Document Summary

SHRP 2 L07: Identification and Evalaution of the Cost Effectiveness of Highway Design Features to Reduce Nonrecurrent Congestion

MRI Global

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Summary of the Work

Highway agencies need better guidance on the use of strategies and treatments to improve travel time reliability, including design and application guidance for each treatment, the advantages and disadvantages of each treatment, as well as quantitative estimates of their effectiveness. SHRP 2 Project L07 - Identification and Evaluation of the Cost Effectiveness of Highway Design Features to Reduce Nonrecurrent Congestion - focuses on the role of geometric design treatments to reduce nonrecurrent congestion and on providing better guidance on highway agencies on the use of such treatments. The key objective of the project is to evaluate the cost effectiveness of promising highway design treatments capable of reducing delays due to key causes of nonrecurrent congestion. Another key objective is to identify the full range of possible roadway design features used by transportation agencies on freeways and major arterials to improve travel-time reliability. In Phase I, several state agencies were contacted and a qualitative assessment of the most commonly used treatments was performed. Design treatments were categorized first as either directly design related or indirectly design related. A summary was prepared for each treatment with an overview of the information available about that treatment in the literature, and supplemented with information about applications of that treatment type learned from focus groups and interviews with highway agencies.

Phase II focused on estimating the traffic operational effectiveness, traffic safety effectiveness, and cost of each treatment. To do this, the research team developed a preliminary spreadsheet-based analysis tool for implementing the SHRP 2 Project L03 models, which predict a Travel Time Index (TTI) curve based on three input variables: lane-hours lost (LHL), critical demand to capacity ratio (DCcrit), and number of hours per year with rainfall exceeding 0.05 inches (Rain05). The tool can be used to estimate the operational effectiveness, as well as the economic benefit of design treatments, for a freeway segment of interest. Highway agencies provide specific information about a freeway segment – including geometric information, hourly demand volumes, and crash and incident (or special event or work zone) information – and then the tool enables them to compare the benefits and costs of implementing various design treatments to address nonrecurrent congestion.

The preliminary tool, as developed in Phase II, effectively performed the analysis computations and was reasonably user friendly. However, further refinements are being made to the tool as part of Phase III. Another product being developed in Phase III is a design guidebook that presents quantitative information about the performance and cost-effectiveness of each design treatment as well as qualitative information—such as advantages and disadvantages of treatments and factors to consider in selecting appropriate locations for specific treatment types—to assist highway agencies in decision making.

The scope of Project L07 was recently expanded to add Phase IV. The objective of the added work is to further develop and refine the analytical framework and spreadsheet-based analysis tool that were developed in Phases II and III of the project. Specifically, Phase IV work is focused on:

- Addressing effects of snow and ice on the traffic operational effectiveness of design treatments
- Addressing effects of multi-hour incidents on the traffic operational effectiveness of design treatments
- Analyzing existing data to improve applicability of reliability models for time periods with d/c < 0.8
- Verifying the reasonableness of evaluation results obtained with the spreadsheet-based analysis tool

Project Recommendations for Future Work

Project L07 has relied heavily on the reliability models developed in Project L03. Project L33, which is not yet underway, will validate and enhance these models. Other recommendations for future work include additional research on the value of travel-time reliability.