

## KANSAS DOT RESEARCH PROJECTS QUARTERLY PROGRESS REPORT

Lead Agency (University or Contractor): \_\_\_\_\_ Kansas DOT \_\_\_\_\_

**INSTRUCTIONS:**

*Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.*

<b>KDOT Project Number</b> RE-0617-01	<b>Transportation Pooled Fund Program - Report Period:</b> <input checked="" type="checkbox"/> Quarter 9 (January 1 – March 31, 2015) <input type="checkbox"/> Quarter 10 (April 1 – June 30, 2015) <input type="checkbox"/> Quarter 11 (July 1 – September 30, 2015) <input type="checkbox"/> Quarter 12 (October 4 – December 31, 2015)	
<b>Project Title:</b> Real-Time Quality Control Monitoring and Characterization of Aggregate Materials in Highway Construction using Laser Induced Breakdown Spectroscopy		
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<b>Lead Agency Project ID:</b> RE-0617-01	<b>Other Project ID (i.e., contract)</b>	<b>Project Start Date:</b> June 1, 2013
<b>Original Project End Date:</b> May 31, 2016	<b>Current Project End Date:</b> Likely December 31, 2016	<b>Number of Extensions:</b> 0

Project schedule status:

- On schedule     
  On revised schedule     
  Ahead of schedule     
  Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Total Percentage of Work Completed
\$975,000	\$515,530.55	52.9%

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Complete This Quarter
\$975,000	\$89,440.73	9.2%

**Project Description:**

The primary objectives of this research effort is to calibrate laser-spectral models to develop the means to monitor aggregate materials from participating State agencies, and to demonstrate the use of the technology in actual field applications. The overall objective is to transition the technology from a lab-based application to a field based system. Testing of aggregates and the calibration models developed in the NCHRP 150 research effort were accomplished using a laboratory-based laser-optical system. The proposed pooled fund work plan is designed to transition the technology from the laboratory to the field through the calibration, deployment and demonstration of the technology at selected field demonstration site(s). As part of the NCHRP 168 project, a field prototype sampling and laser targeting system field prototype, referred to as the SLT system (Sampling and Laser Targeting System), is under development for use in the pooled funding effort. The SLT system is a bulk sampling and laser-targeting system that is designed to analyze a diverted portion of the bulk material by passing target aggregate material passed a laser that is strategically located to provide for continuous or semi-continuous monitoring of the bulk aggregate stream. Diversion of samples of the bulk material into the SLT system is designed to remove the aggregate from the bulk stream during material transport, such as conveying. This material diversion provides the means to minimize interferences that would be encountered in an in-line monitoring system, without diminishing the effectiveness of the laser monitoring system to obtain large quantities of data necessary to properly characterize the targeted material. It also provides the means to ensure safe operation of the laser by enclosing the entire system in a separate sealed housing disconnected from the main bulk material conveying system, thereby ensuring a contained and safe operation. The SLT can be deployed in a laboratory environment as well where buckets of samples are periodically introduced for analysis or in a continuous or semi-continuous field operation where materials are diverted from a conveying operation to the SLT for analysis.

**Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**

During this period, a technical project review meeting was held in New Mexico to review all scanning data. As a result of this meeting, all of Kansas, Ohio, Pennsylvania, and Oklahoma samples were rescanned to enable new models to be developed that would account for spectral intensity normalization corrections and intensity drift corrections. Development of Special SLT modeling software and SLT operational software continued. A special training platform was designed and fabricated to initiate training of operators of the SLT for optical system cleaning and optical component alignment. The second Project review meeting was held at New Mexico State University on March 24. Discussions were undertaken with PA, OH, KS, NY and OK to plan future activities and receipt of additional samples. Additional plans were made to undertake modifications to the SLT based on experience during the quarter.

**Anticipated work next quarter:**

New samples will be received from all States for additional calibration and validation testing. The SLT may be taken off line at the end of this coming quarter for system modifications.

**Significant Results:**

Calibration data generated to date suggest that the models can predict engineering properties. Not all properties are modeled equally. Three significant issues are at play: 1) Laser generated intensities require normalization, and 2) Additional sample analyses are needed to increase the sample population and 3) Capability of the spectra to be resolved sufficiently to differentiate samples with different properties.

**Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints set forth in the agreement, with recommended solutions to those problems).**

At the present time the project is approximately 6 to 9 months behind schedule due to equipment down time and delays in receiving samples. Unless additional time can be made up, a contract of extension of approximately 6 months will probably be requested in early 2016.