KANSAS DOT RESEARCH PROJECTS
QUARTERLY PROGRESS REPORT

Lead Agency (University or Contractor):_____Kansas DOT_____

KDOT Project Number RE-0738-01	Transportation Pooled Fund Program - Report Period: ☐Quarter 1 (January 1 – March 31, 2019) **X**Quarter 2 (April 1- June 30,2019) ☐Quarter 3 (July 1 – Sept 30, 2019) ☐Quarter 4 (October – December 31, 2019)

Project Title:
Utilization of Laser Induced Breakdown Spectroscopy for Real-Time Quality Control Monitoring and Characterization of Aggregate Materials Used in Highway Construction using

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Lead Agency Project ID: RE-0738-01	Other Project ID (i.e., contract	Project Start Date: July 1, 2017
Original Project End Date: **June 30, 2020**	**Current Project End Date:** **June 30, 2020**	**Number of Extensions:** 0

Project schedule status:

X 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
$870,000.	$560,000	64.4 %

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Complete This Quarter
$870,000.	$83,302 .	9.6%

Project Description:

The primary objectives of this research effort is to develop a near-real-time laser-scanning system to rapidly classify aggregates used in highway construction. The intent is to employ this classification process to
- Quantify specific engineering properties (e.g., acid insoluble residue, soundness, LA Loss, etc.)
- Assess whether an aggregate will pass or fail a defined engineering property test
- Identify and/or quantify the presence of deleterious materials (e.g., ASR, chert, shale, reactive aggregate)
- Determine the composition of blends in stockpiled aggregate
- Determine the source of an unknown aggregate

Six states are part of this TPF program. They include: KS, MD, OK, OH, NY and NM.
Each State is supplying aggregates that will be tested and evaluated to determine the efficacy of the technology

Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):
During this period, modeling studies proceeded with a focus on MD samples. MD provided a series of unknown samples from unknown source quarries and requested the Research Team to identify the quarry source. MD has provide 42 different source materials. This means that the laser will be tested to determine whether the system can be modeled to identify which of the 42 sources the unknowns came from. OH sent in aggregate (gravel) samples and shale samples for the purpose of determining whether the shale content in gravel can be determined. the SLT software is continually being upgraded.

Anticipated work next quarter:
MD and OH analyses will continue. New KS samples will be received for D cracking evaluation..

Significant Results:
Modeling of New York and Maryland friction properties were successful using carbonate samples. Kansas D cracking Models were successfully developed for samples of a given formation. Chert counting models for Ohio were not effective. Although differences between chert and parent aggregate and light and dense chert can readily be differentiated the counting models were overestimating the chert content of the samples. There is a lack of adequate sample volume from Oklahoma and New Mexico to pursue modeling activities at this time

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).
Additional work on sample collection (types and quantities) and modeling will be required. Discussions are being held with State Agency to address these issues. Sample collection has lagged, The program is scheduled for completion in 12 mont time. We are tracking budget and schedule closely at this time.to determine whether some issues may arise.