

UTC Project Information	
Project Title	Understanding & Modeling Bus Transit Driver Availability (Former title: Understanding & Modeling Bus Transit Driver Availability (Extraboard Management))
University	Rutgers, The State University of New Jersey Mineta National Transit Research Consortium
Principal Investigator	Kaan Ozbay, Ph.D.
PI Contact Information	Department of Civil & Environmental Engineering 96 Frelinghuysen Road Piscataway, NJ 08854 kaan@rci.rutgers.edu 732-445-2792
Funding Source(s) and Amounts Provided (by each agency or organization)	Research and Innovative Technology Administration University Transportation Centers Program (\$60,000)
Total Project Cost	\$60,000
Agency ID or Contract Number	
Start and End Dates	June 2012 – August 2014
Brief Description of Research Project	<p>Bus transit agencies are required to hire extraboard (i.e. back-up) operators to account for unexpected absences. Incorrect sizing of extra driver workforce is problematic for a number of reasons. Overestimating the appropriate number of extraboard operators has financial implications while underestimating can lead to service disruption. It is therefore important that transit agencies properly manage extraboard operator staffing. A review of relevant literature showed that current models for extraboard management are generally agency-specific and that, in practice, extra driver assignments are usually based on the experience of the decision makers rather than the utilization of a mathematically sound modeling process.</p> <p>In this study, two mathematical programming models with probabilistic constraints were developed to determine daily optimal extraboard size for bus transit (driver availability and deployment) while incorporating reliability and risk measures in the decision making process. Two distinct solution approaches were proposed. The first approach used pLEP's as the solution methodology and the second approach used second order stochastic dominance constraints. The models were tested using long-term data obtained from three Tri-County Metropolitan Transportation District of Oregon (TriMet) garage. The individual performance of both models under different cost assumptions was evaluated and then the actual historical assignments were</p>

	<p>compared with the optimal solutions obtained from these models. The results revealed possible improvements of extra driver size for one of the three garages studied. These models can be easily used in a computerized environment to assist agencies in efficient decision-making, which is also illustrated using a simulation procedure developed for comparison with observed driver assignment data.</p>
Describe Implementation of Research Outcomes (or why not implemented)	
Place Any Photos Here	
Impacts/Benefits of Implementation (actual, not anticipated)	

<p>Web Links</p> <ul style="list-style-type: none">• Reports• Project Website	<p>Final report (MNTRC Website): http://transweb.sjsu.edu/project/1140.html</p> <p>Final report (TRB Website): http://trid.trb.org/view/2014/M/1319584</p>
--	---