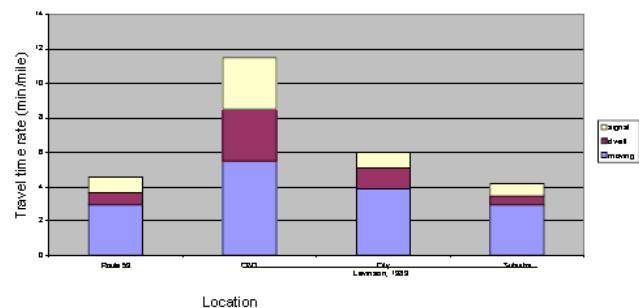


Impact of Congestion on Bus Operations and Costs

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Traffic congestion in Northern New Jersey imposes a substantial operational and monetary penalty on bus service. The purpose of this project was to quantify the additional time and operational costs due to traffic congestion. A regression model was developed that estimates the travel time rate (in minutes per mile) of a bus as a function of the car travel time rate, the number of passengers boarding per mile, and the number of bus tops per mile. The model was used to estimate the bus travel time rate under free flow conditions; these results were compared with observed bus travel times. A second model was developed that estimated operating costs as a function of vehicle hours and peak vehicles. This model was used to estimate the cost of the additional time represented by the difference in current time minus travel time estimated under free flow conditions.



Components of Bus Travel Time

The models showed that the additional bus travel time per mile due to congestion is equal to 0.73 times the increment of general traffic time rate due to congestion. To determine the increment of general traffic time due to congestion on a broader basis, travel rate indices (TRIs) – the ratio of actual travel time per mile to free flow travel time per mile – for the individual counties in New Jersey were used. Traffic levels were forecasted to increase by about 5% in the next five years. To calculate the impact on vehicle hours and costs, new TRIs were calculated for a 5% increase in volume-to-capacity ratios for buses in the New Jersey counties. Using the new TRIs, the increment in vehicle hours and costs were calculated using 39 sample bus routes in New Jersey and extrapolated to the Northern New Jersey bus system. The results indicate that the time increment due to congestion would be 423,000 vehicle hours and the monetary cost of the time would be \$27.0 million.

Findings from this study were published as:
 C.E. McKnight, H.S. Levinson, K. Ozbay, C. Kamga,
 and R.E. Paaswell, "Impact of Traffic Congestion on
 Bus Travel Time in Northern New Jersey,"
 Transportation Research Record, No. 1884 (2004).



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