

Vehicle Replacement Strategies

NCTRP Data Provide Basis for Guidelines on Reducing Cost Impacts



**Urban Mass
Transportation
Administration**

Public transit agencies, like everyone else, must try to balance their expenses and incomes. Faced with an anticipated vehicle replacement shortfall of more than \$200 million in the next 10 years, the Los Angeles County Transportation Commission (LACTC), in conjunction with 13 Los Angeles County transit operators, conducted a study to develop cost-effective vehicle replacement guidelines. The study built on the results of research recently completed under an Urban Mass Transportation Administration-sponsored program directed by TRB under the National Cooperative Transit Research and Development Program (NCTRP). The result was a simple, efficient method for evaluating cost impacts of alternative vehicle replacement schedules.

Problem

Although transit capital investments can have a significant impact on operating costs and, therefore, on deficits, decisions on capital investments are seldom based on optimization. Capital investment decisions are more often driven by federal funding availability and are based on federal vehicle replacement guidelines. Simply replacing vehicles at 12 years of age or 500,000 miles, or when local matching funds are available, does not ensure cost-effective investment, nor do such investment policies properly evaluate the choice between vehicle replacement and rehabilitation.

Solution

In July 1988, the LACTC estimated a \$220 million shortfall in funding needed to meet the capital replacement requirements of 13 Los Angeles County bus operators between the years 1990 and 2000. These organizations initiated a study to develop vehicle replacement guidelines that would better use their available transit-operating and capital-financial resources and engaged Fleet Maintenance Consultants, Inc. (FMC, Inc.) of Houston, Texas, to help develop the guidelines. The consultants had previously prepared NCTRP Report No. 10, *Public Transit Bus Maintenance Manpower Planning*, and No. 15, *Transit Capital Investment To Reduce Operating Deficits—Alternative Bus Replacement Strategies*. FMC, Inc., provided an extensive data base that they had developed for the NCTRP reports that encompassed vehicle operating and maintenance costs for 170 transit coach fleets containing more than 10,000 buses and 18,000 cars, trucks, and vans.

This national data base was used to provide specific cost relationships, such as operating cost as a function of age and mileage; cost versus miles between vehicle subsystem rebuilds; and salvage value related to mileage, age, and purchase price, to supplement available local information. Los Angeles County transit operators carefully examined the applicability of national cost relationships to their vehicle fleets and deployment practices and critically

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reviewed the results. In all cases, the transit operators found the results to be reasonably consistent with their experience and understanding and agreed to use local information supplemented with the national data base to develop local vehicle replacement guidelines.

Application

The study group developed a coach replacement methodology considering

1. Capital costs, which were amortized across the useful life of the vehicle and decreased as the vehicle age increased;
2. Base maintenance costs, which increase with vehicle age and cumulative miles, reflecting the higher cost of operation and repair associated with older vehicles; and
3. Major vehicle subsystem rebuild costs (for engines, transmissions, bodies, and frames), which can either in-

crease or decrease with age because they generally occur at fixed mileage intervals. These costs were totaled to determine the annual equivalent cost (AEC) for the existing bus replacement practice. They were then applied for a range of potential vehicle replacement ages and the relative AEC was compared for each age. This indicated that the minimum AEC for the buses under study occurred at 15.5 years.

A similar technique was applied to the Dial-a-Ride and support fleet operations. Major subsystem rebuilds are not common with these fleets; when they occur, they are included in the base maintenance costs. Unlike transit coaches, vans and support fleet vehicles (trucks and automobiles) may have significant residual or salvage value at retirement. The research indicated that a three-and-a-half- to four-year retirement period yielded the lowest total cost for support vehicles. In mileage terms, this reflects about 55,000 to 65,000 miles per vehicle in Los Angeles.

Benefit

When the guidelines were applied to each bus fleet owned by the 13 Los Angeles County transit operators, the alternative replacement schedules produced an estimated cost saving of \$117 million (in 1989 dollars) over 10 years. When the guidelines were applied to the van and support vehicle fleets, the alternative replacement schedule, which required replacing the vehicles earlier than planned, produced an estimated cost saving of about \$8 million.

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Alternative replacement schedule guidelines applied to bus fleets in Los Angeles offer potential for significant savings.



LOS ANGELES COUNTY TRANSPORTATION COMMISSION