Grant Deliverables and Reporting Requirements for UTC Grants

UTC Project Information	
Project Title	Evaluation of Freeway Traffic Data Acquisition: Technology, Quality, and Cost
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Funding Source(s) and Amounts Provided (by each agency or organization)	USDOT: $0 Caltrans: $127,948
Total Project Cost	$127,948
Agency ID or Contract Number	Sponsor Source: Federal Government CFDA #: 20.701 Agreement ID: 69A3551747119
Start and End Dates	Start date: 06/15/2017 End date: 06/14/2019
Brief Description of Research Project	Travel time is an important piece of information to both travelers and transportation service providers, such as state DOTs and local transit agencies. In the past, Caltrans has deployed its own sensors to either directly collect travel time data or collect other traffic data that can be used to infer travel times. Such efforts carry significant costs at both the deployment and maintenance stages. With the growth of private traffic data providers, such as Waze, HERE and INRIX, it becomes feasible to have partnerships with such companies or simply purchase data from them. The accuracy, reliability, and cost of private vendor data should be evaluated before any contract can be pursued. This project is to help Caltans to assess the above aspects and inform their decisions on future procurement of travel time data. With assistance from Caltrans and INRIX and HERE, the research team collected about a month of traffic data for two stretches of Interstate 80. The data included traffic volume, occupancy and speed reported by dual loop detectors, travel times from Caltans deployed Bluetooth measurement system, and 5-minute average travel times from INRIX, HERE, and

Waze. Since we have high granularity data from the Bluetooth system, the sampling rate from this system was obtained and it ranged from 5-10% in most cases. A simulation study to find the critical sampling rate under which the sample average travel time is a good (95% confidence) representation of the population's average travel time, and the value was found to be at 5%. Consequently, the Bluetooth travel times were used as the ground truth, against which travel times provided by vendors were compared.

Figure 1: Students and a Caltrans engineer downloading data from controller box (left), and detector rack inside the controller box.

Figure 2: An example of travel times from different sources for the I-80 EB segment from Chiles Road to Webster.

Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	Our analysis indicated that the vendor provided travel times are generally as accurate and reliable as the Bluetooth travel times, although travel times from one vendor systematically underestimated travel times but its time-of-day profile is very similar to those from other vendors and Bluetooth. The research concluded that forging a data sharing partnership with vendors or signing data purchase agreements with them can be an economical way to obtain travel time data to cover the entire California freeway system. It is also recommended that Caltrans deploy their own sensors on a limited number of locations to verify the quality of vendor data from time to time.
Impacts/Benefits of Implementation (actual, not anticipated)	Caltrans is currently evaluating their options of obtaining travel time data for the entire state highway system, and this study will be an important reference for them to make the decision. The research team shared the results with key Caltrans personnel involved in this decision process and will make a final presentation to them in September 2019.
Web Links • Reports • Project website	http://ctech.cee.cornell.edu/final-project-reports/