40 percent outsourced.
- 60 percent in-house.
- 50 percent.
- 20 percent.
- All outsourced.

**10. In terms of cost, what percentage of your agency's equipment *repairs* are performed in-house compared with outsourced?**

Twenty-seven individuals responded to this question.

- 95 percent.
- 95 percent.
- 95 percent.
- A majority, in excess of 90 percent.
- 90 percent.
- 90 percent in-house.
- 90 percent performed in house.
- 90 percent.
- Approximately 85 percent.
- 85 percent.
- 85 percent.
- 85 percent.
- Approximately 75-90 percent in-house.
- 80 percent.
- 80 percent.
- 80 percent.
- 75 percent.
- 75 percent.
- 75 percent.
- 70 percent.
- 60 percent in house.
- 60 percent in-house, 40 percent outsourced.
- 60 percent.
- 10 percent.
- Zero.
- Under warranty, 50 percent in-house; out of warranty, 90 percent in-house.
- Our labor costs per hour statewide in our maintenance facilities are at 30 percent below contract costs.

**11. What factors impact your agency’s decisions to perform repairs or preventive maintenance internally or externally? (Select all that apply.)**

Twenty-six individuals responded to this question.

	Percent responses	Total responses
In-house work is more expensive	15.4%	4
Outsourced work is more expensive	69.2%	18
In-house work requires fewer bureaucratic steps	34.6%	9
Outsourced work requires fewer bureaucratic steps	11.5%	3
Our agency lacks in-house expertise	53.8%	14
Our agency does not stock sufficient repair parts	11.5%	3

Follow-up: **Please explain.** (Free response.)

- Availability of qualified vendors, distance to vendors, repair shop workload, expected turnaround time, vendor quality, in-house quality, repair complexity or special tools required, legal and policy constraints.
- Connecticut DOT does not have tools or training to complete some repairs.
- Most of the time this decision is made with logistics in mind. Who is closer and available: in house staff versus outside vendor. Some specialty pieces go out because we lack the tools or expertise to perform the work.
- Our agency lacks sufficient in-house staff levels and repair facilities.
- Specialized repairs are sent out often because of a lack of tools, software or training.
- Specialty work is outsourced.
- Staffing.
- We are required to submit outside labor requests for all repairs.
- We have contacts for most light vehicle repairs and service with [Automotive Resources International, <http://www.arifleet.com>]; most of what we outsource is light duty preventive maintenance and repair.
- We review the various types of work, and if we can do the work in-house, with current technician workload, training and parts access, at an equitable cost, we perform them in-house.
- We’ve always performed repairs and preventive maintenance internally, but as we reorganize and reduce staff, we outsource preventive maintenance services on the light duty (non-core fleet) when applicable. We also decided to outsource all major repairs on our passenger fleet (if the repairs are made instead of surplus the unit).
- With the newer equipment, keeping technicians trained gets to be a factor.

**12. Does your agency encounter any of the following issues related to replacement parts? (Select all that apply.)**

Twenty-two individuals responded to this question.

	Percent response	Total responses
Out of internal stock	63.6%	14
Difficulty locating parts	50.0%	11
Difficulty purchasing sole source parts	50.0%	11
Low bid requirements for acquiring parts	40.9%	9
Contract requirements for acquiring parts	50.0%	11
Staffing deficiencies	31.8%	7

**13. Does your agency internally up-fit new equipment?**

Twenty-seven individuals responded to this question.

**Yes** 48.1% (13)

**No** 51.9% (14)

**14. Does your agency internally install specialty equipment and components (e.g., lighting, delineation, radios, toolboxes, plows, bodies, etc.)?**

Twenty-eight individuals responded to this question.

**Yes** 85.2% (24)

**No** 14.8% (4)



### SECTION III: EQUIPMENT OPERATION AND REPLACEMENT

#### 15. Please rate how well your agency is meeting its requirements in these *utilization-related* areas.

Twenty-five individuals responded to one or more parts of this question.

	Not meeting requirements	Meeting requirements	Exceeding requirements	Total responses
Average asset age	52.0% (13)	48.0% (12)	0.0% (0)	25
Average asset utilization rate (time spent in use for assets available for use)	20.0% (5)	72.0% (18)	8.0% (2)	25
Average asset cost per mile	21.7% (5)	65.2% (15)	13.0% (3)	23

#### 16. How does your agency record equipment utilization? (Select all that apply.)

Twenty-five individuals responded to one or more parts of this question.

	Manually	Electronically	Recorded only locally	Entered into statewide database	Total responses
Daily use	28.0% (7)	44.0% (11)	0.0% (0)	76.0% (19)	25
Emergency use	26.3% (5)	36.8% (7)	10.5% (2)	63.2% (12)	19
Idle time	25.0% (3)	58.3% (7)	16.7% (2)	50.0% (6)	12
Downtime	20.0% (4)	55.0% (11)	10.0% (2)	55.0% (11)	20

#### 17. What additional considerations or requirements does your agency have for purchasing special equipment (e.g., lighting, delineation, radios, toolboxes, plows, bodies, etc.)? (Free response.)

Twenty individuals responded to this question.

- All done in the private sector.
- All of the above, as well as vendor build time and locations.
- Competitive bids that are usually tied in with the complete vehicle contract.
- ConnDOT reviews to see if specialty equipment can save labor and materials.
- Contracts of most items.
- Cost and need that can be justified.
- Emergency/warning lights are based on published policies and standards. Therefore, lights are under contract for purchase insuring uniformity. Districts have free agency from headquarters to purchase other items as needed or wanted.
- Equipment use requirements.
- Expected usage, availability through local rentals, safety-related usage.

- Internal standards, AASHTO guides, risk and safety analysis.
- Liquefied petroleum gas conversions.
- None.
- Request and/or justification for need.
- Some are included in purchase specifications. Some are offered as options. Two-way radios are installed in-house.
- Specifications are used for all components.
- Statewide standards are established for plows, radios. Bodies and lighting. End user and local areas make the decisions on tool boxes.
- Switching from internally built or designed and built externally to buying off-the-shelf.
- Warning lighting must be on a pre-approved list.
- We have to follow state procurement laws.
- We try to buy equipment that can be used for multiple purposes.

**18. Approximately what percentage of your agency's fleet is replaced annually?**

Twenty-two individuals responded to this question.

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• In a normal cycle 1.5 to 2 percent.</li> <li>• 3 percent.</li> <li>• 4 to 5 percent.</li> <li>• 5 percent.</li> <li>• 5 percent.</li> <li>• Approximately 5 percent of the fleet.</li> <li>• 5 percent to 6 percent.</li> <li>• 6 percent.</li> <li>• 5 to 10 percent.</li> <li>• 5 to 10 percent.</li> <li>• 8 percent.</li> <li>• 8 percent.</li> </ul> | <ul style="list-style-type: none"> <li>• 7 percent to 10 percent (depending on fleet class being purchased).</li> <li>• 8 to 10 percent.</li> <li>• 10 percent.</li> <li>• 10 percent.</li> <li>• 10 percent.</li> <li>• 10 percent.</li> <li>• 10 percent.</li> <li>• 10 percent.</li> <li>• 12 percent.</li> <li>• 20 percent.</li> <li>• 3 to 4 percent on heavy duty; 12 to 15 percent on light duty.</li> </ul> |
|--|--|

**19. Approximately what percentage of your agency's fleet is currently overdue for replacement?**

Twenty-two individuals responded to this question.

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• 2 percent.</li> <li>• 5 percent.</li> <li>• 8 to 10 percent.</li> <li>• 10 percent.</li> <li>• 10 percent.</li> <li>• 14 percent.</li> <li>• Approximately 15 percent.</li> <li>• 18 percent.</li> <li>• 20 percent.</li> <li>• 20 percent.</li> <li>• 22 percent.</li> <li>• 25 percent.</li> <li>• Over 30 percent.</li> </ul> | <ul style="list-style-type: none"> <li>• 33 percent.</li> <li>• 40 percent.</li> <li>• 50 percent.</li> <li>• 50 percent.</li> <li>• 50 to 55 percent.</li> <li>• 56 percent.</li> <li>• 20 percent for heavy duty only. Light is current and meets its replacement cycle.</li> <li>• This depends on the trade criteria. The fleet replacement cycle is about 17 years.</li> <li>• We salvage sale our equipment to the public twice yearly so no equipment is overdue for replacement.</li> </ul> |
|---|---|

**20. What steps does your agency take to recondition or dispose of used assets efficiently and cost-effectively? (Free response.)**

Twenty-four individuals responded to this question.

- All sold through auction process; no reconditioning.
- Assets are inspected by our vehicle management agency staff and disposed via VMA public auction.
- Auction sales.
- Clean it up and make it presentable and usable to potential buyers. Cosmetics.
- Determine replacement/disposal priorities based on age, odometer, and maintenance and repair costs. Utilize a variety of methods for disposal (Internet, auction services, direct selling to municipalities, etc.).
- Disposal is through a mandated contract with the state department of general services.
- Each turned-in asset is evaluated to decide if it should be re-issued, repaired and re-issued, cannibalized for parts, or sold as-is. Units request assets they need to have replaced in case a suitable turn-in becomes available so we don't unnecessarily hold onto an asset. Quarterly auctions. If turned-in items are not re-issued within a year, they are auctioned.
- Equipment sale.
- Just starting pilot to improve the quality of our used equipment prior to sale and a renewed focus on optimum replacement times to increase return-on-investment and lower cost per mile/hr.
- Must sell through state surplus, which is not efficient or cost effective.
- On-site surplus auction; online surplus auction/bidding.
- Recondition is performed based on overall condition of vehicle/equipment. Disposal is mandated by state law to be turned over to our state surplus department, unless not in a condition to be used; in that instance the vehicle/equipment are disposed through recycling/trash.
- Repair cost.
- Repair versus replacement cost is reviewed before a decision is made. If the repair value exceeds value of equipment, the equipment will be surplus.
- Sale to local units of government is required.
- Sold through state property and surplus, both online and public auctions.
- The replaced fleet items are set to state auctions.
- Until recently we held public auctions with the proceeds going to the general fund but now contract the auctions to an outside vendor.
- Very little in regards to reconditioning equipment. Assets are disposed of based on Idaho Code at multiple locations around the state.
- We are bound by state statute to utilize our department of administration, surplus services agency for all disposals. This has proven to not give us our greatest return.
- We have a rolling fund set up that we collect sales taxes on and also put the proceeds from our salvage equipment sales into to lower the cost of replacement equipment.
- We hold two equipment auctions per year. The funding is rolled directly back into the capital budget for the purchase of new equipment.
- We hold public auctions on a regular basis.
- We use state auctions to dispose of equipment.

## SECTION IV. FLEET INFORMATION MANAGEMENT

**21. Please rate how well your agency is meeting its requirements in these *information technology-related* areas (specifically regarding equipment operations, repair and maintenance).**

Twenty-three individuals responded to one or more parts of this question.

	Not meeting requirements	Meeting requirements	Exceeding requirements	Total responses
Sufficient number of computers	26.1% (6)	65.2% (15)	8.7% (2)	23
Up-to-date computers	17.4% (4)	78.3% (18)	4.3% (1)	23
Up-to-date software	17.4% (4)	78.3% (18)	4.3% (1)	23
High-speed Internet access	13.0% (3)	82.6% (19)	4.3% (1)	23
Wireless Internet access	50.0% (11)	45.5% (10)	4.5% (1)	22
Computer technical support from the agency's MIS department	22.7% (5)	72.7% (16)	4.5% (1)	22
Computer technical support from external vendors	13.6% (3)	81.8% (18)	4.5% (1)	22

**22. Which department in your agency primarily provides management information system (MIS) support for fleet management?**

Twenty-three individuals responded to this question.

	Percent response	Total responses
Finance	0.00%	0
Equipment	43.50%	10
Maintenance	13.00%	3
Information systems	43.50%	10

Follow-up: **Other (Please specify.)** (Free response.)

- Private sector database (ARI).
- The fleet management system is managed and supported by another agency.

**23. Which of these functions does MIS support for equipment management? (Select all that apply.)**

Twenty-one individuals responded to this question.

	Percent response	Total responses
Accounting and financial	85.70%	18
Equipment and tool inventories	81.00%	17
Fuel, oil and fluid inventories	81.00%	17
Parts inventories	71.40%	15
Procurement and procurement tracking	66.70%	14
Maintenance and repair records	95.20%	20
Fleet inventory	90.50%	19
Assignment location	90.50%	19
Assignment history	90.50%	19
Life-cycle status	57.10%	12

**24. Please describe which advanced technologies your agency uses (such as automatic vehicle location, auto-link technology, tire telemetry, bar coding) to improve its fleet data and management. (Free response.)**

Twenty individuals responded to this question.

- Automatic vehicle location (AVL).
- AVL on contractors' trucks and equipment.
- Bar coding.
- Currently the highways division is trying to convert/update to a new computer system.
- Exploring global positioning system (GPS) opportunities.
- GPS/AVL/telematics; vehicle diagnostic software loaded onto laptop computers; barcode scanning of technician labor hours; automated fuel system; modern fleet management system.
- Limited use of bar coding and we utilize mobile handhelds so our mechanics capture repairs in real time/on the road.
- Mobile Data Collectors in some of our plow trucks.
- N/A.
- None.
- None.
- None at this time.
- None at this time.
- None in use currently.
- Preventive maintenance requirements, some GPS, fuel systems, emergency incident vehicle locating, and inventory control.
- Telematics including AVL, winter maintenance activities and equipment diagnostics.
- We are just now implementing a snowplow MDC (mobile data computer)/AVL project for snowplows only.
- We bar code for asset management.
- We do utilize an AVL system and are working on a long term solution that will tie in the vehicle telematics with the dispensing information.
- We have begun a program which places AVL technology into our snow plow trucks and also returns back road weather info.

**SECTION V. FLEET POLICY, FINANCIAL MANAGEMENT AND BUSINESS PLANNING**

**25. What factors does your agency take into consideration for fleet asset capital expenditures? (Select all that apply.)**

Twenty-two individuals responded to this question.

	Percent response	Total responses
Life-cycle cost analysis	77.30%	17
Future use and need forecasting	81.80%	18
Alternative capital financing approaches	22.70%	5
Required approval or other requirements from another agency (please specify in the space below)	27.30%	6

Follow-up: **Please specify or describe other factors.** (Free response.)

- All fleet purchases go through our central management services agency.
- Available funding.
- Budget driven.
- Capital replacement budget is provided from the minister of finance.
- Fleet is capitalized asset.
- Governor, budget/finance, comptroller approvals are needed to purchase major and unbudgeted purchases.
- Leasing requires approval from the state attorney general.
- Legislative approval for a biannual budget.
- Minimum age and mileage requirements within budgetary constraints.
- Replacement cycle policies or guidelines; repair versus replacement; subjective input from equipment, maintenance, and field personnel; needs and approved budget funding; contract, rent, or buy analysis; availability of operators; safety and risk; and identified projects.

**26. How are your agency’s equipment needs funded?**

Twenty individuals responded to this question.

	Percent response	Total responses
Revolving fund	15.00%	3
Allocation by legislation	55.00%	11
Allocation from highway maintenance funds (motor license funding)	25.00%	5
Funding recovered from state vehicle sales or auction	5.00%	1

Follow-up: **Please specify or describe other factors.** (Free response.)

- Currently out of the transportation commission’s general fund.
- Fleet vehicle sales.
- Heavy duty is allocation; light duty is a revolving fund.
- Internal rental process, plus supplemental from appropriations.
- Internal service fund.
- Minister of Finance provides funding.
- Revenues come from state fuel tax revenues. The amount left after payroll, construction, administration, and engineering expenses are met is allocated for maintenance operations. From operation funds organizations request some be spent to purchase or replace vehicles and equipment, subject to approval by management.
- We also augment our annual budget with funds recovered at auctions.

**27. By percentage increase or percentage decrease, please state how your agency's equipment management budget has changed in the past five years.**

Twenty individuals responded to one or more parts of this question.

**Personnel budget.** (Free response.)

*(Indicated a decrease)*

- Minus 3 percent.
- 30 percent decrease.
- Decrease.
- Down slightly.

*(Indicated an increase)*

- 2 percent.
- Greater than 6 percent.
- 5 to 10 percent.
- Plus 10 percent.
- Plus 15 percent.
- 35 percent.
- Increased 50 percent.

*(Indicated no change)*

- 0 percent.
- Stagnant; mechanics did just receive a 3 percent pay increase as did all agency employees.
- Steady.
- No change.
- No increase.

*(Other)*

- Unknown.
- Determined by our vehicle management agency.

**Repair and maintenance budget.** (Free response.)

*(Indicated a decrease)*

- Minus 3 percent.
- Minus 15 percent.
- Decreased 23 percent.
- Decrease.



*(Indicated an increase)*

- Increased 10 to 15 percent.
- Plus 15 percent.
- Up about 15 percent.
- 20 percent increase.
- Plus 20 percent.
- 20 percent.
- 35 percent.
- Increased 54 percent.
- Increased based on need.

*(Indicated no change)*

- 0 percent.
- Remained constant.
- No change.
- No increase.
- Steady.

*(Other)*

- Determined by our vehicle management agency.

**Capital expenditures budget.** (Free response.)

*(Indicated a decrease)*

- Decreased 2 percent.
- 20 percent decrease.
- Down 40 percent last four years; heavy duty equipment purchases.
- Decrease 40 percent.
- Reduced by 60 percent over the last five years.

*(Indicated an increase)*

- Increase by about 4 percent per year.
- Plus 15 percent.
- 18 percent increase.
- Increase of 15 to 25 percent.
- Plus 20 percent.
- Increased by 20 percent over the last four years.
- 35 percent.
- 100 percent increase for three fiscal years; back to original afterward.
- Gone up slightly.
- Increase.

*(Indicated no change)*

- 0 percent.
- 0 percent.
- 0 percent.

*(Other)*

- Consistently less than the actual need.

## SECTION VI. FLEET HUMAN RESOURCES MANAGEMENT

### 28. Does your agency provide operators training in the operation of equipment?

Twenty-four individuals responded to one or more parts of this question.

<b>Yes</b>	91.7%	(22)
<b>No</b>	8.3%	(2)

### 29. How does your agency recognize and correct instances or patterns of improper equipment operation? (Free response.)

Twenty-three individuals responded to one or more parts of this question.

- All operators must attend our training for heavy truck and loader within their probationary period. Failure to pass results in dismissal.
- Annual “road-eos” to evaluate individual operator skills.
- Chargebacks to operator’s department.
- Driver training is privatized.
- Each division has a safety officer for these purposes.
- Equipment committee reviews problems.
- Equipment inspections.
- Managed on a case-by-case basis.
- No[t] often enough.
- Onsite or offsite training by manufacturer’s qualified representative.
- Progressive discipline to include dismissal.
- With respect to operator training, vendors provide new equipment operator and safety training. Otherwise, operators are trained on the job. We address improper equipment use via reported accidents and individually between supervisor and employee.
- Reported incidents and problems identified cause us to look at what can be done.
- Retraining.
- Supervisor.
- That is a problem that could be addressed with better operator training. We are looking at new training modules, but have not finalized anything yet.
- Through equipment repair and reports from the field.
- Through on the job training.
- Training, field supervisors, documentation and performance issues with corrective actions.
- Training and disciplinary action.
- We have a 5 percent pay differential program for meeting training requirements that can be taken away for misconduct and misuse.
- We use a risk management program to identify problem operators.
- Yes.

### 30. How is repair staff productivity measured at your agency? Is it based upon manufacturers’ time standards or some other standard? Please explain. (Free response.)

Twenty-one individuals responded to one or more parts of this question.

- An internally calculated shop rate.
- Book standards are used for garage mechanics; mechanics in the field are not monitored and measured.

- Compared with other SCDOT mechanics in same and other SCDOT repair shops performing the same tasks. Time to complete repair and percent rework required.
- Currently we are lacking in this area.
- Determined by our vehicle management agency. VMA has a facility performance recognition program.
- Internal standards.
- It is based on our own in house historic repair time data.
- It is not currently measured.
- Manufacturer time standard.
- Manufacturer's standards and industry materials.
- Manufacturer's standards.
- Manufacturer's standards.
- No objective standards.
- None.
- None.
- Not currently tracked.
- Not measured at this time.
- Percentage of wrench time charged to the actual work order.
- Standard times and historical data.
- Through the use of work orders and time cards and cost analysis programs.
- We recently implemented a new management system to capture actual repair times by service reason so we're working to establish an internal baseline now. We'd like to benchmark against OEM standards but that is difficult for our core fleet (heavy duty trucks and off road equipment).

**31. Does your agency have difficulty *hiring* qualified repair and maintenance staff?**

Twenty-three individuals responded to one or more parts of this question.

<b>Yes</b>	78.3%	(18)
<b>No</b>	21.7%	(5)

**32. Does your agency have difficulty *retaining* qualified repair and maintenance staff?**

Twenty-three individuals responded to one or more parts of this question.

<b>Yes</b>	65.2%	(15)
<b>No</b>	34.8%	(8)

**CONCLUDING TEXT**

The concluding text of the online survey follows:

Thank you! Your responses will help state DOTs evaluate best practices, challenges and opportunities for equipment management. We will notify all respondents by email when the results of the survey are published.

# Survey Analysis

## **INTRODUCTORY SECTION: RESPONDENT INFORMATION (Questions 1-2)**

- Respondents represented a broad geographic range, and with fully half of the states reporting, together represent an accurate national picture of equipment management practices.
- For the different areas of equipment and fleet management, the most common level of authority among respondents was statewide management and decision making. Some respondents (about 10 percent to 15 percent) had higher executive oversight while a few (3 percent to 10 percent) had only regional authority.
- Respondents tended not to be involved in an authority capacity—or not involved at all—in the areas of fleet facility infrastructure management (12 respondents, or 43 percent) and fleet human resources (10 respondents, or 34 percent).

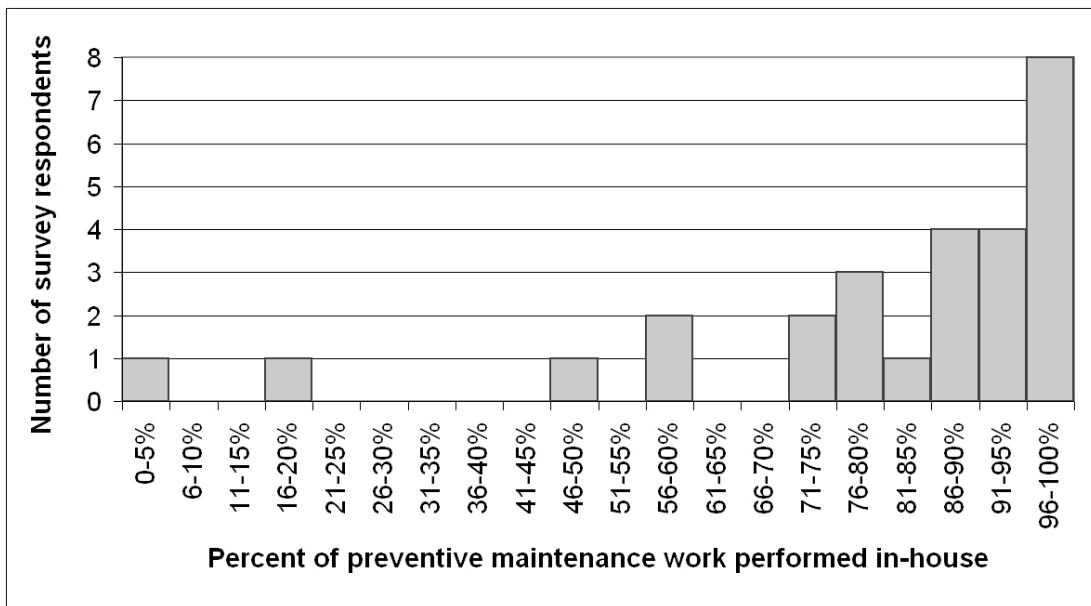
## **SECTION I. EQUIPMENT ACQUISITION (Questions 3-5)**

- A majority of respondents (86 percent) said that their agencies' equipment needs are determined in a consistent manner based on established work methods, business practices, allocation methods or formally defined standards (Question 3).
  - Respondents provided details of their usage tracking, existing standards and funding mechanisms.
  - Several respondents described the roles of the different bodies involved, such as the state legislature, the DOT's vehicle management agency or regional offices.
- A majority (79 percent) likewise reported that their agencies use a process for identifying the most cost-effective means of meeting the need for an asset (Question 4). Respondents provided additional details on factors contributing to how and when their agencies own, rent or lease equipment.
- Approximately two-thirds of respondents (66 percent) indicated that their agencies purchase what they would consider “off-the-shelf” road maintenance equipment (Question 5). Those who indicated that they did so were asked to elaborate on whether such off-the-shelf equipment is modified—either by vendors or agency staff—to make it suitable for agency use.
  - Comments indicated a range of modifications requirements, from minor to major and performed either by the agency or the vendor. Several respondents noted that the extent of modifications varies by equipment type.
  - Two respondents reported that their specifications take industry standard configurations into account. Two noted that off-the-shelf equipment generally is not modified.

## **SECTION II. EQUIPMENT MAINTENANCE AND REPAIR (Questions 6-14)**

- When asked how well their agencies are meeting their maintenance and repair requirements in several asset-related areas (Question 6), among all eight areas a majority of respondents reported that their agency is meeting or exceeding requirements.
  - 80 percent or more of respondents said their agencies are meeting or exceeding requirements in the areas of maintenance intervals for light-duty vehicles (cars, pickups, vans, SUVs) (93 percent); maintenance intervals for heavy-duty trucks (89 percent); maintenance intervals for off-road/construction vehicles (88 percent); and asset breakdown rate (87 percent).

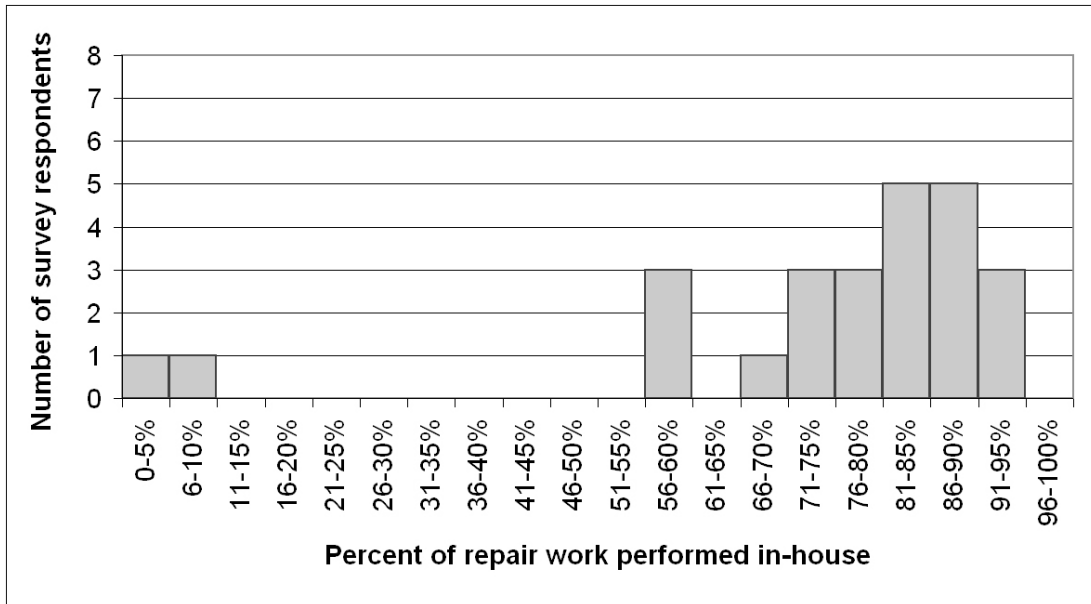
- Fewer than 80 percent of respondents reported meeting or exceeding requirements in the areas of repair downtime (78 percent), parts requisition fill time (77 percent), asset repair turnaround time (74 percent) and percentage of parts requisitions filled from inventory (73 percent).
- When asked how well their agencies are meeting their requirements in three staff-related areas (Question 7):
  - A large majority (91 percent) reported that the cost per in-house mechanic labor hour is meeting or exceeding requirements, and 82 percent reported that their mechanic productivity rates are likewise meeting or exceeding requirements.
  - A slim majority (52 percent) said that their agencies’ ratio of mechanics to vehicles is meeting requirements. None said that it is exceeding requirements.
- The methods that agencies use for determining mechanic staffing levels vary, including average shop workload, historical figures, set calculations and maintenance repair unit analysis (Question 8). Staffing levels at the regional or district levels are a factor among several respondents. One respondent noted that “all of our maintenance work is privatized.”
- Maintenance work is performed overwhelmingly in-house, as indicated in this histogram of responses (Question 9). (Note that this and similar graphics show the distribution of all responses given either as a single number or as the average of a range; for example, the response “85 to 95 percent” is plotted as 90 percent.)



- Eight among 27 respondents said all or nearly all (96 percent to 100 percent) of preventive maintenance work is performed in-house, with four respondents reporting fully 100 percent of such work performed in-house.
- Among those who said that less than 50 percent of such work is performed in-house, one respondent reported 20 percent, and another said that all such work is outsourced.

The average among all respondents is 81 percent.

- Repair work is also performed largely in-house (Question 10), though to a lesser degree than preventive maintenance.



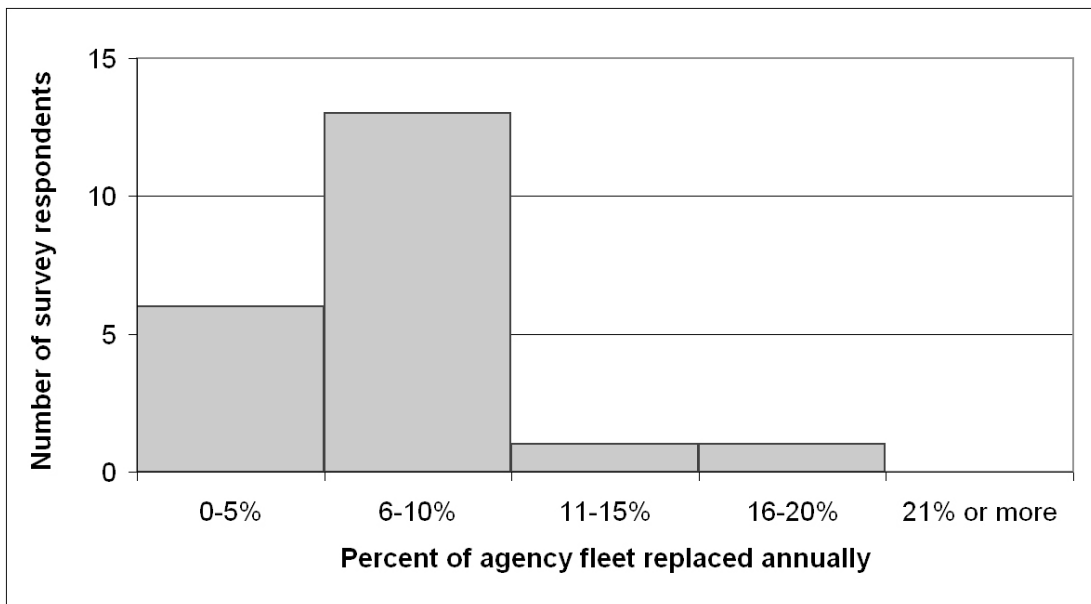
- While none of the respondents said that fully 100 percent of repairs are done in-house, eight of 25 respondents said that between 90 percent and 95 percent of repairs are performed in-house.
- Among those who said that less than 50 percent of such work is performed in-house, one respondent reported 10 percent, and another said that all such work is outsourced.
- One respondent noted a difference based on warranty: “Under warranty, 50 percent in-house; out of warranty, 90 percent in-house.”

The average among all respondents is 75 percent.

- Among the questions comparing costs and other factors for work performed in-house compared with outsourced (Question 11):
  - More respondents said outsourced work is more expensive (69 percent) compared with in-house (15 percent).
  - Likewise, more respondents said outsourced work requires more bureaucratic steps (35 percent) versus in-house (12 percent).
- Among issues that respondents encounter to replacement parts (Question 12), the most common issue is being out of internal stock (64 percent). Three other issues are experienced by 50 percent of respondents: difficulty locating parts, difficulty purchasing sole source parts and contract requirements for acquiring parts.
- About half of the respondents said that their agencies internally up-fit new equipment (Question 13). A majority (85 percent) said their agencies internally install specialty equipment and components (Question 14).

### SECTION III: EQUIPMENT OPERATION AND REPLACEMENT (Questions 15-20)

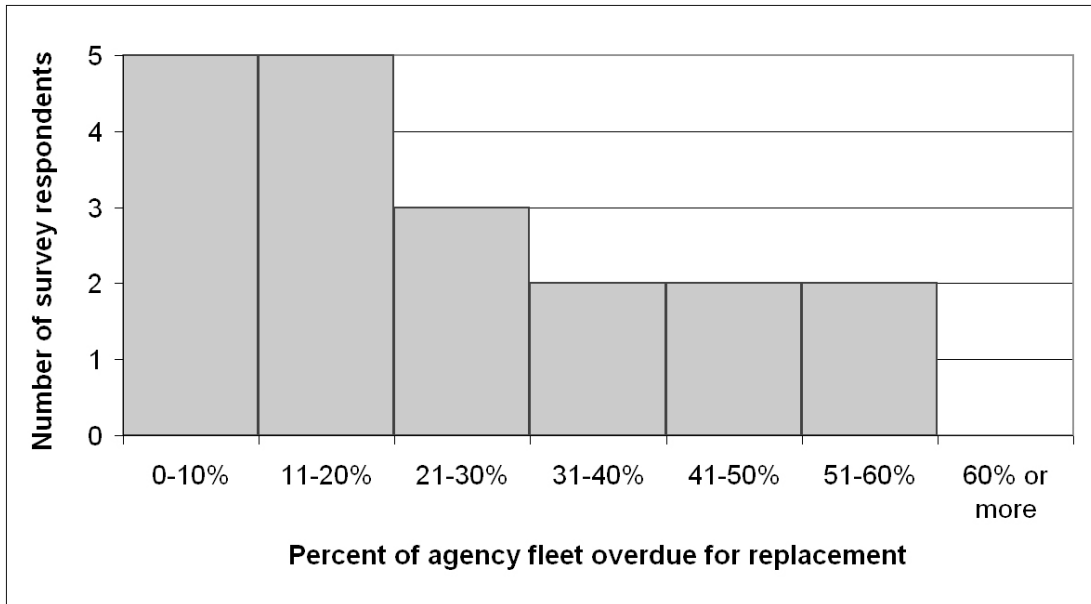
- When asked how well their agencies are meeting their requirements in three asset-related areas (Question 15):
  - About half (48 percent) reported that the average asset age is meeting requirements, with the remainder reporting that it is not meeting requirements.
  - About 80 percent of respondents said that both the average utilization rate and the average cost per mile are meeting or exceeding requirements.
- Among ways of recording four different aspects of equipment utilization (daily use, emergency use, idle time and downtime), agencies tended to use electronic means rather than manual recording methods. Entry of these data into a statewide database is much more common than recording these only locally (Question 16).
- Respondents provided further details on agency requirement for purchasing specialty equipment (Question 17). Several mentioned agency specifications and noted how expected use drove these purchasing decisions.
- Most respondents said that not more than 10 percent of their agencies' fleets are replaced annually (Question 18).



- None indicated a value greater than 20 percent.
- Two respondents noted a distinction based on fleet class type.

The average value among respondents was 7.9 percent.

- By contrast, the percentage overdue for replacement (Question 19) was significantly higher: 25 percent on average, with responses as high as 56 percent.



- Respondents discussed agency steps to recondition or dispose of used assets efficiently and cost-effectively (Question 20). A prevailing response was the sale or auction of such equipment through a state surplus department. This is typically according to state law or mandate and often at a predefined frequency.
  - One stated this method “is not efficient or cost effective” and another that “this has proven to not give us our greatest return.”
  - Two respondents described a process by which proceeds of such sales are returned to the budget for new capital purchases.
  - Two respondents noted the use of online auctions or sales.

Some described their agencies’ processes for equipment analysis and decision making regarding repair, reconditioning, replacement and disposal.

#### **SECTION IV. FLEET INFORMATION MANAGEMENT (Questions 21-24)**

- When asked how well their agencies are meeting their requirements in seven information technology-related areas (Question 21):
  - 74 percent or more of respondents stated that their agencies are meeting or exceeding requirements in six of the seven areas: number of computers, up-to-date computers, up-to-date software, high-speed Internet, internal technical support and external/vendor technical support.
  - However, only half of the respondents reported that availability of wireless Internet meets or exceeds requirements.
- Respondents reported that the departments within their agencies most likely to provide MIS support (Question 22) are the equipment department (44 percent) or the information systems department (44 percent). The most common functions supported by MIS (Question 23) are maintenance and repair records (95 percent), fleet inventory (91 percent), assignment location (91 percent) and assignment history (91 percent). Less common are parts inventories (71 percent), procurement and procurement tracking (67 percent) and life-cycle status (57 percent).



- Advanced technologies used to improve fleet data and management among respondents (Question 24) are:
  - Telematics, including automatic vehicle location and GPS (10 respondents); bar coding (four respondents, including one who noted its use for scanning technicians' labor hours); advanced fuel systems (two respondents); onboard laptops with vehicle diagnostic software; and advanced asset and inventory control technologies.

## **SECTION V. FLEET POLICY, FINANCIAL MANAGEMENT AND BUSINESS PLANNING (Questions 25-27)**

- The most common factors that respondents' agencies take into account for fleet asset capital expenditure (Question 25) are future use and need forecasting (82 percent) and life-cycle cost analysis (77 percent).
  - Twenty-seven percent of respondents noted that their agencies needed approval or had other requirements from another agency. These include a state legislature; a central management services agency; the finance office or ministry; and the offices of the governor, comptroller or state attorney general.
- Responses to Question 26 showed that agencies' equipment needs are funded most commonly through allocation by legislation (55 percent), with allocation from highway maintenance funds as the second most common response (25 percent).
  - Free responses by survey participants noted differences by asset type ("Heavy duty is allocation; light duty is a revolving fund") as well as various combinations of funding sources.
- Respondents provided information on how their agencies' personnel budgets, repair and maintenance budgets, and capital expenditures (Question 27) changed in the past five years. Due to the various ways in which respondents phrased their answers, it is not possible to provide reliable averages. Based on trends in responses:
  - Among personnel budgets, four respondents reported a decrease, seven reported an increase, and four reported no change. The greatest decrease was 30 percent, and the greatest increase was 50 percent.
  - Among repair and maintenance budgets, four respondents reported a decrease, nine reported an increase, and five reported no change. The greatest decrease was 23 percent, and the greatest increase was 54 percent.
  - Among capital expenditures budgets, five respondents reported a decrease, 10 reported an increase, and three reported no change. The greatest decrease was 60 percent, and the greatest increase was "100 percent increase for three fiscal years; back to original afterward."

## **SECTION VI. FLEET HUMAN RESOURCES MANAGEMENT (Questions 28-30)**

- A large majority (92 percent) of respondents indicated that their agencies provide operators training in the operation of equipment (Question 28).
- The ways in which respondents' agencies address improper equipment operation vary:
  - Several noted job training or retraining (nine respondents) as a way to correct this issue. Two noted training conducted by manufacturer representatives. One stated that training is privatized. At one agency, training is accompanied by a probationary period and a test that must then be passed.

- Three respondents discussed the role of the supervisor in addressing improper equipment operation. Three respondents noted their agencies' disciplinary or punitive processes. One noted specifically that "we have a 5 percent pay differential program for meeting training requirements that can be taken away for misconduct and misuse."
  - Respondents stated that improper use can be identified through equipment inspections, equipment repair reports and a risk management program.
- Repair staff productivity is measured in the following ways (Question 30):
  - Internal standards or internal calculated rates are more commonly used (nine respondents) than manufacturers' time standards or book standards (five respondents).
  - Eight respondents said that productivity is not currently measured.
- 78 percent of respondents said their agencies had difficulty hiring qualified repair and maintenance staff, and 65 percent said that their agencies had difficulty retaining them.

## Additional Resources

In the process of preparing this survey, we referred to several online resources related to equipment management that may be of interest to Caltrans.

**Equipment Management Technical Services Program (EMTSP)**, AASHTO, undated.

<http://www.emtsp.org/>

The EMTSP is composed of four regional equipment management partnerships of state DOT equipment managers and staff. The partnerships “serve as the comprehensive national resource supporting effective and efficient governmental highway equipment fleet management.” The EMTSP web site includes links to web pages for each of the four regional partnerships.

The mission statement of the EMTSP is to “provide governmental equipment fleet management personnel and agency executives with the resources, material and support to promote effective fleet asset management, advance emerging equipment technologies, communicate best practices, and to provide a voice to decision makers and industry on issues impacting fleet operations.”

**First National Equipment Fleet Management Conference**, June 24-28, 2012, Mobile, AL.

<http://www.emtsp.org/national2012>

The conference brochure states that “AASHTO EMTSP’s and TRB’s joint First National Equipment Fleet Management Conference will be comprised of Fleet Managers, Administrators, Directors and Engineers from State Agencies and local governments throughout the nation, Federal, equipment industry and academic participants, along with members from the American Association of State Highway Transportation Officials (AASHTO) and the Transportation Research Board (TRB). The conference will provide technical presentations from experts in the equipment field, panel discussions on various fleet management topics, break-out and business meetings for the EMTSP Regional Partnerships, and a forum to share equipment fleet management strategies and best practices. This conference will not only afford the opportunity to learn about national initiatives and research projects by AASHTO and TRB, as well as technological advances in equipment, but attendees will also meet and interact with peers from States and other equipment fleets throughout the country.”

**AASHTO Equipment Reference Book**, May 2011.

<http://www.emtsp.org/files/2011/05/AASHTO-Equipment-Reference-Book-2011-Format.pdf>

Main sections of this publication of AASHTO EMTSP include:

- Contact information for state and provincial equipment management staff (page 3).
- Equipment specifications provided by a number of states (page 33).
- Highlights of “new or innovative equipment ideas and concepts” (page 75).

**Challenges and Opportunities: A Strategic Plan for Equipment Management Research**, Final Report for NCHRP Project 20-07/Task 309, 2011.

<http://maintenance.transportation.org/Documents/NCHRP%2020-07%20Task%20309,%20Final%20Final%20Report-October%202011.pdf>

This research was requested by AASHTO’s Standing Committee on Highways to identify research needs in transportation asset management. It captures the research challenges and opportunities as discussed and prioritized among several state DOT participants at a June 2011 workshop.

Appendix B of this report includes Table 1, Equipment Management Functions and Available Research Studies (page 33 of the PDF), which lists 14 areas of equipment management:

- Equipment acquisition.
- Equipment operation management.
- Equipment utilization management.

- In-house equipment maintenance and repair management.
- Outsourced maintenance and repair services management.
- Equipment fueling management.
- Equipment replacement management.
- Equipment disposal management.
- Information management.
- Fleet financial management.
- Human resources management.
- Fleet management infrastructure management.
- Customer service management.
- Fleet management program business planning.

Each of these areas is further broken down into asset management functions, with 50 functions listed in total.

**The Use of Highway Maintenance Management Systems in State Highway Agencies**, Applied Pavement Technology, Inc., 2006.

[http://maintenance.transportation.org/Documents/MMSSurvey-StateofthePractice\\_References.pdf](http://maintenance.transportation.org/Documents/MMSSurvey-StateofthePractice_References.pdf)

In 2005, FHWA and AASHTO collaborated on the development of a National Highway Institute training course, “Principles and Practices for Enhanced Maintenance Management Systems.” To support this effort, the organizations conducted a survey of state DOTs “to capture the state-of-the-practice in maintenance management systems (MMS).” The survey addresses equipment management alongside a number of other management areas (pavements, bridges, signs and signals, safety and others), and it is narrowly focused on different aspects of management systems.

**Implementing an Equipment Management System**, Federal Highway Administration, 1986.

<http://www.youtube.com/watch?v=wYon05xFTMw&feature=BFa&list=SP9BADB8ACC34C0404>

This FHWA video is part of a training course on equipment management. It includes information about five main “subsystems” involved in equipment management:

- Inventory, planning and control.
- Equipment maintenance.
- Parts and supplies management.
- Financial management.
- Information systems.