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MINETA NATIONAL TRANSIT RESEARCH CONSORTIUM

UTC Project Information	
Project Title	Development of Bus-Stop-Time (or Dwell Time) Models in Dense Urban Areas: A Case Study in Washington DC (Former title: Development of Total Bus-Stop-Time Models for Bus Transit in Dense Urban Corridors: A Case Study in Washington DC)
University	Howard University Mineta National Transit Research Consortium
Principal Investigator	Stephen Arhin, Ph.D., P.E., PTOE, PMP
PI Contact Information	Howard University Transportation Research Center Lewis K. Downing Building, Room 2121 2300 6th St., NW Washington, DC 20059 saarhin@howard.edu 202-806-4798
Funding Source(s) and Amounts Provided (by each agency or organization)	Research and Innovative Technology Administration University Transportation Centers Program ($194,148.57) Howard University ($145,000) District of Columbia Department of Transportation ($50,000)
Total Project Cost	$389,148.57
Agency ID or Contract Number	DTRT12-G-UTC21
Start and End Dates	December 2013 – December 2015
Brief Description of Research Project	Bus transit reliability depends on several factors including the route of travel, traffic conditions, time of day, and conditions at the bus stops along the route. The number of passengers alighting or boarding, fare payment method, dwell time (DT), and the location of the bus stop also affect the overall reliability of bus transit service. This study defines a new variable, Total Bus Stop Time (TBST) which includes DT and the time it takes a bus to safely maneuver into a bus stop and the re-entering the main traffic stream. It is thought that, if the TBST is minimized at bus stops, the overall reliability of bus transit along routes could be improved. This study focused on developing a TBST model for bus stops located near intersections and at mid-blocks using ordinary least squares method based on data collection at 60 bus stops, 30 of which were near intersections while the remaining were at mid-blocks in Washington DC. The field data collection was conducted during the morning, mid-day, and evening peak hours. The following variables were observed at each bus stop: bus stop type, number of passengers alighting or boarding, DT, TBST,

	number of lanes on approach to the bus stop, presence of parking, and bus pad length. The data was analyzed and all statistical inferences were conducted based on 95% confidence interval. The results show that the TBST could be used to aid in improving planning and scheduling of transit bus systems in an urban area.
Describe Implementation of Research Outcomes (or why not implemented)	TBST and Dwell Time models were developed which could be used to help improve transit bus reliability along busy corridors in DC. The models developed from the study will potentially provide strategies for minimizing delays at bus stops thereby maximizing reliability along corridors. The following publications were generated out of this research: S. Arhin, E.C. Noel, L. Williams, M. Anderson, A. Ribbiso (2015). *Optimization of Transit Total Bus Stop Time Models (In Press).* Journal of Traffic and Transportation Engineering, Elsevier. Arhin SA, Noel EC, Anderson M, Williams L, Ribbiso A, et al. (2015) *Predicting Dwell Time by Bus Stop Type and Time of the Day*. Journal of Civil & Environ Eng 5:189. doi:10.4172/2165-784X.1000189
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Impacts/Benefits of Implementation (actual, not anticipated)	The outcome of this study has been shared with WMATA. WMATA intends to use these models to help in predicting dwell times and use the constraints in this study to improve overall bus reliability.
Web Links • Reports • Project Website	Final report (MNTRC Website): http://transweb.sjsu.edu/project/1239.html Final report (TRB Website): http://trid.trb.org/view/2015/M/1365297