

**State of Wisconsin/Department of Transportation**  
**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: December 31, 2005**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title:</b> Vehicle Classification from Single Loop Detectors	<b>Project ID:</b> 05-02
<b>Administrative Contact:</b> Nina McLawhorn	<b>Sponsor:</b> MRUTC
<b>WisDOT Technical Contact:</b> Jason Bittner	<b>Approved Starting Date:</b> 10/1/04
<b>Approved by COR/Steering Committee:</b> \$39,998	<b>Approved Ending Date:</b> 8/30/06
<b>Project Investigator (agency &amp; contact):</b> Ohio State University, Benjamin Coifman	

**Description:** The goal of this research is to utilize the advances in velocity and length estimation from single loop detectors to develop a vehicle classification methodology. It is envisioned that the classification work will also improve length-based classification at dual loop detectors. The research promises to extend vehicle classification to existing stations using only single loop detectors and offers viable options in the event that one of the loops in a dual loop detector fails.

- Task 1: Meet with ODOT engineers and potentially teleconference with other state departments of transportation (DOT's) in the MRUTC to establish properties of existing classification systems and desired properties of the classification system, e.g., number of bins and length thresholds between bins.
- Task 2: Collect additional detector data. Particular emphasis will be on stations with significant truck demand. Each location will need an external measure for verification. ODOT will be the primary source to log individual vehicle data from several of their stations. The researchers will collect concurrent video at several stations to manually verify the vehicle class.
- Task 3: Develop and test the single loop detector classification against the Weigh in Motion or axle classification. In parallel, the researchers will further improve the length estimation techniques from single loop detectors.
- Task 4: Use the manually extracted vehicle class from video to verify the methodology.
- Task 5: Work with ODOT and other state DOT's to deploy the resulting length-based classification methodology for single loop detectors.

Total study budget	Current FFY budget	Expenditures for current quarter	Total Expenditures to date	Percent Complete
<b>\$39,998</b>	<b>\$39,998</b>	<b>\$0</b>	<b>\$0</b>	<b>0</b>

**Progress This Quarter:**

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

The funding for this project was finalized just before this quarter began. As such, most of the work this quarter was devoted to starting up.

Most of this time was spent familiarizing the students with how to estimate accurately vehicle speed and length from single loop detectors and then measure the same metrics at dual loop detectors. We revisited our algorithms for length estimation and tested how close the single loop estimated vehicle length compared to those measured at a dual loop. Some anomalies were found in the analysis. Upon closer inspection, comparing against video ground truth data at the same location, many of these errors appear to be due to the detector dropping out in the middle of long trucks. Although the best solution would be to improve the performance of the loops in the field, our approach needs to be robust enough to operate with existing hardware and we may need to develop additional tests to catch when the detector erroneously drops out.

Secondly, we began reviewing literature on length based vehicle classification and then found several different schemes for vehicle classification (e.g., 13 classes used by FHWA, or a much simpler 4 classes based strictly on length used by WSDOT). We applied the 4 classes scheme to a detector station in Columbus, on I71. We had little problem differentiating between vehicles shorter or longer than 39 ft. There are two bins on either side of this threshold and the error rate between the pairs of bins are larger. Work is progressing on determining the nature, magnitude, and source of these errors.

Finally, we have started discussions with ODOT about the meeting for task 1.

**Work Next Quarter:**

We have a meeting scheduled with ODOT early next quarter for task 1, establishing what they would want or need from a length based classification system. This meeting is anticipated to lead to one or more rounds of field data collection at ODOT classification sites for tasks 2-4.

**Circumstances affecting progress/budget:**

The original proposal consisted of two companion proposals submitted, each approximately \$20,000, submitted independently to MRUTC and ODOT, with the remaining funds and matching coming from OSU. It took considerably longer for the red tape to be worked through than anticipated.

