Operations Committee Meeting - March 18, 2020

1. Agenda Packet
   Documents:
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2. Media Index By Agenda Item
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OPERATIONS COMMITTEE

Pursuant to the Executive Order N-25-20 issued by Governor Newsom, one or more Board members may participate in the meeting via teleconference.

AGENDA

DATE: Wednesday, March 18, 2020  TIME: 3:15 p.m.

1. CALL MEETING TO ORDER AND ROLL CALL.

2. ITEMS TO BE ADDED, WITHDRAWN, OR REORDERED IN THE AGENDA.

3. PUBLIC COMMENT.
   Opportunity for members of the public to address the Committee. (Government Code Section 54954.3).

4. ACTION AGENDA.
   The following items on the Action Agenda call for discussion and action by the Committee. All items are placed on the Agenda so that the Committee may discuss and take action on the item if the Committee is so inclined, including items listed for information.
   B. Consideration to Provide a Summary of Future Items to be Considered by the Committees (Item Requested by Director Calderon-Scott) (No Enclosure)

5. CLOSED SESSION.
   At any time during the regular session, the Committee may adjourn to closed session to discuss real property matters within the attorney-client privilege, subject to the appropriate disclosures. (Government Code Section 54956.8).

6. NEXT MEETING DATE: Wednesday, April 1, 2020 at 3:15 p.m.

7. ADJOURNMENT.

This agenda was posted at least seventy-two (72) hours before the meeting in a location freely accessible to the Public on the exterior bulletin board at the main entrance to the Authority’s office and it is also posted on the Authority’s website at www.sweetwater.org. No action may be taken on any item not appearing on the posted agenda, except as provided by California Government Code Section 54954.2. Any writings or documents provided to a majority of the members of the Sweetwater Authority Governing Board regarding any item on this agenda will be made available for public inspection at the Authority Administration Office, located at 505 Garrett Avenue, Chula Vista, CA 91910, during normal business hours. Upon request, this agenda will be made available in appropriate alternative formats to persons with disabilities, as required by Section 202 of the Americans with Disabilities Act of 1990. Any person with a disability who requires a modification or accommodation in order to participate in a meeting should direct such request to the Board Secretary at (619) 409-6703 at least forty-eight (48) hours before the meeting, if possible.

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TO: Governing Board
FROM: Management
DATE: February 7, 2020

SUMMARY
At its April 24, 2019 meeting, the Governing Board rejected the bids for the Vehicle Replacement Program and directed staff to procure the services of a consultant to perform an analysis of staff’s methodology to evaluate and recommend vehicles for replacement that is data-driven and states source document and industry standards. Staff’s methodology was summarized in the FY 2018-19 Budget as follows:

Vehicle and Equipment Replacement Assessment Policy considers vehicle age, mileage, maintenance cost, cost of downtime, depreciation, and salvage value when replacing vehicles. It also ensures the most cost-effective balance of fleet composition and utilization and the timely replacement of vehicle assets. The Authority utilizes a fleet asset management system (Maximo) to evaluate fleet vehicles semi-annually, and assists in tracking and reporting those vehicles that are nearing, or have met, the following minimum criteria:

- Age - 10 years or older
- Mileage - 100,000 miles or greater
- Repair/Cost Ratio - repair costs equal to or greater than 50 percent of the original purchase price.

Staff sought and received proposals from consultants to perform a comprehensive analysis of the policies and procedures for the Authority’s fleet replacement, management, maintenance, and operations. The objectives of the analysis were to compare the Authority’s vehicle and equipment replacement criteria practices to current industry standards, and practices that are in alignment with the Authority’s Strategic Plan.

BACKGROUND
Through a Request for Proposal (RFP) the Authority sought a fleet consultant to review its current vehicle and equipment replacement policy and fleet management practices, with particular attention in evaluating the current criteria used in determining lifecycle cost and total cost of ownership. The purpose of the RFP was to identify a consultant that is qualified
to conduct a detailed evaluation of the Authority’s fleet management operations. The selected consultant was required to have a proven track record of providing comprehensive analyses of government/public fleet maintenance and management. Additionally, the selected consultant was required to have the aptitude to recommend steps the Authority can take to improve the effectiveness and efficiency for the utilization of equipment, infrastructure, personnel, and financial resources in support of fleet management, maintenance, and replacement.

The overall goal of the engagement was to provide a vehicle replacement strategy while ensuring the Authority is providing vehicles and equipment that are suitable to users’ needs, available when needed, and achieve expectations regarding service, reliability and safety, and environmental sustainability.

The Report on a Review of Fleet Replacement and Management Practices (Report) provided findings and recommendations in the following areas:

- Optimal Replacement Cycle Analysis
- Fleet Replacement Analysis
- Management Practices and Resources Review
- Fleet Management Information System
- Fleet Cost Control and Financial Management

A representative from Mercury Associates, Inc. will be at the February 12, 2020 Board meeting to provide a summary of the Report findings; the Report is attached.

**PAST BOARD ACTION**

June 12, 2019

The Governing Board moved the Fleet Budget of $1,065,000 to the Operating Reserve Fund until a fleet study is completed.

**FISCAL IMPACT**

The study cost was $33,485 which was funded by the administration consulting service budget.

Implementing the recommendations from the Report has the potential to save the Authority $9,000 per year in operating costs

**POLICY**

The Authority’s Procurement Policy requires that the Governing Board approve all equipment purchases in excess of $75,000.

Strategic Plan Goal 2: System and Water Supply Reliability: Achieve an uninterrupted, long-term water supply through investment, maintenance and innovation.
Memo to: Governing Board  
Subject: Consideration of Recommendations from Report on the Review of Fleet Replacement and Management Practices  
February 7, 2020  
Page 3 of 3

- Objective SR4: Maintain and replace fleet vehicles and equipment in accordance with manufacturers’ recognized standards and practices, and the Authority’s Fleet Maintenance and Replacement Program.
  - 004.00 Complete a study of the Authority’s Fleet replacement criteria and practices for lifecycle of the assets; compare the findings with current industry standards and practices. Study to be used for consideration of Authority’s FY 2019-20 Fleet Budget of $1,065,000 which was moved to the Operating Reserve Fund on June 12, 2019 (Completion Date: June 2020).

**ALTERNATIVES**

1. Direct staff to incorporate the Report recommendations into the FY 2020-21 Strategic Plan Work Plan and Budget for consideration by the Board.

2. Return to the Authority’s prior replacement plan approach of evaluating fleet vehicles that are nearing, or have met, the following minimum criteria:
   - Age - 10 years or older
   - Mileage - 100,000 miles or greater
   - Repair/Cost Ratio - repair costs equal to or greater than 50 percent of the original purchase price.

3. Other alternatives as identified by the Governing Board.

**STAFF RECOMMENDATION**

Staff recommends that the Governing Board direct staff to incorporate the Report recommendations into the FY 2020-21 Strategic Plan Work Plan and Budget for consideration by the Board.

**ATTACHMENTS**

Fleet Replacement and Management Practices Report (Mercury Associates Inc.)
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Report on
Fleet Replacement and Management Practices for

SWEETWATER AUTHORITY

December 2019

MERCURY ASSOCIATES, INC.
December 22, 2019

Mr. Greg Snyder  
Director of Distribution  
Sweetwater Authority  
744 "F" Street  
Chula Vista, CA 91910

Dear Mr. Snyder:

Mercury Associates, Inc. is pleased to submit this final report on Fleet Replacement and Management Practices. We would like to express our appreciation to all of the Authority’s officials and employees, for the time and effort extended to our project team in conducting this study.

The report includes several in depth vehicle life cycle analyses, a strategic 20-year fleet asset replacement plan, which details each asset’s replacement date and calculates future responding requirements over the course of the plan, and a high-level assessment of the Authority’s fleet management practices, resources and needs. We have provided a set of recommendations that we are confident will be instrumental in facilitating improved fleet management practices, which will result in both economic efficiencies and improved service delivery, and enable to the Authority to better anticipate and manage its future fleet costs. We have also provided several data analyses that will assist the Authority in having a more thorough understanding of its current fleet assets.

Mercury appreciates the opportunity to work with the Sweetwater Authority, and would welcome the opportunity to present our findings to Authority representatives and stakeholders. We hope that you will not hesitate to call on Mercury in the future as the need for consulting services arise in determining future fleet management improvement activities.

Very truly yours,

Paul T. Lauria  
President
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EXECUTIVE SUMMARY

OVERVIEW

The Sweetwater Authority engaged Mercury Associates, Inc. to perform a review of its current fleet management program. The three central tasks of the study included an Optimal Replacement Cycle Analysis (ORCA) of two asset classes, an analysis of fleet replacement practices and future replacement spending requirements for the Authority’s capital fleet assets, and an evaluation of fleet management practices and resources of the Fleet Management Section (FM) within the Distribution and Maintenance Department. Our assessment and the report herein focus on identifying process improvement and/or cost reduction opportunities associated with specific fleet management practices within the agreed upon scope of study. In conducting our study, Mercury reviewed available pertinent documentation (e.g. policies, procedures, forms, etc.), interviewed numerous stakeholders directly involved in fleet management activities (i.e., manager, fleet supervisor, maintenance mechanics, etc.), and conducted various analyses of available data.

FINDINGS AND RECOMMENDATIONS

Optimal Replacement Cycle Analysis

We performed Optimal Replacement Cycle Analysis (ORCA) for two asset types within the Authority’s fleet: 250-Series Utility Trucks and Heavy-Duty Dump Trucks. For each, we performed extensive statistical analysis of historical asset usage, maintenance and repair cost data, and available cost and resale data, in order to develop regression equations for estimating a) annual asset maintenance and repair costs, and b) end-of-year asset fair market values (FMV), as a function of changes in asset age and accumulated miles of use (i.e., potential replacement cycle).

Key Findings

Based on existing asset ages, we can see that 250-Series Utility Trucks have been replaced on average every 11 years, and Heavy-Duty Dump Trucks every 16. Our analyses show that both asset types should be replaced more quickly, at 9 years and 13 years, respectively. Doing so will save the Authority approximately $9,210 per year in operating cost, and will reduce the Total Cost of Ownership (TCO) for these asset types.

Key Recommendations

1. Implement the replacement cycles noted for 250-Series Utility Trucks and Heavy-Duty Dump Trucks.

2. Perform optimal replacement cycles for other key asset types, so as to generate additional operational cost savings. The utility and dump trucks noted above only make up a combined 13 percent of the fleet; therefore, there is additional opportunity to realize operational savings via life cycle analyses.
Fleet Replacement Analysis

The objective of this analysis was to 1) quantify the replacement costs of the Authority's fleet for the purposes of determining the extent to which any backlog of fleet replacement needs may exist; and 2) to identify the amount of money the Authority should expect to spend on the purchase of vehicles and equipment each year, if these assets are to be replaced in a reasonably timely manner. To accomplish this, we developed a Baseline Replacement Plan for the Authority.

Key Findings

There is a very large replacement backlog. 59 of the Authority's 141 capital\(^1\) assets (41 percent) will exceed replacement criteria as of the start of 2020, amounting to $2.7 million in replacement costs. Over the past five years (2015-2019), Sweetwater has spent an annual average of $0.5 million (when adjusted for inflation to reflect 2019 dollars) on fleet replacements, which is 50 percent of the necessary average annual spending level required ($1 million) based on the entire fleet inventory and recommended replacement parameters. Additional spending will be required to eventually eliminate the backlog.

In comparison to a younger fleet whose assets are replaced in a consistently timely manner, an old fleet typically has higher operating costs, lower residual values, and poorer asset availability and reliability, which affects employee safety and productivity. An increase in fleet replacement spending aimed at modernizing a fleet often is essential for achieving an overall reduction in fleet costs, which, in turn, increases the availability of funds to support a particular agency's primary mission.

Key Recommendations

1. Develop a Smoothed Replacement Plan based on knowledge of existing fleet assets to ensure relatively consistent year over year spending for fleet replacement based on the average annual replacement cost of the fleet.

2. Follow through on replacement spending to avoid the additional costs associated with an aging fleet, including increased maintenance and repair costs, increased reliability and safety concerns, increased downtime, and decreased user satisfaction and performance. Consider various financing alternatives, including debt financing, to facilitate appropriate replacement purchase while minimizing near-term budgeting requirements and year-over-year fluctuations in necessary funding.

\(^1\) The Authority defines capital assets as those with an original purchase price of $10,000 or greater. Therefore, our replacement analysis is limited to those assets for which current replacement costs are estimated to be at least $10,000.
Management Practices and Resources Review

The objective of this portion of the study was to evaluate the fleet management program's current resources and practices, and provide recommendations to help improve operational efficiency and potentially reduce cost. As part of our evaluation, we rated each management function we reviewed as a means of scoring its current performance. Based on our rating system, FM’s average score was 2.5 out of a possible 5. This means the Authority's performance and/or resource allocation for the functions and activities therein is generally average, and requires some improvement.

The key improvement opportunities and associated recommended action items are:

Fleet Maintenance Resources

Evaluation of the workforce, as it relates to the workload shows that FM is likely understaffed by one mechanic position, in part because of the requirement to perform facilities repairs, in addition to fleet asset maintenance and repairs. Additionally, the workplace, or shop maintenance facility, is inadequate for the assets that FM is required to maintain.

Recommended Actions:

- Hire additional staff to account for the demand generated by a fleet of the Authority’s size and composition;
- Ensure all non-fleet related work is also recorded appropriately in the work order system;
- Develop a comprehensive fleet maintenance facility master plan that identifies short-term improvements for the shop operation along with a long-term strategic plan to replace or augment the current fleet maintenance facility with one that can adequately house the assets under FM’s care.

Fleet Management Information System (FMIS)

Maximo is being used as a digital record keeping system. Reports have to be created by the IT team at the request of the Equipment Mechanic Supervisor. All of our data requests required the IT department’s assistance, which means data is not being used on an ongoing basis for the management of fleet functions and activities. Maximo does not have the necessary reporting capabilities, and lacks several other features of an off-the-shelf FMIS that are necessary for a modern fleet operation.

Recommended Actions:

- Conduct a formal FMIS needs assessment to determine exactly what features are critical to the management responsibilities of FM; based on this assessment, identify and acquire an off-the-shelf FMIS to replace Maximo;
• Ensure all relevant staff are trained appropriately in the use of the FMIS system.

Fleet Cost Control and Financial Management

FM does not charge customers for any of the goods and services it provides, but rather utilizes budgeted funds. This leads to a lack of cost visibility and transparency, cross subsidization of costs between fleet user departments, and ultimately less efficient use of the Authority’s resources as stake holders are not incentivized to manage fleet assets and resources efficiently.

Recommend Actions:

• Establish FM as an internal service fund, requiring all fleet costs and expenditures to recovered through the appropriate charge-back of FM customers utilizing various rates and fees associated with the full recovery of both direct and indirect costs.
INTRODUCTION

OVERVIEW

Sweetwater Authority is a publicly-owned water agency in Southern California that provides safe, reliable water service to approximately 190,000 people in a 32-square mile service area that includes National Authority, Bonita, and portions of Chula Vista. The Authority has a fleet of approximately 242 vehicles and pieces of equipment, which are maintained in-house at the Authority’s operations yard in Chula Vista, CA. Mercury Associates, Inc. (Mercury) was engaged by the Authority to conduct a comprehensive review of fleet management practices as proliferated by Fleet Management (FM), which falls under the Distribution and Maintenance Department.

The Equipment Mechanic Supervisor, who acts as the fleet manager overseeing all fleet management activities (e.g. fleet maintenance, acquisition, etc.), reports to the Director of Distribution. FM also has two mechanics who report directly to the Supervisor.

In recognition of the fact that the fleet is an important tool used to fulfill the Authority's mission to provide a safe and reliable water supply, the Authority has undertaken a project to review its fleet management practices and improve the effectiveness and efficiency of fleet management operations. The overall goal of this project is to ensure the Authority is providing vehicles and equipment that are suitable to users' needs, available when needed, and to achieve expectations regarding service, reliability, safety, and environmental sustainability.

OBJECTIVE, SCOPE, AND REPORT ORGANIZATION

The objectives of this study was to a) conduct detailed analyses of available asset data to provide recommendations and future spending requirements for fleet asset replacement; and b) to evaluate and comment on the overall effectiveness of the Authority’s fleet management program, as executed by FM, based on industry standards (Are included later in this report) for a high-performing fleet management service provider; to be clear, it did not include an evaluation of outsourcing the management of the fleet.

Accordingly, the report is broken into two major sections. The first section evaluates past replacement practices, providing recommendations and calculated spending requirements for future fleet asset replacement, which includes an Optimal Replacement Cycle Analysis for two of the Authority's key asset types, 250-Series Utility Trucks and Heavy-Duty Dump Trucks The second provides the findings and recommendations associated with our review of FM’s current fleet management and maintenance practices.

The specific areas of review included in the assessment of fleet management practices are listed below.

- Asset specification, acquisition and disposal
• Fleet sustainability and use of alternative fuels
• Asset maintenance and repair practices
• Fleet maintenance resource management, organization, and staffing
• Fleet information management/systems
• Fleet cost control and financial management

PROJECT APPROACH

Our approach to this study consisted of a review of documentary materials, quantitative data analysis where applicable and where data was available, and business process mapping and gap analysis, as measured alongside of industry best practices. We obtained input from formal and informal interviews with FM. Members of our project team conducted a site visit where we met with FM employees, observed shop practices, and assessed the fleet maintenance facilities. Our approach to the review of fleet management practices was comprehensive and interactive and included four phases:

1. Project initiation
   a. Validated project objectives and scope
   b. Developed and submitted a formal request for information
   c. Received and reviewed existing documentation and data

2. Assessment of existing conditions
   a. Conducted assessment of current program performance
   b. Calculated key measures of performance based on available data
   c. Conducted interviews with project stakeholders

3. Performance of analyses based on available data
   a. Calculated total cost of ownership and other metrics for key asset classes
   b. Calculated future fleet replacement costs based on provided inventory

4. Development of recommendations for improvement
   a. Developed specific action items for each fleet management program element reviewed
FLEET REPLACEMENT

The objectives of this portion of the study were to:

a) determine optimal replacement cycles for two key types of vehicles in the Authority's fleet (½-Ton 250-Series Utility Trucks and Heavy-Duty Dump Trucks); and

b) quantify the future replacement costs of the fleet that the Sweetwater Authority owns today by developing a replacement plan that projects these costs based on appropriate replacement cycle guidelines.

In doing so, we are able to quantify the extent to which a backlog of fleet replacement needs exists, and identify the Authority's future spending requirements, year by year, for the purchase of vehicles and equipment, if these assets are to be replaced in a reasonably timely manner. In our experience, regularly replacing fleet assets within appropriate timeframes is one of the most important things a fleet owner can do to control the costs and performance of its fleet.

PRINCIPLES OF ASSET AND FLEET REPLACEMENT

Before reviewing this specific replacement plan, it is useful to first review the major elements of an effective fleet replacement program. In our experience, an effective fleet replacement program has four key components:

1. Vehicle replacement cycle guidelines, empirically validated where practical using the organization's own historical vehicle cost data, which indicate at what age specific types of assets generally should be replaced so as to minimize their total cost of ownership (TCO).

2. A multi-year replacement plan that pinpoints future replacement dates and costs of individual assets based on the application of recommended replacement cycles, allowing for the determination of future year-by-year fleet replacement costs and variations therein.

3. A capital financing method that facilitates securing sufficient funds each year to acquire replacement vehicles in accordance with the replacement plan.

4. A short-term replacement prioritization and budgeting process for selecting the specific vehicles and pieces of equipment to be replaced in the coming fiscal year.

Each of these components is discussed in more detail below.
Replacement Cycle Guidelines

Ideally, replacement cycle guidelines are based on the economic principles of asset replacement, which are illustrated in the graph below. As an asset ages, its annual capital cost\(^2\) diminishes and its annual operating costs increase. The sum of these two costs produces a U-shaped total cost of ownership (TCO) curve. Ideally, a vehicle or piece of equipment should be replaced when its TCO is at or near a minimum. In most cases, the TCO curve looks more like a salad bowl than, say, a horseshoe, meaning that there usually is not a single optimal replacement age but, rather, a range of reasonable replacement ages.

The total cost of ownership is different for different types of assets and, indeed, for individual assets of a given type. This variability is caused by differences in the design and engineering of different types of assets, in operating environments, in the quality of care assets receive, in the nature and amount of their use, and a variety of other factors. In recognition of this fact, most organizations develop recommended replacement cycles for a class or type of assets which are intended to represent an appropriate (if not necessarily optimal) replacement cycle for most of the units in that particular class. Historically this was most often accomplished in an informal manner based on discussions among fleet management and maintenance officials and drivers and operators, and a comparison of replacement cycles with peer organizations.

However, best-practice fleet management organizations develop these cycles empirically using lifecycle cost analysis (LCA) techniques when practical. This involves modeling the stream of costs associated with acquiring, operating, and disposing of a particular type of vehicle or piece of equipment over various replacement cycles, and then determining the cycle that will result in the lowest total cost of ownership.

Lifecycle cost analyses are valuable for examining the “hard” capital and operating costs associated with alternative replacement cycles for a given type of asset. It is important to note, however, that there often are other “soft” costs, some more easily measured than others, which also increase as fleet assets age. Generally speaking, these include:

\[^2\] In economic terms – as opposed to, say, financial or fiscal terms – the capital cost of a vehicle or piece of equipment is the change in its fair market value (FMV) from one point in time to another, such as the course of one year.
• Reduced asset reliability and availability and the resulting need to maintain more spare vehicles;
• Reduced employee productivity due to reductions in asset availability and reliability;
• Reduced efficiency in the use of maintenance resources (facilities, equipment, mechanics, etc.) to perform difficult-to-predict repairs in comparison to predictable and schedulable preventive maintenance services; and
• Increased wear and tear due to diminishing employee satisfaction with asset appearance, condition, and performance.

Fleet Replacement Planning

As indicated above, one of the components of an effective fleet replacement program is a long-term fleet replacement plan that projects future vehicle replacement dates and purchase costs associated with the use of a given set of replacement cycle guidelines. It quantifies year-to-year, fleet-wide replacement costs and future variations therein, without which information effective ongoing replacement budgeting is difficult to perform.

A key benefit of a long-term replacement plan is its ability to help fleet managers educate decision makers as to the magnitude of fleet replacement costs and the inherent "lumpiness" of such costs over time. Specifically, it helps fleet management organizations and their customers clearly identify the year-to-year variance in the amount of money required for replacements.

A good fleet replacement planning process not only quantifies the costs of replacing the fleet over the long term so that management and budget decision makers can see that this is a significant, recurring, albeit variable cost of doing business, it also illustrates the consequences of underfunding replacement expenditures by translating spending shortfalls into future spikes in, and backlogs of, replacement spending needs.

Replacement Financing

A capital financing method is the manner in which an organization pays for vehicle replacement costs. The best fleet replacement guidelines, policies, and plans are of no value without the financial resources — the cash — required to follow them.

Even during good economic times, securing sufficient funds to replace vehicles and equipment in a timely manner is a challenge for many organizations. In our experience, the vulnerability of fleet replacement funding in most organizations stems less from a lack of appreciation of the importance of vehicles to the business of the organization, or of the benefits of replacing vehicles on a regular basis, and more from a lack of willingness to commit sufficient funds to fleet replacement. This reluctance is greatly impacted by the large cost of assets that may need to be replaced in some years and the inability of certain capital financing approaches to effectively deal with the resulting spikes in replacement spending needs.
Many organizations do not have a good mechanism for accommodating peaks and valleys in annual spending requirements when the availability of funds for such expenditures is relatively static. The solution to this problem lies in pursuing one of two courses of action: decreasing the year-to-year variation in fleet replacement spending requirements or decreasing the variation in replacement funding requirements. While annual variation in the replacement costs of a fleet can be managed to a certain extent over the short term—say three to five years—they cannot be completely eliminated, particularly in a fleet composed primarily of high-cost equipment, as is the case with Sweetwater. The volatility of annual replacement funding requirements, on the other hand, can be managed quite well, depending on the method used to finance fleet replacement costs. There are essentially three ways to finance fleet capital costs: cash, savings (i.e., a reserve fund), and debt. Each of these methods has its advantages and disadvantages, but the latter two methods are much better than the first in mitigating annual peaks and valleys in replacement funding requirements.

**Replacement Prioritization and Budgeting**

The final component of an effective fleet replacement program is a short-term replacement prioritization and earmarking process for designating specific vehicles and pieces of equipment to be replaced in the coming fiscal year. Such a process takes us from the data-driven model of a long-term fleet replacement plan, to the real-world review of vehicles proposed to be replaced in a given year.

Because a fleet replacement plan and the replacement cycle guidelines on which it is based derive from cost and other information for the "typical" asset (of each type) in the fleet, they do not take into account any unique characteristics of individual assets in a fleet. A replacement plan should identify which assets are candidates for replacement each year, not which assets will definitely be replaced each year. These candidates should be scrutinized using criteria that are not limited to age and life-to-date miles or hours of use. A replacement prioritization process includes reviewing an asset's business application(s), recent usage, and recent repair history to determine if it will be required long term. It might not make sense, for example, to replace an asset to which an organization recently made major repairs solely because it meets a replacement cycle guideline. Best-practice organizations use a structured scoring system to set priorities. The system incorporates weights and values for factors or attributes that are unique to each asset, including current utilization level; front-line or backup assignment status; recent repair history and needed repair/refurbishment costs; repair parts availability; operator perceptions of reliability, suitability, and safety; and ease of replacement.

**OPTIMAL VEHICLE REPLACEMENT CYCLE ANALYSES**

**Methodology**

Determining the optimal replacement cycle for a vehicle or piece of equipment of a given type involves modeling the stream of costs associated with acquiring, operating, and maintaining and repairing that asset over a range of potential ages or replacement cycles,
and then identifying the cycle that will result in the lowest total cost of ownership. The metric we use to identify the optimal cycle is called the equivalent annual cost (EAC). The EAC of a capital asset is a uniform dollar amount, the net present value of whose payments for a given period of time (i.e., replacement cycle) is equivalent to the net present value of the costs of owning and operating that asset over the course of that period. It permits the comparison of alternative replacement cycles (i.e., streams of future costs of different durations) for the purpose of pinpointing the cycle that will result in the lowest total cost of ownership.

While the analysis of objective data is essential for identifying optimal replacement cycles, it is important to note that there also are indirect asset costs that are impacted by an organization’s vehicle replacement policies and decisions. They may not be easy to quantify, but nonetheless should be taken into account when reviewing and interpreting empirical analysis results. These indirect costs include:

- The predictability and, hence, manageability of asset repair costs, both of which tend to diminish as assets age;
- Maintenance and repair-related asset downtime and its impact on fleet size;
- Service disruptions resulting from unexpected asset breakdowns;
- Impacts on employee efficiency, productivity, effectiveness, and safety associated with asset availability and reliability levels;
- Reduced driver/operator confidence in and satisfaction with asset performance, and corresponding changes in asset usage decisions and practices; and
- Technological obsolescence, which impacts everything from repair parts availability to fuel consumption rates.

In consultation with the Authority, we selected two types of assets in the fleet for inclusion in the optimal replacement cycle analysis component of this study: Ford F 250 series utility trucks and heavy-duty dump trucks. The number of each type of unit in the fleet is shown in Exhibit 1.
Exhibit 1
Asset Types Included in Replacement Cycle Analysis and Quantities of Each

<table>
<thead>
<tr>
<th>Asset Type</th>
<th>Number of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>250-Series Utility Trucks</td>
<td>11</td>
</tr>
<tr>
<td>Heavy-Duty Dump Trucks</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
</tr>
</tbody>
</table>

We selected specific elements of historical data for each asset of each type included in our analysis. These data items pertained to the principal direct costs associated with owning and operating each of the asset types such as original purchase prices and in-service dates and miles that were driven, and maintenance and repair costs for the past year. For each type of asset identified above, we conducted a life cycle cost analysis using a proprietary software program called ORCA™ developed by Mercury Associates for this purpose. We used this program to calculate the equivalent annual cost (EAC) associated with keeping each type of asset in service for periods ranging from 1 to as many as 20 years and identified the replacement cycle that would result in the lowest EAC. We made a final replacement cycle recommendation based on the review of the EAC calculations, especially relative differences (often small) between the EAC under the lowest-cost replacement cycle and under replacement cycles that are one or two years shorter or longer than that of the lowest cost cycle. We also took into account other “soft cost” considerations such as those discussed above (e.g., reliability, predictability of repair costs, parts availability, and technological obsolescence).

For each group of assets examined, we performed extensive statistical analysis of historical asset usage and maintenance and repair cost data in order to 1) determine the average annual level of usage (in miles) during the primary period of use of each asset type during its service life; and 2) develop regression equations for estimating a) annual asset maintenance and repair costs, and b) end-of-year asset fair market values (FMV) as a function of changes in asset age (i.e., potential replacement cycle) and accumulated miles of use.

We estimated fuel costs based on the fuel efficiency in miles per gallon of each vehicle type derived from reported data, the Chula Vista average cost per gallon of fuel in December 2019 as reported by GasBuddy, and an annual fuel price inflation rate of three percent. We also included an annual fuel efficiency deterioration factor of two percent to reflect the fact that assets become less fuel-efficient as they age and the fact that is keeping assets in a fleet for a long time deprives fleet owners of gains in new vehicle fuel efficiency made possible by advances in vehicle engineering and manufacturing required to comply with US EPA fuel economy standards.
Summary of Analysis Results

The current average and optimal replacement cycle (in years) and the estimated operating cost savings for each type of asset included in our analysis are shown in Exhibit 2. As can be seen, the average replacement cycles that result from Sweetwater Authority's current and recent fleet replacement spending levels are longer than the recommended cycles.

We estimate that Sweetwater Authority could reduce the operating costs of all of the assets of these two types in its fleet by approximately $9,210 per year (in 2019 dollars) if it were to replace them in accordance with the recommended replacement cycles rather than the current cycles identified here.

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3 The "current" replacement cycle was determined by developing a frequency distribution of the assets in each class by current asset age and evaluating the results. If the current ages of all the assets in a given class displayed a normal distribution, the current average replacement cycle would be exactly double the current mean age of the assets. In a non-normal age distribution, typical of the assets in older fleets, simply doubling the current mean age of the assets tends to overstate the age at which most of the assets in a given class currently are being replaced.

4 It is important to note that these savings are based on historical costs for fleet assets provided by FM, and therefore are dependent on the accuracy with which these costs have been recorded. We suspect that these costs could in fact be understated, and therefore so are the savings noted from the recommended replacement cycles. Our suspicion arises from the current lack of a charge-back system with cost allocation methods that ensure all direct and indirect costs are appropriately assigned. It is our understanding that M&R costs are derived purely from the recorded shop labor rate, and direct cost on parts and sublet repairs. As such, it is likely that much of the overhead and time/effort associated with procuring parts, sublet services and fuel are not factored into the operational costs recorded for each asset, and thereby, are understated. Thus, the operational savings from moving to shorter replacement cycles are most likely even greater. Furthermore, having a robust FMIS would improve data capture and billing for FM, facilitating more accurate cost collection and visibility.

5 Our estimation of annual cost savings from implementing the recommended replacement cycles is limited to asset operating costs because the capital cost values used in determining optimal replacement cycles are economic rather than fiscal impact (i.e., cash) values. It is of limited value to decision making to quantify asset capital cost savings from a change in replacement cycles without specifying how the capital costs are actually paid (financed). That said, the cost savings shown in Exhibit 2 would clearly be reduced by the increase in asset capital costs that would result from the use of shorter replacement cycles.
### Exhibit 2
Current and Recommended Replacement Cycles and Associated Annual Operating Cost Savings
(all costs in 2019 dollars)

<table>
<thead>
<tr>
<th>Asset Type</th>
<th># of Units</th>
<th>Current Average Age (years)</th>
<th>Current Replcmnt Cycle (years)</th>
<th>Recommnd Replcmnt Cycle (years)</th>
<th>Avg Ann Operating Cost Under Current Cycle per Vehicle</th>
<th>Avg Ann Operating Cost Recommd Cycle per Vehicle</th>
<th>Avg Ann Operating Cost Savings per Vehicle</th>
<th>Ann Operating Cost Savings per Vehicle %</th>
<th>Total Avg Annual Operating Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>250-Series Utility Trucks</td>
<td>11</td>
<td>5.6</td>
<td>11</td>
<td>9</td>
<td>$7,434</td>
<td>$6,906</td>
<td>$528</td>
<td>7.1%</td>
<td>$5,808</td>
</tr>
<tr>
<td>Heavy-Duty Dump Trucks</td>
<td>6</td>
<td>7.9</td>
<td>16</td>
<td>13</td>
<td>$5,596</td>
<td>$5,029</td>
<td>$567</td>
<td>10%</td>
<td>$3,402</td>
</tr>
<tr>
<td>Total/Average</td>
<td>17</td>
<td></td>
<td>13</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$9,210</td>
</tr>
</tbody>
</table>
Below are the details of our optimal replacement cycle analysis for Sweetwater Authority 250-Series Utility Trucks. ORCA results for Heavy-Duty Dump Trucks can be found in the appendix to this report.

**ORCA Results – 250-Series Utility Trucks**

The key assumptions and inputs we used for the 250-Series Utility Trucks replacement cycle analysis included the following:

1. New vehicle purchase price: $48,000
2. Average annual usage (miles): 7,898
3. Fuel economy rate (MPG): 6.4
4. Fuel cost per gallon: $3.39
5. Annual fuel efficiency deterioration rate\(^6\): 2 percent
6. Annual inflation rate for M&R and fuel costs: 3 percent
7. Discount rate: 6 percent
8. Residual values by vehicle age and accumulated mileage, expressed as a percentage of the current vehicle purchase price, obtained from an analysis of used vehicle sales data.
9. Maintenance and repair cost projections based on regression analysis of Sweetwater Authority data.

The average age of all the 250-Series Utility Trucks currently in the fleet is 5.6 years, and the current average replacement cycle is 11 years.

The results of our analysis, shown in Exhibit 3, indicate that these vehicles’ total cost of ownership (indicated by the equivalent annual cost – EAC – shown in the bottom row of the table) is, strictly speaking, at a minimum under a replacement cycle of nine years.

Comparing the average annual operating cost of this type of vehicle under a nine-year cycle and the current 11-year cycle, it can be seen that Sweetwater Authority would save an estimated $528 or 7 percent per vehicle per year by replacing these vehicles every nine years. Based on the total number of 250-Series Utility Trucks in the fleet, this translates into approximately $5,800 in operating savings per year. Since vehicle capital costs can vary substantially over time, depending on the method used to finance them, it makes no sense to incorporate them in this average annual cost savings estimate. However, annual vehicle capital costs would be higher under the optimal replacement cycle, meaning that the aggregate net cost savings would be lower than this amount.

---

\(^6\) Per year of vehicle age.
### Exhibit 3
Optimal Replacement Cycle Analysis for 250-Series Utility Trucks

<table>
<thead>
<tr>
<th>Replacement Cycle (years)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year-End Odometer Reading</strong></td>
<td>7,898</td>
<td>15,796</td>
<td>23,663</td>
<td>31,501</td>
<td>39,489</td>
<td>47,367</td>
<td>55,284</td>
<td>63,182</td>
<td>71,080</td>
<td>78,978</td>
<td>86,875</td>
</tr>
<tr>
<td><strong>CAPITAL COST</strong>&lt;sup&gt;7&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year-End Fair Market Value Percentage</td>
<td>60.0%</td>
<td>40.0%</td>
<td>30.0%</td>
<td>23.0%</td>
<td>18.0%</td>
<td>16.9%</td>
<td>15.5%</td>
<td>14.2%</td>
<td>13.1%</td>
<td>12.0%</td>
<td>11.0%</td>
</tr>
<tr>
<td>Year-End Fair Market Value</td>
<td>$28,800</td>
<td>$19,200</td>
<td>$14,400</td>
<td>$11,040</td>
<td>$8,640</td>
<td>$8,092</td>
<td>$7,432</td>
<td>$6,825</td>
<td>$6,208</td>
<td>$5,757</td>
<td>$5,267</td>
</tr>
<tr>
<td>Annual Capital Cost</td>
<td>$19,200</td>
<td>$9,600</td>
<td>$4,800</td>
<td>$3,360</td>
<td>$2,400</td>
<td>$548</td>
<td>$600</td>
<td>$606</td>
<td>$557</td>
<td>$512</td>
<td>$470</td>
</tr>
<tr>
<td><strong>OPERATING COSTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual M&amp;R Cost</td>
<td>$883</td>
<td>$995</td>
<td>$1,122</td>
<td>$1,264</td>
<td>$1,424</td>
<td>$1,604</td>
<td>$1,808</td>
<td>$2,037</td>
<td>$2,295</td>
<td>$2,586</td>
<td>$2,914</td>
</tr>
<tr>
<td>Annual Fuel Cost</td>
<td>$4,400</td>
<td>$4,625</td>
<td>$4,861</td>
<td>$5,109</td>
<td>$5,369</td>
<td>$5,643</td>
<td>$5,931</td>
<td>$6,234</td>
<td>$6,552</td>
<td>$6,886</td>
<td>$7,238</td>
</tr>
<tr>
<td>Total Annual Operating Cost</td>
<td>$5,284</td>
<td>$5,620</td>
<td>$5,982</td>
<td>$6,372</td>
<td>$6,793</td>
<td>$7,248</td>
<td>$7,739</td>
<td>$8,271</td>
<td>$8,847</td>
<td>$9,472</td>
<td>$10,151</td>
</tr>
<tr>
<td><strong>TOTAL COST</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Total Cost</td>
<td>$24,484</td>
<td>$15,220</td>
<td>$10,782</td>
<td>$9,732</td>
<td>$9,193</td>
<td>$7,796</td>
<td>$8,399</td>
<td>$8,877</td>
<td>$9,404</td>
<td>$9,984</td>
<td>$10,621</td>
</tr>
<tr>
<td>Cumulative Total Cost</td>
<td>$24,484</td>
<td>$39,704</td>
<td>$50,486</td>
<td>$60,219</td>
<td>$69,412</td>
<td>$77,207</td>
<td>$85,607</td>
<td>$94,484</td>
<td>$103,888</td>
<td>$113,872</td>
<td>$124,463</td>
</tr>
<tr>
<td>Equivalent Annual Cost</td>
<td>$24,484</td>
<td>$20,145</td>
<td>$17,329</td>
<td>$15,729</td>
<td>$14,715</td>
<td>$13,837</td>
<td>$13,340</td>
<td>$13,068</td>
<td>$12,960</td>
<td>$12,063</td>
<td></td>
</tr>
</tbody>
</table>
REPLACEMENT PLAN DEVELOPMENT

Most details of the methods used to develop the fleet replacement plans are explained in later sections of this report where analytical results are presented. However, there are a few elements of our overall approach to developing this plan that are useful to outline here.

Fleet Inventory Data

Our analysis of fleet replacement costs began with the development and submission of a request for a fleet inventory containing certain detailed information on each asset in the fleet. The Authority supplied this inventory along with key operational and cost data that was available.

To determine the future costs of replacing the fleet, we developed a 20-year replacement plan that identified future replacement dates and costs for each asset in the fleet. The asset-specific information used to construct the replacement plan included user department/division name; asset class code; asset make, model, and model year; original purchase price; and in-service date. The replacement plan we developed assumed that all vehicles and pieces of equipment currently in the fleet will be replaced and that they will be replaced with an asset of like type. That is, we made no assumptions about future changes in the size and composition of the fleet resulting from improved asset allocation and utilization practices or the replacement of conventionally fueled vehicles with alternative fuel or electric vehicles (AFVs/EVs).

Included in the inventory are fairly large portion of small pieces of equipment and motorized tools. As many did not qualify for the Authority's threshold for a capital asset, or $10,000, and therefore can be purchased with operating funds, these were eliminated from the replacement plan. With these adjustments, fleet size was identified at 133 assets owned by the Authority.

Replacement Cycles

Apart from the replacement cycles developed for 250-Series Utility Trucks and Heavy-Duty Dump Trucks as described in the ORCA section above, the recommended replacement cycles used for asset types in the Authority fleet were not identified through independent empirical analysis. Instead these are replacement guidelines recommended by Mercury Associates based on the replacement planning work we have performed for hundreds of public and private fleets. Some examples can be seen in Exhibit 4. While these replacement cycles provide a reasonable basis for performing this study, they are no substitute for empirically validated optimal replacement cycle guidelines as described above. We also imputed current replacement cycles based on past practice, which can be calculated based on the age and in-service dates of existing assets in the fleet. These cycles serve as our starting point for comparing alternative options to this approach.
Exhibit 4
De Facto and Recommended Replacement Cycles

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Current Median Age (years)</th>
<th>De Facto Replacement Cycle (years)</th>
<th>Mercury Recommended Replacement Cycle (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 8500 GVW-Pickups-Half Ton-Extended Cab</td>
<td>6.58</td>
<td>13.2</td>
<td>8</td>
</tr>
<tr>
<td>&lt; 8500 GVW-Sport Utility-Compact-4 Passenger</td>
<td>6.58</td>
<td>13.2</td>
<td>8</td>
</tr>
<tr>
<td>10,001-14,000 GVW-Pickups-Super Duty-Extended Cab</td>
<td>7.58</td>
<td>15.2</td>
<td>10</td>
</tr>
<tr>
<td>Off Road and Construction-Wheeled-Loader/Backhoes-Heavy</td>
<td>5.58</td>
<td>11.2</td>
<td>10</td>
</tr>
</tbody>
</table>

**Purchase Prices and Inflation Rates**

In order to determine future fleet replacement costs, it is necessary to assign a current purchase price to each asset type. We determined an average expected acquisition cost for each asset class, using the Authority recent purchase history and replacement costs provided by FM.

We assumed an average annual purchase price inflation rate of three percent. While it is impossible to predict future price inflation, in practice we have found this to be a reasonable assumption. This inflation rate was applied to future new asset purchases and used asset sales in the replacement plans we developed for the Authority.

**Residual Values**

In order to properly estimate the future funding requirements for fleet replacement, it is necessary to include asset residual value: the amount the Authority should reasonably expect to realize upon the sale of an asset at the end of its useful life. Ideally, this occurs at the end of the recommended replacement cycle but could be later in the event that the replacement of an asset has to be deferred. We estimate residual values for asset types using regression equations based on data for used asset sales for the Authority’s fleet where possible, as well as data we previously developed for similar public fleets, and from other industry sources.

**Planning Parameters**

Determining the future costs of replacing the Authority’s fleet required two basic inputs: 1) the aforementioned fleet inventory; 2) a set of parameters for each asset type or class. Parameters are assumptions that represent the typical asset in each class and include: a
recommended replacement cycle (in months), an acquisition cost in today’s dollars, and an annual acquisition cost inflation rate. We developed planning parameters for 47 different classes of vehicles and equipment in the Authority’s fleet. A sample of the parameters used in our analysis are shown in Exhibit 5.

**Exhibit 5**

**Sample Asset Replacement Parameters**

<table>
<thead>
<tr>
<th>Asset Class</th>
<th># of Vehicles in Fleet</th>
<th>Recommended Replacement Cycle (Years)</th>
<th>Current Acquisition Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 8500 GVW-Pickups-Half Ton-Extended Cab</td>
<td>5</td>
<td>8</td>
<td>$35,000</td>
</tr>
<tr>
<td>&lt; 8500 GVW-Sport Utility-Compact-4 Passenger</td>
<td>14</td>
<td>8</td>
<td>$32,000</td>
</tr>
<tr>
<td>10,001-14,000 GVW-Pickups-Super Duty-Extended Cab</td>
<td>7</td>
<td>10</td>
<td>$40,000</td>
</tr>
<tr>
<td>Off Road and Construction-Wheeled-Loader/Backhoes-Heavy</td>
<td>5</td>
<td>10</td>
<td>$154,000</td>
</tr>
</tbody>
</table>

We used Mercury’s proprietary CARCAP™ (Capital Asset Replacement Cost Analysis Program™) software to develop the fleet replacement plan and analyze various fleet asset costs and outcomes associated with their implementation. This program allows us examine each asset individually to develop projections for: remaining use life, future replacement dates, replacement costs, residual values, ages, book and fair market values, book and effective depreciation costs; these amounts are aggregated into department-, fund-, and jurisdiction-wide totals for fleet cost analysis purposes.

CARCAP™ generates a replacement plan by 1) comparing current age and meter reading (mileage or use hours) of each fleet asset to the recommended replacement criteria of that asset type (age, miles, or use hours) recorded to the program’s Planning Parameter Table; 2) projecting when each asset will be due for replacement based on whichever of these criteria an asset will meet first; and 3) calculating the future purchase price of the replacement asset in the year it is due for replacement.

We used this program to develop a *Baseline Replacement Plan* for the Authority’s fleet.

**BASELINE REPLACEMENT PLAN**

We developed the baseline plan to project future fleet replacement costs, beginning in 2020, based on the application of the replacement parameters for Sweetwater owned assets. The replacement cycles we used range from five to 15 years, and their weighted average, for all the assets in the fleet, is just over eight years. This is consistent with the
weighted average replacement cycle we typically use in other fleet replacement planning projects.

We calculate that replacement cost for the entire fleet at $7.7 million; that is, if the fleet were to be repurchased today, the portion of the fleet with replacement costs of $10,000 or more would cost approximately $7.7 million. This metric ignores book value of existing assets; it is simply the present value cost today to produce an identical replacement fleet with new models. Exhibit 6 shows the gross replacement costs, adjusted for inflation, in each year of the baseline plan. The amounts shown do not include proceeds from the sale of use assets.

Selected fleet replacement statistics derived from the Baseline Replacement Plan are shown in the table below. The current median age of assets in the Authority fleet is 7.6 years. If fleet assets are uniformly distributed by age, their average age would be one-half of their average replacement cycle; we can infer that the de facto average replacement cycle for the assets in the fleet is roughly twice this age, that is 15.2 years. This imputed average replacement cycle is considerably longer than the 8-year weighted average recommended cycle that results from applying a combination of the replacement
cycles we arrived at using the ORCA results we calculated along with values we have found in other similar fleets.

**Exhibit 7**

Replacement Statistics

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of assets in fleet</td>
<td>133</td>
</tr>
<tr>
<td>Current median asset age (years)</td>
<td>7.6</td>
</tr>
<tr>
<td>De facto average replacement cycle (years)</td>
<td>15.2</td>
</tr>
<tr>
<td>Weighted average recommended replacement cycle (years)</td>
<td>8.1</td>
</tr>
<tr>
<td>Average asset replacement cost (2019 dollars)</td>
<td>$57,947</td>
</tr>
<tr>
<td>Number of assets that will meet or exceed recommended age in FY 2020</td>
<td>65</td>
</tr>
<tr>
<td>Percentage of assets that will meet/exceed recommended age FY 2020</td>
<td>49%</td>
</tr>
<tr>
<td>Number of vehicles that will exceed recommended replacement age in FY 2020</td>
<td>59</td>
</tr>
<tr>
<td>Percentage of assets that will exceed recommended age FY 2020</td>
<td>44%</td>
</tr>
<tr>
<td>Current replacement cost of the fleet</td>
<td>$7.7 M</td>
</tr>
<tr>
<td>Cost of replacing assets that will meet or exceed recommended age in FY 2020</td>
<td>$2.9 M</td>
</tr>
<tr>
<td>Cost of replacing assets that will exceed recommended age in FY 2020</td>
<td>$2.7 M</td>
</tr>
<tr>
<td>Average annual fleet replacement cost (amount the Authority should be replacing annually) for the fleet</td>
<td>$1 M</td>
</tr>
<tr>
<td>Average annual value of asset purchases (FY 2015-19) adjusted to 2019 dollars</td>
<td>$0.5 M</td>
</tr>
<tr>
<td>Average current odometer reading</td>
<td>30,645</td>
</tr>
<tr>
<td>Average annual mileage</td>
<td>4,594</td>
</tr>
</tbody>
</table>

As we can see, there is a very high replacement cost in the first year of the Baseline Plan. Together with high average asset ages, this indicates there is a large replacement backlog. Over 44 percent of fleet assets exceed their recommended replacement age as of the start of 2020. At a value of $2.7 million, this backlog is equivalent to 35 percent of the replacement cost of the entire fleet (in present value terms), or the equivalent of almost three years of average annual replacement costs (according to recommended replacement cycles). Furthermore, the cost of replacing all assets that will become overdue by the end of FY 2020 is almost six times the average annual dollar value (adjusted for inflation) of purchased assets the Authority placed in service from FY 2015 to FY 2019.

To address the large replacement backlog, the Authority will have to increase replacement spending. The Authority's average annual replacement cost utilizing the recommended replacement cycles is $1 million. In comparison, fleet replacement expenditures for the prior five years have averaged $0.5 million per year (in 2019 dollars).
based on the purchase prices of vehicles currently in the fleet, half of the annual amount required.

In order to consider the impact of used asset resales on the Authority's funding requirements, we applied the residual value calculations described earlier to the baseline plan. Exhibit 8 below shows the impact of asset resales on the baseline plan.

*Exhibit 8*

Gross Replacement Costs Less Sale Proceeds

Over the first 10 years, used asset sale proceeds will average approximately $116,000, or about 11 percent of gross replacement costs. Nonetheless, even if it had the financial wherewithal to do so, we would not recommend that Sweetwater attempt to replace a large portion of its fleet in a single year, as suggested in the *Baseline Plan*. There are a number of reasons for this, the two most important of which are 1) the logistical challenges of accomplishing it, such as the impact on operations of procuring, commissioning, decommissioning, and disposing of these many assets; and 2) the “ripple effects” in future

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8 Further deferment of asset replacement will diminish these values. However, for much of the Authority's fleet, the marginal change will be relatively small due to the age of the fleet and the nature of changing residual values over time; i.e. a vehicle tends to lose a larger portion of its resale value in the earlier years of its life, with the proportionate loss in value decreasing each year.
fleet replacement costs that would result from many of the assets replaced in the first year of the plan coming due for replacement simultaneously in future years. In short, the Baseline Plan is a valuable benchmarking tool, but not a practical near-term plan for renewing Sweetwater's fleet.

In light of these concerns, the next step would be to smooth the Baseline Plan to develop a more realistic – that is, affordable and implementable – replacement plan. This plan would be based on the same assumptions and parameters as was the Baseline Plan with one exception; adjusted initial replacement dates of many of the assets (that will meet the criteria for replacement in FY 2020) so that the average replacement expenditures over the first several years under each plan are reasonably close to the average annual replacement costs of the fleet. Once complete, the Authority can then assess the best means of financing fleet replacement.

RECOMMENDATIONS

Below we summarize key recommendations based on our analyses and application of replacement practices fundamental to optimizing fleet costs and performance, as described in detail earlier in the report:

1. Implement the optimal replacement cycles developed for 250-Series Utility Trucks and Heavy-Duty Dump Trucks.

2. Perform additional optimal replacement cycle analyses for other key asset types in the remainder of the fleet. The objective of an optimal replacement cycle analysis is to find a replacement interval for each asset class that minimizes total cost of ownership.

3. Develop a smoothed fleet replacement plan as described above based on specific operating needs of the fleet, and knowledge about the condition and reliability of fleet assets.

4. Determine the best method of financing fleet replacement to ensure consistent asset replacement over time. Debt financing may be a good option as it can often facilitate increased replacement purchasing without a corresponding increase in budgetary requirements for replacement spending in the early years of a replacement plan.

5. Follow through with replacement spending. Replacement spending should not be viewed as discretionary. If the Authority does not make a choice to spend appropriately for replacement, it will incur the additional costs associated with an aging fleet, including increased maintenance and repair costs, increased reliability and safety concerns, increased downtime, and decreased user satisfaction and performance.
MANAGEMENT PRACTICES AND RESOURCES

FLEET MANAGEMENT EXPLAINED

In our experience, every fleet management operation is comprised of three essential elements: *workload*, the work that needs to be done; the *workforce*, who will do it; and the *workplace* where it occurs.

*The workload* can be described as "the measured accumulation of duties and responsibilities for the fleet management operation." Examples include conducting a preventive maintenance service, responding to a service call to repair a flat tire, diagnosing a check engine failure code, conducting an annual inspection on a vehicle or piece of equipment, sourcing, ordering and managing a parts inventory, and developing a long-term fleet replacement plan.

*Workload*, properly measured and expressed, is very useful for meaningful decision-making. Our "Vehicle Statistical Referencing System (VSRS)" allows us to empirically calculate a fleet's maintenance burden. It can measure the workload for all vehicles and pieces of equipment in any fleet. In the VSRS, each asset is assigned a Vehicle Equivalency Unit (VEU). The basis for this system is a passenger sedan, given a VEU value of 1.0. The assumption made: the measured accumulation of the associated duties and responsibilities (brake jobs, tire rotations, oil changes, etc.) = 1.0 VEUs, or 10-15 direct labor hours each year. Even though the VEU assignments can vary greatly from vehicle to vehicle, the workload can be accurately and usefully measured.

Mercury maintains and constantly updates a database of VEU values for more than 600 vehicle and equipment classifications. The database includes the entire spectrum of vehicles and equipment found in a typical fleet, from push mowers to aerial bucket trucks. This is perhaps the most important element found in the VSRS. Each class is given a VEU value as it relates to that of a passenger sedan (rated at 1.0 VEU). A general-purpose trailer, for example, can be assigned a rating of 0.5 VEUs. A pickup truck may have a rating of 1.5 VEUs. By statistically reducing a fleet to its equivalency in terms of sedans, we can make reasonable, standards-based comparisons with the fleet operations of other organizations. A fleet of one hundred (100) pickup trucks\(^9\), each rated at 1.5 VEUs, constitutes a fleet of 150 VEUs. The number of mechanics required to maintain this fleet is more than those needed to maintain a fleet of 100 sedans (100 VEUs) but far less than those needed to maintain a fleet of 100 Heavy-Duty Dump Trucks (450\(^10\) VEUs).

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\(^9\) For pickup trucks, a VEU assignment of 1.5 is one of many used based on any number of different factors such as equipment and deployment characteristics and is used for illustrative purposes only.

\(^10\) For Heavy-Duty Dump Trucks, a VEU assignment of 4.5 is one of many used based on any number of different factors such as GVWR, added equipment, use, and application and is used for illustrative purposes only.
In total, FM maintains a fleet of 242 vehicles and pieces of equipment\textsuperscript{11}. We calculated the entire fleet which revealed an overall VEU count of 307.3. This includes vehicles, trailers, small tools, and miscellaneous equipment.

The *workforce* is the human capital – the people charged with managing and maintaining the fleet. For many fleets, this includes a fleet manager, shop supervisor, mechanics, parts clerks, fleet analysts, motor pool clerks, and support staff. The number of people should be directly related to the workload. The appropriate number of mechanics, for example, can be calculated once the total number of direct labor hours required to maintain and repair the fleet has been calculated. Then, the tolerance\textsuperscript{12} for each mechanic can be established. Once the number of “wrench-turners” has been determined using quantitative statistics, the number of supervisory positions and parts clerks can be calculated. For example, we know that a shop supervisor should be able to effectively manage 8-10 mechanics. And we know that the number of support staff (i.e., parts clerks) can also be based on the number of mechanics. An understanding of the workload will also lead to the identification of the number of support personnel such as analysts, motor pool clerks, administrative clerks, etc. The workforce must grow or shrink in response to changes in the workload (i.e., fleet size and composition) or the mission (i.e., taking on additional responsibilities such as managing a motor pool).

FM has 3 positions that support the management and maintenance of the fleet. We have identified the required workforce allocation by position type and will address it later in this report.

The *workplace* is the facility (facilities) where the work is performed. This includes work areas such as the shop (i.e., maintenance bays, weld/fabrication bays, tire repair area, small engine repair shop), shop support areas (i.e., parts room, bulk fluid distribution room, reference library; tool and equipment storage), employee amenities (locker rooms, break rooms, wellness centers, etc.), and administrative areas (i.e., offices, conference rooms, workstations, lobbies, and storage areas). The workplace also includes exterior staging areas (ready line, deadline, official vehicle parking, employee parking, new vehicle storage, etc.) and site circulation. All of these must be sized to match the workforce, which is sized to address the workload.

**FLEET MANAGEMENT PRACTICES ASSESSMENT ORGANIZATION AND FORMAT**

This section of the report is organized into sections that correspond to the specific areas of fleet management reviewed. For instance, the *In-house Asset Maintenance and Repair* section includes findings and recommendations on several distinct elements, ranging...
from the preventive maintenance (PM) program to workflow distribution. For each of the reviewed processes, we included a discussion describing five major points:

- **The objective** of the fleet management activity; for instance, the purpose of a PM program (i.e., to minimize unexpected and potentially costly vehicle system and component failures through the performance of pre-defined, pre-scheduled inspection, adjustment, refurbishment, and/or replacement services).

- **The maturity** of FM's current performance of the activity – referred to as the *present mode of operation* or PMO – using a business process "maturity" rating based on the scale and definitions shown in the following table:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Brief Description of Maturity Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - Best in Class</td>
<td>The organization has an innovative, well-above-average ability to define, measure, monitor, manage, and perform the fleet management activity that clearly sets it apart from the typical fleet management organization.</td>
</tr>
<tr>
<td>4 - High Performing</td>
<td>The organization has comprehensive, well-defined, data-driven policies and procedures for performing the activity and promoting continuous improvement in its execution.</td>
</tr>
<tr>
<td>3 - Competent</td>
<td>The organization has good knowledge of basic fleet management principles and techniques associated with the performance of the activity and applies it in a generally consistent manner.</td>
</tr>
<tr>
<td>2 - Basic</td>
<td>There is a limited understanding of the proper methods of, and generally inconsistent performance of the activity across the organization.</td>
</tr>
<tr>
<td>1 - Reactive</td>
<td>The organization has a poor understanding of, and ad hoc approach to performing, the fleet management activity, or fails to perform it with any consistency, if at all.</td>
</tr>
</tbody>
</table>

- **Observations** regarding the PMO on which our assessment or rating of its maturity is based.
- The **future mode of operation** (FMO) of the activity that will reflect the results of implementing the suggested actions.
- **Recommended action item(s)** that are specific recommendations or activities that will bring FM closer to the stated objective.

**COMPARISONS AND BENCHMARKS**

Benchmarking is important because it can take the politics and personalities out of fleet management decision making, help an organization detect areas of sub-standard performance, pinpoint where improvements are needed, help an organization measure goals and objectives, and track changes or trends in performance over time.

Decision-makers need to be careful because comparing fleet organizations with other peer organizations is difficult at best, and the results can be misleading. For example, one fleet organization may not include facility depreciation in the calculation of a fully burdened labor rate. Another example: mechanics may be required to charge time to work orders based on industry “flat rate” time standards while a different group of mechanics charges actual time spent performing the repair.

For these reasons and others, measuring an organization’s effectiveness cannot be based solely on external comparisons. The development of internal measures and goals for improvement are often the most effective approach. Therefore, the most important benchmarks measure internal performance over time. As long as the calculations are consistent, they will correctly reflect the competitiveness and effectiveness of the fleet organization. These trends reveal whether performance is improving, remaining constant, or declining.

We arrived at our assessments of the **maturity** of each activity through a myriad of processes. These include carefully comparing actual performance to industry standards and benchmarks, assessing how the activity has been developed and is currently managed, and showing how well it is aligned with best management practices.
FINDINGS AND RECOMMENDATIONS

This section contains the results of our assessment of the Sweetwater Authority fleet management practices as of the fourth quarter of 2019. Our findings, conclusions, and recommendations for improvement have been developed specifically for the Authority. It should be noted that this report focuses primarily on opportunities for improvement. Therefore, more attention is given to areas that need re-engineering, change, or other improvements as opposed to areas that are functioning at or above recommended levels of performance. This study, and the recommended changes, will help FM continue to improve operations and become more efficient and cost-effective.

FLEET POLICY AND PROCEDURES

Objective: The fleet organization develops and publishes a series of policies and procedure statements (PPS) that address, organize, and simplify fleet operations. They are carefully developed and consistently applied. They are reviewed routinely to assess the relevance, updated to maintain currency, and added-to or subtracted-from to serve as the most pertinent governing document for the organization’s fleet program.

Maturity Rating: 2

Observations on PMO: Some policies of varying quality exist, but the majority of functions and activities that should be covered in a comprehensive PPS manual are missing. Existing policies are a collection of individual statements, lacking interconnectivity, references, and or exhibits.

Future Mode of Operation (FMO): FM has a comprehensive policy and procedure manual dedicated to Fleet operations and responsibilities, which is regularly reviewed and updated to remain current and relevant.

Recommended Action Item(s):

- Draft required additional PPS and consolidate into a comprehensive manual. While by no means exhaustive, key topics related to FM are:
  - Authorities and responsibilities of FM;
  - Prioritization of work;
  - Operator responsibilities for scheduling or requesting work;
  - Procedures for capturing critical data in FMIS;
  - Procedures for call-out and roadside assistance;
- Revise manual annually. Distribute to staff accordingly.
ASSET SPECIFICATION, ACQUISITION AND DISPOSAL

Purchase Specifications Development, Bid Solicitation, And Vehicle/Supplier Selection

Objective: Ensure that detailed vehicle purchase specifications are formally developed with the user's functional requirements in mind; take advantage of advances in automotive technology, and facilitate standardization of fleet composition. Use available supply chain resources to leverage volume purchasing power and market competition to secure favorable pricing and high-quality value-add services. Maximize vehicle value by selecting from among competing vehicle make/models that meet functional/technical specifications based on best value (i.e., the total cost of ownership) as opposed to the lowest purchase price.

Maturity Rating: 3

Observations on PMO: FM uses Sourcewell for most of its vehicle and equipment acquisitions. The Equipment Mechanic Supervisor writes specifications for all fleet assets with the help of local dealers and with input from fleet customers. FM also uses State contracts for light-duty vehicles. The Sweetwater Authority is actively trying to standardize their fleet to reduce variation on the number of parts needed to stock, tooling, and training. Accordingly, there is a section in the procurement policy that covers the standardization of specifications, which has detailed instructions and provides FM with the appropriate span of control.

Future Mode of Operation: FM performs as the "subject matter experts" with respect to fleet vehicle replacements including identification of eligible vehicles, specifications, and budget development and collaborating with user departments to ensure right-typing for future needs.

Recommended Action Item(s):

- Ensure parts lists, schematics, training etc., are included in specifications of all future bids/acquisitions;
- Periodically audit current contracts to ensure the specifications included meet the needs of the fleet;
- Ensure assets are not chosen simply because they are on an existing contract if they are not the best asset for the job.

Asset Commissioning

Objective: A systematic process exists prior to placing assets in service, ensuring the assets delivered contain the appropriate specifications, including the upfitted equipment that was ordered. Step-by-step work instructions are in place directing staff in the precise procedures to create the asset birth certificate in the fleet information system. Quality control in-service inspection checks exist and are used to verify specifications adhere to
delivery contracts, and users verify assets meet their application expectations. When post-delivery upfitting is necessary, ensure that the associated costs are captured and codified properly in the fleet management information system, and capitalized where appropriate.

**Maturity Rating: 3**

**Observations on PMO:** Upon delivery, FM uses specifications from ordering documents to check-in purchased vehicles and equipment. If the new unit meets these requirements, the Equipment Mechanic Supervisor enters the information in the fleet management information system (FMIS). All vehicle information such as VIN numbers, descriptions, warranties, and special notes are put into the FIMS along with a photo of the unit. FM does have a policy on how to commission assets.

All delivered vehicles are checked by the Equipment Mechanic Supervisor to ensure that all vehicle specifications are met, but he does not use a "New Vehicle Check-In Sheet." The Equipment Mechanic Supervisor does not accept any vehicles not meeting specification. A work order is created for any upfitting that might be needed to record parts and labor, or sublet vendor costs. All upfitting is capitalized.

**Future Mode of Operation (FMO):** Assets are placed in service only after systematic inspections occur, ensuring they meet the designed specifications. Users are involved in the in-service delivery process, verifying that the asset is capable of meeting its intended mission.

**Recommended Action Item(s):**

- Create an in-service inspection checklist to guide FM personnel on key elements of inspection so as to retain institutional knowledge and facilitate involvement beyond the Equipment Mechanic Supervisor;

- Track days to in-service the asset (i.e., number of days from the date of delivery until the asset is released to the user department for full deployment) to ensure in-service times are reasonable, identify causes for delays, ensure loss of asset residual value during un-used periods is minimal, and request delayed warranty periods when necessary and appropriate.

**Asset Decommissioning and Remarketing/Disposal**

**Objective:** A detailed process exists to ensure vehicles determined to no longer be needed are physically removed from service to control fleet size, ensure the accuracy of fleet inventory records, prevent unauthorized expenditures on vehicles, and to prepare and dispose of used vehicles in the most cost-effective manner possible utilizing remarketing strategies that maximize net vehicle residual values (used vehicle sales prices less reconditioning, if any, and disposal costs).

**Maturity Rating: 3**
Observations on PMO: Upon receipt of replacement assets, fleet users are required to bring replaced vehicles to FM for decommissioning. FM is responsible for decommissioning of all vehicles and equipment, and preparing them for auction. After the vehicle is turned into Fleet for disposal, a thorough assessment is conducted to evaluate the vehicle’s condition. The asset is then processed in Maximo for decommissioning, and paperwork is sent to management for approval. Once approved, FM removes decals and reusable specialty equipment before assets are sent to auction; currently Ken Porter Auctions is the exclusive resale provider. Currently, FM does not track days to sale, and sale prices are not benchmarked against industry data sources such as Kelly Blue Book (KBB).

Future Mode of Operation (FMO): Disposal Policy and Procedure guidelines are reviewed routinely to govern vehicle decommissioning practices to strengthen compliance and accountability. FM uses and tracks the results of various methods of disposal and remarketing to ensure that the Authority realizes the best possible returns with the least amount of effort. FM tracks days-to-sell and benchmarks against available industry sources such as KBB, Edmunds, NADA, etc.

Recommended Action Item(s):
- Utilize an on-line auction system in addition to local auction firms;
- Place surplus vehicles in auction as soon as they are fully decommissioned;
- Track auction results (e.g., days to sale, disposal proceeds as a percentage of the original purchase price, etc.) to ensure the best return for vehicles and equipment;
- Track decommissioning time and cost;
- Monitor resale, values and benchmark against industry data sources such as NADA or KBB, to ensure appropriate residuals are achieved.

FLEET SUSTAINABILITY AND USE OF ALTERNATIVE FUELS

Objective: The Authority has a sustainability policy in place to take advantage of opportunities to add alternative fuel vehicles to the fleet when possible. The Authority has a clear goal in place for reducing vehicle emissions and greenhouse gases.

Maturity Rating: 2

Observations on PMO: FM only has 8 hybrid vehicles in the fleet, 7 Ford Escapes, and 1 Ford Fusion. FM evaluates the availability of alternative vehicles and equipment that will meet the needs of the authority. There is no plan to implement more use of alternative fueled vehicles and equipment. Sweetwater’s current facilities limit the ability to install infrastructure to accommodate alternative fuels.

Future Mode of Operation (FMO): FM has a fleet sustainability policy in place outlining how the Authority will implement alternative fuels vehicles and equipment into the fleet,
with clear goals in place for achieving reduced emissions, as well as guidelines for evaluating the replacement of conventional assets with AFVs.

Recommended Action Item(s):

- Implement a policy that requires cost-benefit analysis of AFVs, that includes total cost of ownership (TCO) and carbon emissions considerations before acquisition of new assets;
- Establish short- and long-term goals related to the quantity of alternative fuel vehicles (AFV) assets and/or reduction in carbon emissions;
- Research the benefits of using renewable diesel.

FUEL MANAGEMENT

Objective: Obtain the best value in the purchase of fuel supplies with formally negotiated contracts that provide for volume discounts, performance standards, and efficiencies in administering transactions. Maintain and monitor inventories ensuring fuel availability to take advantage of pricing fluctuations. Ensure fuel sites are well maintained, pumps and equipment are fully operational, storage tank integrity is monitored, and the sites are in full compliance with all federal, state, and local government regulations.

Maturity Rating: 3

Observations on PMO: The Equipment Mechanic Supervisor takes daily tank level readings from both unleaded and diesel tanks. FM also performs a daily inspection of the fuel island. FM performs minor repairs to the fuel island and outsources the maintenance and repairs that are beyond their capability.

The diesel tank is a 1,000 gallon above ground container and is “topped-off” by the fuel vendor weekly. FM also have a 10,000 Gallon underground unleaded fuel tank. The supervisor calls the vendor when the tanks is at 2,000 gallons. Currently, FM’s fuel contract “piggy-backs” the City of San Diego’s contract with SOCO Group, Inc. FM uses Veeder Root for fuel data collection.

The Authority also has 10 commercial fuel cards for employees working in remote sites. Other employees use a P-Card when traveling on business outside the local area.

Future Mode of Operation (FMO): FM uses electronically controlled fuel sites and has a daily “push” from Veeder Root of data into the FMIS to capture fuel usage by vehicle.

Recommended Action Item(s):

- Benchmark final pricing against similar municipalities, state contract and other contract options periodically, to ensure cost-competitiveness;
- Define priority delivery during emergencies for next contract development.
ASSET MAINTENANCE AND REPAIR PRACTICES

Key Components of the Preventive Maintenance Program

A fleet management organization's primary mission is to maximize the availability of vehicles and equipment so that the employees they support can perform their jobs productively. To achieve a high level of fleet availability, the focus of maintenance management needs to be on the development of practices that minimize unscheduled repairs and return vehicles and equipment requiring repair to service in as little time as possible. This should, of course, be accomplished at a competitive cost, given the requirement for a high level of service.

The centerpiece of any vehicle maintenance program is its preventive maintenance (PM) program. The primary goal of any PM program is to minimize unexpected and costly mechanical failures through the performance of pre-defined, pre-scheduled maintenance efforts. This will reduce unplanned breakdowns, maximize opportunities to pre-position supplies and materials, reduce fleet downtime, and shorten turnaround times. When executed properly, a good PM program drives the cost of fleet operations down and promotes efficiencies throughout the organization.

PM intervals should be based on specific “triggers” that meet manufacturers' recommendations or standards. In most cases, these triggers are based on an interval of time (i.e., days, months), an interval of usage (i.e., miles, engine hours), or the amount of fuel consumed. When one or more of the triggers is met, the need to schedule a PM becomes the primary focus of the operation. The PM program should also incorporate multiple echelons of progressive services. Tasks particular to a specific type of PM should be included in each subsequent PM. For instance, PM A tasks are incorporated into PM B tasks. PM B tasks are incorporated into PM C tasks, and so on.

Without clear and specific involvement of everyone in the organization to focus its attention on the PM program, the operation will not be as successful as required. PM services should be scheduled for the customer’s timetable. Often this is after normal working hours or at times when the vehicle may be idle for some time. At the same time, fleet users must comply religiously with PM requirements, including diligent daily inspection, performance of driver-related maintenance where applicable, timely reporting of issues, and proactive scheduling of assets for service according to prescribed intervals and/or in response to the request of the fleet maintenance provider.

Finally, it is imperative the PM program includes detailed documentation by all involved parties. Without proper documentation, manufacturers may deny warranty, especially if they suspect the vehicle or piece of equipment is not properly maintained.

Preventive Maintenance Program Design and Execution

Objective: Minimize unexpected and costly mechanical failures through the performance of pre-defined, pre-scheduled vehicle and vehicle component inspection, adjustment,
replenishment/refurbishment, and replacement services, as described more thoroughly above.

**Maturity Rating: 3**

**Observations on PMO:** PMs are auto-generated on intervals set up in Maximo. E-mails are sent to the driver’s supervisor to begin a target start date. FM tries to schedule heavy-duty and equipment three days prior to the PM start date and has a goal to complete light-duty vehicles within 30 days of the target date.

FM schedules PMs for light-duty vehicles every 4 months, changes engine oil every 5,000 to 10,000 miles depending on asset type, and uses OEM recommendations for other fluid changes. FM has a PM checklist, but it is outdated. FM mechanics utilize Mitchell ProDemand service lists on all PMs.

FM schedules heavy-duty and equipment PMs every 90 days. FM mechanics utilize checklists for inspections. FM performs oil analysis to determine when oil should be changed. Furthermore, FM uses OEM recommendations for transmission, differentials, and transfer case fluid changes.

When vehicles do not show up for scheduled PMs, the Equipment Mechanic Supervisor contacts the department head to re-schedule. FM does not track PM compliance.

**Future Mode of Operation:** FM employs a multi-tiered PM program that is based on manufacturer recommendations. Mileage is tracked via the fuel use program and transferred to the FMIS, from which the PM scheduling module is used to predict when PMs will be due and to create a monthly forecast report. Departments that are out of compliance (missed PMs) will be notified until the PM has been completed. A report of failed compliance will be created monthly and forwarded to senior management as needed.

**Recommended Action Item(s):**

- Develop multi-tiered, class-specific PMs to account for needs related to components of all assets (PM A, B, C, etc.), which would be done more easily with a FMIS specifically design for fleet management, as this is a "built-in" feature and would facilitate appropriate data capture for decision makers
- Create PM checklists for all classes of vehicles and equipment;
- Publish PM due report (blast email to fleet coordinators of all users and stakeholders);
- Track and formally report PM compliance to both user departments and senior management;
- Prioritize service for scheduled and in-compliance assets to incentivize future compliance and cooperation.
Work Management

**Objective:** Ensure that mechanics are working productively, efficiently, and effectively by monitoring shop floor activities, assisting and guiding mechanics as needed, assisting with the diagnosis of problems, and providing training. Ensure that maintenance and repair services and associated work order documentation are performed accurately and completely to minimize repeat service requests (comebacks).

**Maturity Rating:** 3

**Observations on PMO:** Operators create service requests for fleet assets in Maximo, and the requests are e-mailed to FM to schedule the repairs. Jobs are assigned by the Equipment Mechanic Supervisor to mechanics based on skill level and availability. FM outsources all body and paint work, glass repairs, transmission and engine rebuilds, front end alignments, upholstery, and specialized equipment that is beyond FMs capability.

The Equipment Mechanic Supervisor closes all work orders and checks that labor and parts are recorded correctly. Currently, there is no quality assurance program in place, but the Equipment Mechanic Supervisor does compare actual labor time against Mitchell time standards.

FM has an average of two road calls per month and rarely does any fieldwork. However, there are times when mechanics will perform PM services on heavy equipment at the treatment plant.

Finally, FM mechanics reportedly expend significant time on facilities repairs, but they do not track that time currently.

**Future Mode of Operation:** FM has adopted an array of key performance indicators based on industry best practices and frequently observes shop activities. Shop production and individual mechanic production is monitored monthly. FM also has a robust quality control program designed to ensure that work is done properly, avoids repeat repairs, and maintains a high level of customer satisfaction.

**Recommended Action Item(s):**

- Establish formal quality assurance protocols via policy documentation; including supervisor review, random WO sampling, and fleet user evaluation opportunities;
- Formally track and report turn-around times as a means of performance measurement and resource need identification (i.e., mechanic training, additional equipment); a true FMIS would provide FM the ability to track key data points for associated KPIs
- Track and report callback rate as a means of performance measurement and identifying corrective action needs.
Parts Procurement and Inventory Management

Objective: Minimize the time required to perform in-house maintenance and repair services by maintaining a secure inventory of frequently used parts and critical parts whose procurement requires longer lead times. Maintain the flexibility to meet unusual or unanticipated maintenance parts need using ad hoc sourcing and procurement processes.

Maturity Rating: 1

Observations on PMO: The Equipment Mechanic Supervisor and mechanics order parts and have their own P-Cards. FM maintains a stock of common supplies such as nuts, bolts, and wheel weights, as well as an inventory of fast-moving parts, which are not tracked in Maximo. The parts room is organized and bins are labeled with part numbers. There are no established contracts with parts supply vendors beyond open purchase orders with several local dealerships and parts warehouses. Delivery time from vendors is between 30 minutes and 2 hours when parts are in stock and immediately available.

Future Mode of Operation: FM maintains a minimal amount of parts inventory and all inventory entered into the FMIS. FM tracks all parts to ensure that when stock levels are at set thresholds, adjustments and purchases are made accurately and in a timely manner. Annual inventories are conducted.

Recommended Action Item(s):

- Inventory and track all stocked parts in FMIS;
- Conduct an analysis of parts use each quarter and determine shortfalls or overstocks;
- Use parts consumption data to determine annual parts volumes and use the data to negotiate pricing from all suppliers including OEMs;
- Conduct spot checks of parts orders to actual use and document the results.

Parts Requisitioning and Disbursement

Objective: Requisitions for parts are done in a manner that is auditable. Essential approvals are obtained prior to submitting requisitions. Responsibilities for ordering, receiving, and approving parts purchases are appropriately segregated or otherwise controlled.

Maturity Rating: 1

Observations on PMO: Ordering and recording the use of parts and other supplies are the responsibility of the mechanics. Entries are made into the fleet software system and tied directly to the work orders for the vehicles. FM does not have a full-time parts specialist, which is acceptable based on the current fleet size, however in the current
system, the individual who orders the parts is also responsible for tracking the use of the part, leaving no secondary “check” or confirmation that a part is in fact needed and/or used for the intended asset. While the integrity of the current staff is not in question, as a system there are obvious issues from an accounting and auditing perspective. The current process is purely dependent on the honor system.

Future Mode of Operation: Appropriate separation of duties is in place; the FM parts functions are fully separated from the duties of the mechanics wherever possible, and where not possible, a secondary “sign-off” is required. The process is documented formally and tracked in the FMIS from request to disbursement.

Recommended Action Item(s):

- Assign responsibility for ordering parts and supplies to the Equipment Mechanic Supervisor, and in his absence, the Senior Mechanic;
- Create an audit trail by tracking all parts in the FMIS from order to installation;
- Conduct spot checks from the point of requisition to the point of use.

FLEET MAINTENANCE RESOURCE MANAGEMENT, ORGANIZATION, AND STAFFING

Organization Structure and Staffing

Objective: Ensure that organization structures reflect reasonable spans of control and channels of communication which are consistent with formally defined authority and responsibilities. Ensure that staffing levels are consistent with the amount of effort required to produce desired services in an efficient and effective manner.

Maturity Rating: 2

Observations on PMO: FM is under the Distribution and Maintenance Department. The Equipment Mechanic Supervisor reports to the Director of Distribution and supervises two mechanics in the shop, both of whom are designated senior mechanics. The supervisory span of control is well within industry benchmarks and should afford excellent control for all.

To evaluate the appropriateness of current shop staffing levels, we conducted analysis of the following:

- Vehicle equivalent units (VEUs) to normalize data into uniform known standards;
- Demand hours to estimate the labor effort required to maintain the fleet based on the number of VEUs;
- Productivity to determine actual shop output and compare it to the estimated demand.
Vehicle Equivalency Units: We used our Vehicle Statistical Referencing System (VSRS) to assign a VEU value to every vehicle in the fleet.\textsuperscript{13} Depending on various circumstances, such as shop facilities, asset age, utilization, and condition, etc. 100 to 125 VEU's per mechanic is an appropriate workload to maintain a steady workflow and relatively high output in the shops. After reviewing the FM asset inventory, we estimate the number of VEU's to be 307.3. Thus, the number of VEU's per mechanic is approximately 153.7. The ratio is above the aforementioned benchmark, and clearly a third mechanic would place FM within an appropriate range. However, in a vacuum we may not immediately suggest an additional mechanic, as there are many small assets and motorized hand tools included in the current fleet that in some cases would be cheaper to replace than to repair. However, further evaluation, as noted below, created a more complete picture.

Demand Hours: We also used the VEU count to estimate the number of direct labor hours that will be necessary to maintain the fleet. Nationwide, the needs vary from 10 hours to 15 hours annually. Therefore, fleet asset repair should be expected to consume at least 3,073 hours of direct labor annually. Based on the age of the fleet, we would expect the demand hours for the Authority’s fleet to in fact fall closer to the higher side of the range. Reported work order time shows that shop mechanics are consistently and significantly lower than the demand hours the fleet should be creating. Mechanic productivity reports provided by FM indicate that over the past two fiscal years, FM shops totaled an average of 1408.7 hours billed to work order each year. Some of the difference can be attributed to aforementioned small motorized tools included in the current inventory, and therefore the VEU count, that may not be worth repairing and instead are just replaced. However, there are not enough motorized tools in the inventory to make up for this difference. Most likely additional time not be recorded and/or the fleet is being undermaintained.

Productivity: Staffing levels should be consistent with the workload and the associated amount of effort required to produce desired services productively, efficiently, and effectively. Procedures are in place to distribute work to mechanics so as to promote high levels of mechanic productivity, to minimize repair turn-around time, and to assign the work to a specific mechanic based on an assessment of that mechanics’ availability and skills. The goal is to maximize mechanic productivity while achieving acceptable levels of efficiency and effectiveness. The industry benchmark for total direct labor hours charged to work orders is 1400-1500 hours per year, per mechanic.

When the total labor hours reported are dispersed among the two mechanics on staff, this yields about 704.4 labor hours per mechanic, resulting in 34 percent productivity. Productivity is measured by dividing the number of direct labor hours by the number of payroll hours in a year (2,080 for a 40-hour workweek). We expect a productivity rate in the range of 70 to 75 percent to be achievable.

\textsuperscript{13} The values in the VSRS are derived from the hundreds of actual clients with whom we have worked.
FM mechanics fall short of this benchmark, however Mercury discovered that shop mechanics are performing facilities repairs, loading material for the distribution department, off-loading material for the purchasing department, and these labor hours are not documented in any work order system. As noted earlier, mechanics are also responsible for ordering their own parts for repairs as well as stocking the parts room when needed. Both of these will certainly consume time otherwise dedicated to fleet vehicle and equipment repair.

The combination of factors noted above indicates that FM is understaffed. As mechanics must provide their own parts support and do other work for facilities maintenance, a ratio of at most 100 VEU’s per mechanic is appropriate. This is supported by the difference in demand hours relative to actual repair time. The fleet is not large enough at this time to provide enough work for a dedicated parts specialist, and while a feasible alternative, a dedicated facilities maintenance staff member would still require FM mechanics to “chip-in” during absences and for larger jobs. As such, under the current circumstances, an additional mechanic is most likely the best solution.

**Future Mode of Operation:** FM is appropriately staffed to reasonable workloads. FM monitors shop operations carefully on the floor and through the use of data outputs from the FMIS. Annual productivity goals are in place to incentivize high productivity, and formally hold mechanics accountable for minimum productivity levels. FM also monitors demand hours and fleet size to ensure adequate resources are available as demand for fleet services change over time.

**Recommended Action Item(s):**

- Implement protocols that require mechanics to log on and off of work order tasks to properly record actual time spent on each task, including logging off during breaks or other delays;
- Open a work order for each mechanic every month to log all non-fleet related work for the month;
- Establish productivity targets for mechanics for monthly output;
- Develop and implement shop workload scheduling processes;
- Hire an additional mechanic, or other appropriate staff, to balance workload appropriately and facilitate efficient, high-level maintenance and repair of fleet assets.

**Employee Training and Professional Development**

**Objective:** To ensure that employees have minimum annual training requirements in place, as well as have access to, and encouraged to take part in, additional training that

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14 While it is difficult to say for certain due to the lack of data associated with facilities maintenance, our observations while on site along with information provided during our interviews leads us to believe a significant portion of mechanic time is consumed by facilities maintenance.
will enhance current skills and provide opportunities to broaden their skill base. A plan is in place for each employee that describes a path for professional development and advancement. In doing so, FM ensures staff are keeping up with changes in automotive and fleet technology, can properly diagnose and maintain the Authority's fleet assets, and keeps up with the latest advancements in fleet management.

Maturity Rating: 3

Observations on PMO: The Authority has a training policy that explains training goals, formal training activities, responsibilities, and external learning opportunities, which includes a tuition assistance program; however, mechanics are not receiving much training. The exact quantity of training hours for each mechanic is not being tracked, and indications are that mechanics have in fact received very little training in the past two years.

Future Mode of Operation: FM has a structured training program for each mechanic to continuously expand and improve their skill levels, in accordance with the needs of the Authority's fleet. The program includes training minimums, opportunities for training beyond the minimums, and both positive and negative incentives for completing, failing to complete, or exceeding minimum training requirements. A development plan is set annually for each staff member.

Recommended Action Item(s):

- Conduct a thorough assessment of skills for each mechanic with an eye towards both individual needs and the needs of the shop;
- Create individual growth programs for each staff member that involve skills improvements and certification
- Allocate resources and time to staff training;
- Ensure that each staff member, and especially mechanics, receive 40 hours of training per year.

Maintenance Facility Design, Condition, Maintenance, And Housekeeping

Objective: Promote the safe, efficient, and effective performance of fleet maintenance and repair activities by housing them in facilities that are properly located, designed, and constructed. Safety hazards are quickly remedied. Safety conduct is reinforced through regular inspection and training.

Maturity Rating: 2

Observations on PMO: The shop has four bays; two are equipped with light-duty vehicle lifts. Four bays would be appropriate for two mechanics; however, one bay is blocked to drive-in traffic, used only for small equipment repair, which should have its own section of the facility. Should the Authority add a mechanic as suggested previously, the shop
would fall under the industry standard minimum ratio of 1.5 bays per mechanic. Moreover, the shop is too small and not appropriately equipped for heavy truck and equipment maintenance. Because of the lack of space, there is a large canopy adjacent to the back of the shop utilized for heavy truck and equipment repair.

Due to the inadequate space provided for fleet maintenance and repair activities. The staff struggle with available space when multiple repairs are in progress while waiting on parts. In addition, there is insufficient space for needed tools and equipment causing encroachment of the work and storage space. There is a small tool room within the shop area. The Equipment Mechanic Supervisor has a small office, and parts are stored above the office. There is no breakroom or restroom for the mechanics. Shop staff use the facilities in the “main” building across the street from the shop.

The Authority has a safety committee that meets monthly, and a formal company-wide safety policy. The committee rotates staff from across the Authority on an annual basis. Each member of the committee is assigned to a specific area of inspection. The inspections are performed monthly and an inspection sheet is submitted to the committee. Staff are encouraged to report safety concerns to their supervisor or management team.

**Future Mode of Operation:** FM operates a maintenance facility for all components of its fleet to perform routine maintenance and repair. (e.g., PMs, component M&R, etc.). These facilities are appropriately sized, laid out, equipped, and hazard-free. Shops are inspected monthly to ensure that safety hazards are remedied in a timely manner, and that housekeeping is performed regularly.

**Recommended Action Item(s):**

- Develop and implement PPS that require shop staff to maintain a clean and orderly workspace to reduce clutter and improve shop safety;
- Develop formal shop safety program and conduct regular (i.e., monthly) shop safety inspections in order to identify potential hazards;
- Develop a comprehensive fleet maintenance facility master plan that identifies short-term improvements for the shop operation along with a long-term strategic plan to replace or augment the current fleet maintenance facility with one that can adequately house the assets under FM’s care.

**Shop Equipment and Tools**

**Objective:** FM furnishes appropriate specialty and diagnostic tools required to properly service vehicles and equipment. Tools and equipment are secured and maintained in safe and in good working condition, and policies are in place to drive care and accountability of tools and equipment. Each mechanic possesses its own set of appropriate hand tools to repair vehicles efficiently and maximize productivity.

**Maturity Rating:** 3
Observations on PMO: The Authority provides mechanics with fully equipped toolboxes and has a tool room with specialty and scan tools. Since there are only two mechanics, the shop does not have any tool sign-out procedures for the tool room. Broken or missing tools are reported to the Equipment Mechanic Supervisor.

Future Mode of Operation: FM stays abreast of new types of diagnostic tools and equipment to ensure that the shop is fully up to date and is as efficient as possible.

Recommended Action Item(s):

- Conduct an annual inventory of shop tools to ensure accountability;
- Ensure an adequate budget for tool replacements and upgrades.

FLEET MANAGEMENT INFORMATION SYSTEM

Objective: The fleet management information system is the key business tool for capturing, storing, and analyzing objective, quantitative data on all fleet management activities and functions, including but not limited to asset utilization, maintenance and repair, and parts management. Built-in, fully-integrated support for best practice processes facilitates effective scheduling and management of day to day operations for all aspects of modern fleet management, and reporting tools are conducive to measuring and monitoring fleet performance via various key performance indicators (KPIs), facilitating strategic, data-driven decision making.

Maturity of PMO: 2

Observations on PMO FM is using Maximo as the system of record since 2010. At one time, FM was using RTA, but a switch was made to consolidate software programs and to have everyone in the Authority using one system of record. FM was directed to use the fleet module add-on as the FMIS. FM is not using VRMS codes for repairs in Maximo. Maximo is not capable of tracking sublet repair. To overcome this discrepancy, FM tracks sublets in the parts section of the work order. The built-in reporting capabilities of Maximo also seem to fall short, as reports have to be created by the IT team at the request of the mechanic supervisor. The data provided to Mercury as part of our initial information request required the IT department to be involved in creating reports ad hoc.

At this point, FM is considering going back to using RTA. They still have access to the FMIS to pull data that was not brought over when implementing Maximo.

FM does not use any telematics. FM tried using a fuel management system but had repeated issues with the rings that had to be installed on the vehicle's fuel tank. The rings are used to detect when the fuel nozzle is inserted into the fuel tank, and information from the vehicle is collected by the fuel management system.

Future Mode of Operation: FMs using a full-featured fleet management information system providing improved, comprehensive asset tracking, maintenance scheduling, and
sublet repair management, and facilitates efficient day-to-day fleet management operations. The data in the system is uniform in its content and the fleet users are fully trained to enter and consume data appropriately. Industry-relevant codification and configurations for repair coding and vehicle class such as VMRS, NAFA and APWA support proper business processes and facilitate effective management reporting and analysis. Data capture occurs at the source, and batch entered data is minimized (e.g. fuel data). The system is readily accessible by the entire staff for reference and management decisions. Fleet information is distributed to staff, customers, and management providing visibility of costs and activities.

**Recommended Action Item(s):**

- Utilize industry-based coding such as VMRS codes to identify individual tasks and provide the basis for M&R reporting and analysis;
- Develop a fixed list of “canned” reports that are produced on a regular basis that allow deep analysis of performance;
- Ensure reports are aimed at monitoring and measuring key performance metrics;
- Conduct a formal FMIS needs assessment to determine exactly what features are critical to the management responsibilities of FM; based on this assessment, determine if RTA can meet FM and the Authority’s needs thoroughly, and if not identify and acquire an off-the-shelf FMIS to replace Maximo;
- Ensure all relevant staff are trained appropriately in the use of the FMIS system.

**FLEET COST CONTROL AND FINANCIAL MANAGEMENT**

**Objective:** Fleet costs are distributed equitably and without cross-subsidization to fleet users, and ensures the availability of sufficient funds for both capital and operating costs. This includes a cost charge-back system utilizing cost allocation techniques that facilitate accurate charge-back rates to fully recover both operational and capital costs via an array of fixed fees, labor rates, and surcharges; the ultimate objective is to create cost transparency and visibility for all stake holders. In doing so, fleet customers are motivated to manage the costs they generate appropriately, and the FM is incentivized to provide high-quality, efficient service.

**Maturity of PMO: 2**

**Observations on PMO:** FM does not charge customers for maintenance and repairs, parts, or fuel. They are budgeted out of the general fund. FM does use shop labor rate calculated semi-annually by the budget office, that is used purely for asset cost tracking, for budgeting and planning purposes. Accordingly, there are no markups on parts, fuel, or sublet repairs included in these costs, which ignores the time and effort required to procure and deliver these goods and services to fleet customers. FM does not have a replacement fund. All new vehicle and replacement requests are approved by the board of commissioners and paid for from the general fund.
Future Mode of Operation: FM acts as an internal service fund (ISF) and uses a transparent charge-back system to recover all costs associated with the owning and operating Authority vehicles and equipment. Funds are secured for replacing fleet assets.

Recommended Action Item(s):

- Establish FM as an ISF, requiring all fleet costs and expenditures are recovered through the appropriate chargeback of FM customers;
- Conduct a formal cost allocation and chargeback rate study to develop a formal cost recovery system, and ensure all direct and indirect costs are being captured in chargeback rates and billed clearly:
  - Calculate shop labor rate, fuel, parts, and sublet markups, as well as appropriate replacement charges, annually to recover all costs for fleet goods and services;
  - Calculate fleet user department budget requirements to account for costs associated with the fleet goods and services they consume;
  - Implement a billing system to facilitate transparent cost recovery;
- Evaluate various fleet replacement funding methods, including consolidation for an asset replacement reserve fund and/or debt financing versus using general funds for replacing fleet assets.
APPENDIX

ORCA RESULTS - HEAVY-DUTY DUMP TRUCKS

The key assumptions and inputs we used for the Heavy-Duty Dump Trucks replacement cycle analysis included the following:

1. New vehicle purchase price: $136,000
2. Average annual usage (miles): 3,645
3. Fuel economy rate (MPG): 6.1
4. Fuel cost per gallon: $3.39
5. Annual fuel efficiency deterioration rate\textsuperscript{15}: 2 percent
6. Annual inflation rate for M&R and fuel costs: 3 percent
7. Discount rate: 6 percent
8. Residual values by vehicle age and accumulated mileage, expressed as a percentage of the current vehicle purchase price, obtained from an analysis of used vehicle sales data.
9. Maintenance and repair cost projections based on regression analysis of Sweetwater Authority data.

The average age of all the Heavy-Duty Dump Trucks currently in the fleet is 7.8 years, and the current average replacement cycle is 16 years. There are Heavy-Duty Dump Trucks as old as 17 years in the fleet.

The results of our analysis, shown in Exhibit 9, indicate that these vehicles' total cost of ownership (indicated by the equivalent annual cost – EAC – shown in the bottom row of the table) is, strictly speaking, at a minimum under a replacement cycle of 13 years.

Comparing the average annual operating cost of this type of vehicle under a 13-year cycle and the current 16-year cycle, it can be seen that Sweetwater Authority would save an estimated $567 or 10 percent per vehicle per year by replacing these vehicles every 13 years. Based on the total number of Heavy-Duty Dump Trucks in the fleet, this translates into approximately $3,402 in operating savings per year. Since vehicle capital costs can vary substantially over time, depending on the method used to finance them, it makes no sense to incorporate them in this average annual cost savings estimate. However, vehicle capital costs will be higher under the optimal replacement cycle, meaning that the aggregate net cost savings would be somewhat lower than this amount.

On the other hand, it also should be noted that this savings amount does not include any of those indirect costs of aging vehicles noted earlier, notably the growing unpredictability of repair costs. For example, our life cycle cost analysis (Exhibit 9) shows that predicted

\textsuperscript{15} Per year of vehicle age.
annual maintenance and repair costs increased by over $850 between Age 13 and Age 16, with most if not all of this increase being attributable to increased repair requirements, which are generally unscheduled and thus cannot be performed as efficiently as can scheduled services.
**Exhibit 9**

**Optimal Replacement Cycle Analysis for Heavy-Duty Dump Trucks**

<table>
<thead>
<tr>
<th>Replacement Cycle (years)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAPITAL COST</strong>&lt;sup&gt;16&lt;/sup&gt;</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Year-End Odometer Reading</td>
<td>3,645</td>
<td>7,290</td>
<td>10,935</td>
<td>14,581</td>
<td>18,226</td>
<td>21,871</td>
<td>25,516</td>
<td>29,161</td>
<td>32,806</td>
<td>36,451</td>
<td>40,097</td>
<td>43,742</td>
<td>47,387</td>
<td>51,032</td>
<td>54,677</td>
<td>58,322</td>
</tr>
<tr>
<td>Year-End Fair Market Value Percentage</td>
<td>87.6%</td>
<td>77.9%</td>
<td>69.2%</td>
<td>61.5%</td>
<td>54.6%</td>
<td>48.8%</td>
<td>43.3%</td>
<td>38.3%</td>
<td>34.0%</td>
<td>30.2%</td>
<td>26.8%</td>
<td>23.9%</td>
<td>21.2%</td>
<td>18.8%</td>
<td>16.7%</td>
<td>14.9%</td>
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<tr>
<td>Annual Capital Cost</td>
<td>$16,800</td>
<td>$13,300</td>
<td>$11,816</td>
<td>$10,498</td>
<td>$9,327</td>
<td>$8,266</td>
<td>$7,361</td>
<td>$6,540</td>
<td>$5,810</td>
<td>$5,162</td>
<td>$4,586</td>
<td>$4,074</td>
<td>$3,620</td>
<td>$3,216</td>
<td>$2,857</td>
<td>$2,538</td>
</tr>
</tbody>
</table>

**OPERATING COSTS**

| Annual M&R Cost | $1,284| $1,387| $1,499| $1,620| $1,750| $1,881| $2,043| $2,208| $2,386| $2,573| $2,786| $3,010| $3,253| $3,515| $3,798| $4,104|
| Annual Fuel Cost | $2,114| $2,222| $2,335| $2,454| $2,579| $2,711| $2,849| $2,995| $3,148| $3,308| $3,477| $3,654| $3,841| $4,037| $4,243| $4,459|
| Total Annual Operating Cost | $3,398| $3,609| $3,834| $4,074| $4,329| $4,602| $4,893| $5,203| $5,533| $5,886| $6,263| $6,664| $7,093| $7,551| $8,040| $8,563|

**TOTAL COST**

| Annual Total Cost | $20,198| $18,909| $15,650| $14,572| $13,656| $12,888| $12,254| $11,743| $11,344| $11,048| $10,849| $10,730| $10,713| $10,767| $10,897| $11,101|
| Cumulative Total Cost | $20,198| $37,107| $52,757| $67,329| $80,985| $93,873| $106,127| $117,870| $129,213| $140,261| $151,110| $161,848| $172,561| $183,328| $194,226| $205,327|
| Equivalent Annual Cost | $20,198| $18,928| $18,108| $17,586| $17,188| $16,824| $16,538| $16,302| $16,112| $15,964| $15,856| $15,786| $15,757| $15,796| $15,870|

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<sup>16</sup> The annual capital cost of a vehicle or piece of equipment is defined as the change in its fair market value (FMV) from one year to the next.
Pursuant to the Executive Order N-25-20 issued by Governor Newsom, one or more Board members may participate in the meeting via teleconference.

AGENDA

DATE: Wednesday, March 18, 2020       TIME: 3:15 p.m.

1. CALL MEETING TO ORDER AND ROLL CALL. (00:06)

2. ITEMS TO BE ADDED, WITHDRAWN, OR REORDERED IN THE AGENDA. (00:14)

3. PUBLIC COMMENT. (00:20)
   Opportunity for members of the public to address the Committee. (Government Code Section 54954.3).

4. ACTION AGENDA.
   The following items on the Action Agenda call for discussion and action by the Committee. All items are placed on the Agenda so that the Committee may discuss and take action on the item if the Committee is so inclined, including items listed for information.
   A. Consideration of Recommendations from Report of the Review of Fleet Replacement and Management Practices (00:45)
   B. Consideration to Provide a Summary of Future Items to be Considered by the Committees (Item Requested by Director Calderon-Scott) (No Enclosure)

5. CLOSED SESSION.
   At any time during the regular session, the Committee may adjourn to closed session to discuss real property matters within the attorney-client privilege, subject to the appropriate disclosures. (Government Code Section 54956.8).

6. NEXT MEETING DATE: Wednesday, April 1, 2020 at 3:15 p.m.

7. ADJOURNMENT. (01:20:03)