Incorporation of Travel Time Reliability into the Highway Capacity Manual  

SHRP 2 Project L08

SHRP2 Project L08 is developing methods and guidance on incorporating travel time reliability into Highway Capacity Manual (HCM) analyses. The main product of this project will be a guidebook that describes travel time reliability concepts for an HCM audience, provides step-by-step processes for predicting travel time reliability for freeway and urban street facilities, and illustrates example applications of the procedures. The guidebook is being written in the form of two HCM chapters that are planned to be incorporated into the online Volume 4 of the HCM 2010 (www.hcm2010.org). The first chapter will provide information that will allow typical HCM users to understand, apply, and interpret the results of the processes. The second chapter will provide more specific details of the methodologies, oriented toward researcher and HCM software developer audiences. The guidebook is also planned to be produced as a stand-alone SHRP2 report, with the first HCM chapter becoming the body of the report and the second HCM chapter becoming the appendices to the report.

The basic concept behind the SHRP2 L08 methodology is that the main sources of variability that lead to unreliable travel times are used to generate a series of scenarios in which a facility’s demand and/or capacity are varied. The amount and kind of demand and capacity variation depends on the specifics of a given scenario (e.g., fair weather on a Friday in May with one lane closed for 30 minutes due to an incident during the p.m. peak hour). Local data can be used when available, or national or regional default values can be substituted in the absence of local data. The probability of the occurrence of each scenario is also determined.

The demand and capacity values associated with each scenario are provided as inputs to the appropriate HCM 2010 freeway or urban street facility methodology, which then generates the HCM’s full range of performance measures as outputs for each scenario. The impacts of variability on facility performance over the course of a year (or other user-defined reliability reporting period) can be determined on the basis of a weighted average of the individual scenario results (e.g., a weighted average travel time), a percentile (e.g., the 80th or 95th percentile travel time), or a probability of achieving a particular level of service (e.g., the facility operates at LOS D during X% of non-holiday weekday hours during the year).

This project is updating the existing Excel-based HCM computational engine for freeway facilities, FREEVAL, to automate the generation of the reliability scenarios and to calculate the reliability results. The project has also created a new Excel-based computational engine, STREETVAL, that performs similar functions for urban streets. Finally, the project has updated the HCM 2010 freeway and urban streets methodology to incorporate new features needed to perform reliability calculations. These methodological enhancements as well as the proposed reliability predication methods are currently being discussed and reviewed with TRB’s Highway Capacity and Quality of Service Committee.