

Modeling the Effect of a Road Construction Project on Transportation System Performance

Project 1702B
June 2019

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Road construction projects create physical changes on roads that reduce available road width and escalate travel time during the construction project period. The posted speed limit is lowered during the construction project period, which further reduces vehicle speed and increases the travel time. Likewise, one or multiple lanes may be closed during the construction project period. The reduction in the number of lanes, lane width and shoulder width at the construction zone makes it difficult for the road to accommodate high traffic volume. Motorists shift to alternate roads under such circumstances. In short, the effect of a road construction project may be observed on the project corridor as well as connecting streets. Therefore, the goal of this research is to understand the effect of a road construction project on travel time at road link-level and help improve the mobility of people and goods through dissemination or implementation of proactive solutions.

Study Methods

This research study comprised of three phases. Firstly, a statistical t-test was conducted to examine the relationship between the change in travel time before and during the freeway construction project period on the freeway links as well as their connecting arterial links. In the second phase, statistical models were developed to understand the effect of road network characteristics, time-of-the-day, and day-of-the-week on travel time before the construction project period. Finally, in the third phase, statistical models were developed for during the construction project period and were compared with the developed statistical models for before the construction project period. The road network characteristics of each link, such as the volume/capacity (V/C), the number of lanes, the speed limit, the shoulder width, the lane width, and whether the link is divided or undivided were considered as predictor variables for modeling. Data for a resurfacing construction project on I-485 in the city of Charlotte, North Carolina (NC) was used evaluation, analysis, and modeling.

Findings

Some of the key findings are listed as follows.

1. The travel times before and during the construction project period are significantly different than estimates obtained using the Bureau of Public Roads (BPR) travel time equation.
2. A decrease in travel time was observed during the construction project period on the freeway links when compared to the before construction project period. Contrarily, an increase in travel time was observed during the construction project period on the connecting arterial street links when compared to the before construction project period.
3. The average travel time, the planning time, and the travel time index can better explain the effect of a road construction project on transportation system performance when compared to the planning time index and the buffer time index.
4. If the distance of a link from the construction project section increases, travel times would decrease for both before and during the construction project periods on the connecting arterial street links.

Policy Recommendations

The predictor variables such as the V/C, the speed limit, and the upstream and downstream link characteristics have a significant effect on travel time on the freeway and connecting arterial street links. Practitioners should take these factors into consideration, in addition to the construction zone characteristics, when planning a road construction project and developing temporary traffic control and detour plans.

About the Authors

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To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/1702B

The travel time on connecting arterial street links increase while the travel time on freeway links with the road construction project decrease during the construction project period when compared to before the construction project period.



MTI is a University Transportation Center sponsored by the U.S. Department of Transportation's Office of the Assistant Secretary for Research and Technology and by Caltrans. The Institute is located within San José State University's Lucas Graduate School of Business.