TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): **Indiana Department of Transportation**

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.

Transportation Pooled Fund Program Project # *TPF-5(258)*	**Transportation Pooled Fund Program - Report Period:** **X** Quarter 1 (January 1 – March 31) Quarter 2 (April 1 – June 30) Quarter 3 (July 1 – September 30) Quarter 4 (October 1 – December 31)

Project Title: Traffic Signal Systems Operations and Management		
Name of Project Manager(s): **James R. Sturdevant**	**Phone Number:** **(317) 691-9091**	**E-Mail** jsturdevant@indot.in.gov
Lead Agency Project ID: **TPF 5(258)**	**Other Project ID (i.e., contract #):**	**Project Start Date:** January 1, 2012
Original Project End Date: **December 31, 2015**	**Current Project End Date:** **December 31, 2015**	**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**	**Percentage of Work Completed to Date**
$550,000	$123,198.49	25%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	**Total Amount of Funds Expended This Quarter**	**Total Percentage of Time Used to Date**
	$61,125.83	56%

Project Description:

Signalized arterials represent a substantial component of the highway transportation network in the United States. The National Transportation Operations Coalition (NTOC) in their 2007 Traffic Signal Report Card noted that nationally 5 to 10 percent of all traffic delay is caused by improper traffic signal timings along major roadways. In 2007, the National Report Card for overall traffic signal systems operations was a D. The situation is not expected to improve as travel demand is forecast to grow significantly faster than network capacity. The increase in national attention on sustainable and livable communities necessitate a concentrated effort be placed upon improved management and operation of our nations traffic signal system inventory.

The Transportation Management Center (TMC) Pooled fund study (SPR-2(207)) initiated in 2000, has been very successful at generating consensus on best management practices for traffic management centers oriented mainly towards freeway operations. It is desirable to develop a similar pooled fund study oriented toward traffic signal operations and management that would complement SPR-2(207) and engage a broad cross section of agencies on the leading edge of active traffic signal management.

Project Objectives

Develop a network of transportation agencies to i) develop consensus on operational standards of performance, ii) define a central management model that can leverage commercial wireless IP offerings that can be competitively outsourced, and iii) asset management principles for using a central system to identify when and where resources are most needed to maximize return on investment.

The level of participation and associated funding commitments will allow for additional opportunities over time or in parallel to explore additional traffic signal initiatives beyond those described herein. For example, the evaluation of adaptive control field deployments and associated systems engineering guidance documents under development by FHWA.

Progress Jan-Mar 2013 (includes meetings, work plan status, contract status, significant progress, etc.):

- A white paper was distributed with near final scope this past quarter. Some minor edits were received from Utah and California and were incorporated. The final scope is available at: https://dl.dropboxusercontent.com/u/1007813/pfs/2013_03/Workplan_PFS_2012_04_30.docx
- Developed draft of Performance Measure Guidebook defined in Task 1.1. A draft of that document is at: https://dl.dropboxusercontent.com/u/1007813/pfs/2013_03/signalmoe__2013_04_30.docx
- Interacted with Utah DOT (Task 1.2) to gain experience with other states deploying performance measures. They have aggressively implemented at several intersections and prepared a dedicated web site: http://udottraffic.utah.gov/signalperformancemetrics/

Progress Apr-June 2013 (includes meetings, work plan status, contract status, significant progress, etc.):

- Continued collaboration with Utah DOT on integration of performance measures into their web site.
- Extended the split failure performance measures to incorporate ACS-Lite oriented "Green Occupancy Ratios" and "Red Occupancy Ratios". A link to a paper documenting that work is at: https://dl.dropboxusercontent.com/u/1007813/pfs/2013_06/GOR_ROR_Concept.pdf
- Extended the PCD concept to accommodate multiple contributing phases serving the interior movement of a diamond interchange https://dl.dropboxusercontent.com/u/1007813/pfs/2013_06/Diamond_PCD.pdf

Progress July–Sept 2013 (includes meetings, work plan status, contract status, significant progress, etc.):

- Continued collaboration with Utah DOT on integration of performance measures into their web site.
- Developed methodology for integrating high resolution controller data from City of Richardson, Texas and Utah DOT into Indiana Performance Measure Web Page
- Integrated newly released Siemens high resolution controller data into performance measure web page (We now have Econolite, Peek, and Siemens)
- Initiated dialog with Intellilite and Naztec to integrate high resolution data from those controllers.

Progress Oct-Dec 2013 (includes meetings, work plan status, contract status, significant progress, etc.):

- Continued collaboration with Utah DOT on integration of performance measures into their web site. See next page on significant progress that shows Utah, Indiana, and Michigan data being integrated in each other's web based platform. This data sharing has received very positive national attention because it demonstrates the portability/scalability of these performance measures across agencies.
- Collaborated with the AASHTO TIG group to provide them information to disseminate nationally.
- Collaborated with Utah, Indiana, Minnesota, and FHWA colleagues to prepared an ITE Article for the March 2014 issue of the ITE Journal on Performance Measures. This will be followed by a series of three national webinars to share experience and solicit broader stakeholder input.
- Continued dialog with Intellilite and Naztec on high resolution data logging. Naztec has completed a beta data logger that Purdue begin testing in January. Current status of high resolution data loggers
    - Econolite ASC 3 – deployed in Indiana and Utah
    - Peek –deployed in Indiana
    - Siemens –deployed in Indiana
    - Naztec – beta testing at Purdue University
    - Intellilite – beta testing with City of Richardson, TX
- Developed a portable data collection using device for agencies to participate in web sites without having to provide an IP link. We have tested that at 5 intersections in Indiana. March webinar will provide opportunity to bring additional states into test (we had preliminary dialog with Georgia DOT during TRB).
- Finalized Performance Measure Guidebook defined in Task 1.1 that was distributed for panel review in March 2013. Electronic and hard copies of the final document will be distributed to panel in February.

Progress Jan-Mar 2014 (includes meetings, work plan status, contract status, significant progress, etc.):

- Interfaced with Utah DOT to plan logistics for field deployment of DDI performance measures.
- Interfaced with Utah DOT to conduct link pivot analysis on selected corridors
- Completed performance measure monograph that summarizes portfolio of performance measures developed to-date. Citation and hyperlink to report is:

  Day, C. M., D. M. Bullock, H. Li, S. M. Remias, A. M. Hainen, R. S. Freije, A. L. Stevens, J. R. Sturdevant, and T. M. Brennan. *Performance Measures for Traffic Signal Systems: An Outcome-Oriented Approach*. Purdue University, V Lafayette, Indiana, 2014. doi: 10.5703/1288284315333.
  http://dx.doi.org/10.5703/1288284315333

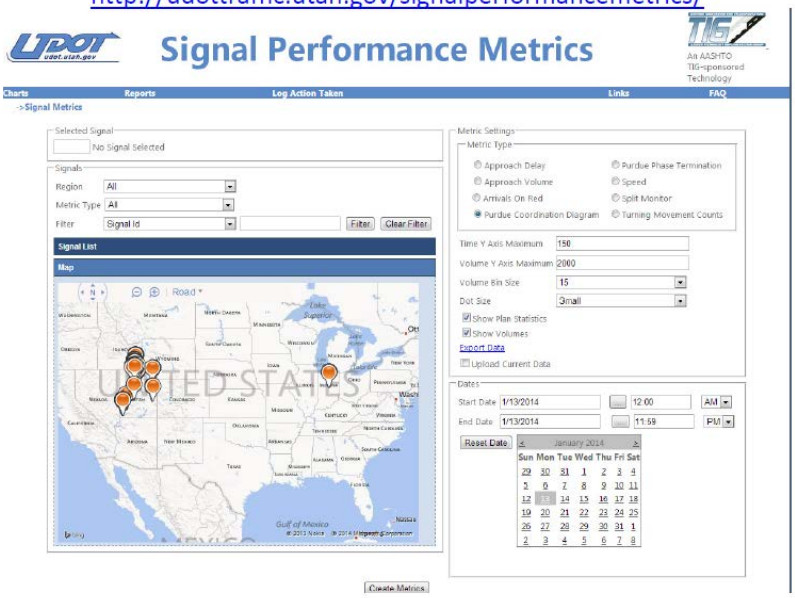
Anticipated work next quarter:

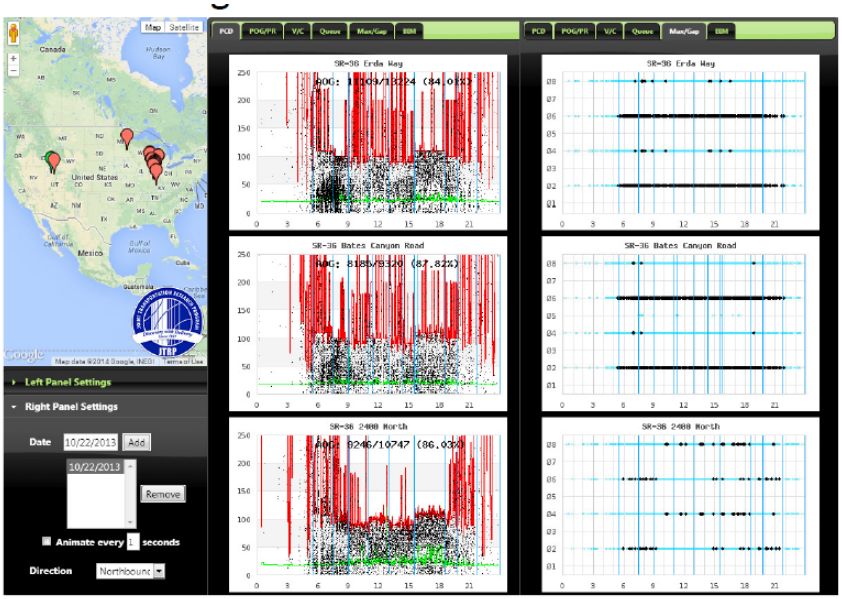
- Conduct field deployment of extended DDI performance measures in Utah first week in May.
- Continue on work plan.
- Work with Utah DOT to integrate link pivot into there software.
- Continue support of AASHTO TIG Group
- Execute contract with University of Minnesota. Scope of Work to be proposed by Prof. Henry Liu was delayed because he accepted job to move to University of Michigan. As soon as proposal is received, it will be distributed to Panel for scope of work review.

Significant Results:

- **INDOT, Utah, and Minnesota have all deployed high resolution data collection. That data has been exchanged and both INDOT and Utah DOT have integrated this peer data into their performance measure**

http://udottraffic.utah.gov/signalperformancemetrics/





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, along with recommended solutions to those problems).

Potential Implementation:

There continues to be strong concurrent and coordinated efforts with both Utah and Minnesota DOT. Georgia DOT and Richardson Texas is targeted for next state to integrate sample data into performance measure web sites.

Continued to leverage AASHTO TIG group for outreach and engagement with peer states.