



UTC Project Information – National Transportation Center @ Maryland (NTC@Maryland)	
Project Title	Optimizing Highway Efficiency in Real-Time
University	Louisiana State University
Principal Investigator(s)	Brian Wolshon
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PI(s) and Co-PI(s) Photo(s) Image should be 80width x 120height pixels. Allowed file types: png gif jpg jpeg .	
Funding Source(s) and Amounts Provided (by each agency or organization)	NTC: \$74,000 LSU: \$74,000
Total Project Cost	\$148,000
Agency ID or Contract Number	DTRT13-G-UTC30
Start and End Dates	10/1/15 – 12/31/19
Project Image (for website) Should be 233width x 155height pixels. Allowed file types: png gif jpg jpeg .	
Brief Description of Research Project	Freeway congestion is a chronic problem observed worldwide. Congestion is costly both monetarily and with regard to time, safety and the environment. A great deal of research has been conducted on decreasing freeway congestion through various traffic management techniques. Ramp management is one tool commonly used to maximize freeway capacity by utilizing control devices (signals, signs, gates, etc.) to regulate the number of

	<p>vehicles entering and leaving the freeway [Neudorff et al., 2006].</p> <p>It has been shown that vehicle platoons entering a freeway creates downstream turbulence, which has the potential to cause traffic breakdowns [Elefteriadou et al., 1995]. Ramp management strategies have been shown to reduce this turbulence by metering the traffic at on-ramps though signalization. The number of vehicles prescribed to enter the freeway is usually calculated by an on-line adaptive traffic control that attempts to optimize the freeway performance by striking a balance between allowable turbulence of the mainline freeway and the vehicles waiting at the on-ramp meter [Elefteriadou et al., 2011]. Previous research has provided a number of ramp metering algorithms which attempt to increase freeway's performance by metering to capacity [Jacobson et al., 2006; Bogenberger and May, 1999; Zhang et al., 2001; Papegeorgio et al., 1991 Papegeorgio et al., 1990].</p> <p>Brilon (2000) proposed a concept to quantify the efficiency of a freeway segment by treating traffic flow similar to a mechanical system [Brilon, 2000]. Brilon describes an analogy where mechanical work, the product of force and distance is synonymous with work done by a freeway, the product of the total number of vehicles and the average speed (veh-miles). Mechanical power is the rate of work i.e the amount of work conducted in a time interval. This therefore translates into freeway power, the number of veh-miles traveled in a time interval. Brilon uses freeway power or production per time interval as a measure of efficiency.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>May Place Any Photos Here</p>	<p>In this research the concept of freeway efficiency is used to modify an existing ramp meter control algorithm. Here, instead of metering to achieve the highest possible capacity, the ramp will be metered to the highest value of freeway efficiency. By metering to efficiency it is theorized that traffic control parameters could surpass the previous algorithm by decreasing the probability of freeway breakdown. It is therefore essential to use the probability of breakdown as measure of effectiveness in this research.</p>

Impacts/Benefits of Implementation (actual, not anticipated)	Project has not begun yet, so no impacts have been realized.
Web Links <ul style="list-style-type: none">• Reports• Project website	