



Equipment

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**Project Title:**

Investigation of DOE Fleet  
Equipment Repair Costs and  
Replacement Criteria

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## Fleet Replacement Model Evaluation and Refinement

A comparison of the Caltrans' Fleet Replacement Model with other state DOTs fleet asset management systems

### WHAT WAS THE NEED?

The California Department of Transportation (Caltrans) manages more than 50,000 miles of California's highway and freeway lanes requiring the acquisition, maintenance and deployment of a broad range of vehicle-based equipment. Caltrans' Division of Equipment (DOE) is responsible for approximately 13,000 vehicles, which range from light vehicles such as passenger cars and utility vehicles to heavy-duty on-road vehicles, such as dump trucks to off-road equipment such as loaders. The DOE is required to determine when a specific piece of equipment is no longer economical to maintain and would be beneficial to procure or produce a replacement.

Currently, the DOE utilizes the Asset Works Fleet Focus Software (FA) to help determine if it is economical to repair a piece of equipment or to replace it. DOE is using a method with a set of criteria referred to as the Vehicles Meets Criteria (VMC). VMC considers equipment age, usage, and life-to-date repair costs to identify candidate vehicle equipment for replacement. The percentage of the pre-defined standard for each criterion is calculated for each piece of equipment and equipment is placed into groups with varying levels of replacement priority. Equipment with higher priority are preferred candidates for replacement. Due to budgetary constraints, replacing all of the candidate vehicles is not an option and as a result, a subsequent assessment of vehicle condition and fleet requirements is made by DOE staff to select the top candidates for replacement.

Since such a decision-making process involves many subjective factors, a more data-driven method to prioritize vehicle equipment for replacement was desired. This research was carried out to determine if the existing methods used by Caltrans DOE are efficient and cost effective compared to methods used by other state department's of transportation (DOTs).



Caltrans provides a safe, sustainable,  
integrated and efficient transportation  
system to enhance California's  
economy and livability.

## WHAT WAS OUR GOAL?

To evaluate and characterize Caltrans current fleet replacement model (FRM), compare it to FRMs used by other state DOTs, and analyze outputs from those alternative FRMs, using Caltrans fleet parameters, to determine potential improvements or alternatives to Caltrans FRM.

## WHAT DID WE DO?

The research consisted of reviewing and evaluating the existing FRMs used by other state DOTs and comparable fleet operations. The project generated an overview and discussion of key factors for the vehicle equipment replacement decision-making process and various FRMs utilized by Caltrans and other states' DOTs.

Three FRM categories –Pre-Defined Threshold, Life Cycle Cost Analysis (LCCA), and Mathematical Ranking Method –were compared and summarized and several FRMs previously or currently being used by state DOTs were described in detail. Caltrans fleet parameters were evaluated with Caltrans existing FRM and the available models from other DOTs to compare and contrast operations with similar fleets.

## WHAT WAS THE OUTCOME?

Following the evaluation of each replacement methodology, the LCCA method was chosen as the most applicable alternative to Caltrans' current FRM. However, the development of the LCCA model presented challenges and opportunities. Considering the characteristics of the life cycle cost and the thorough analysis of Caltrans data, an enhanced LCCA method and a new terminology, Composite Operating Cost (COC), were introduced. These two components help to enhance the basic LCCA, addressing some of the limitations that are characteristic of the LCCA, and providing a more realistic result for the fleet replacement decision-making process.

## WHAT IS THE BENEFIT?

The enhanced LCCA model optimizes the replacement timing of aging equipment in a way that minimizes total costs while maintaining important fleet characteristics. If adopted, this new method could help Caltrans maintain the fleet equipment more economically.

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