TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Colorado 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 # *(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX)* TPF-5(260)		**Transportation Pooled Fund Program - Report Period:** ☐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: Project Four: Construction Production Rates for Estimating Contract Time		
Name of Project Manager(s): David Reeves	**Phone Number:** 303-757-9518	**E-Mail** david.reeves@dot.state.co.us
Lead Agency Project ID: SAP# 271001660	**Other Project ID (i.e., contract #):** 12-HAA-42183	**Project Start Date:** 08/01/2015
Original Project End Date: 08/31/2015	**Current Project End Date:** 12/31/2017	**Number of Extensions:** 1

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	Percentage of Work Completed to Date
131,821		80

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date

Project Description:

Background
It is in the best interest of the traveling public for state transportation agency (STA) construction projects to be completed in the least amount of time possible, to minimize lane closures and construction impacts. In addition, the public takes note regarding activity on construction sites and on occasion, STAs receives complaints when it appears that road construction is not being aggressively pursued.

Contractors sometimes fail to aggressively perform construction work when too much time is allowed in the contract to build the project. When contractors have excessive time, they may neglect to fully commit resources to a project or to work as efficiently as possible. STAs need to improve the accuracy and consistency of estimating contract time, which is based on construction production rates. The focus of this research study is to use historical project information to generate a list of production rates for construction activities that will be used by STAs to more accurately estimate the time needed to construct a project.

Currently, time estimating often depends on the experience and knowledge of STA project staff. As many long-term staff members are retiring, less experienced employees are staffing project management positions. Thus the need for a resource for estimating production rates is becoming more important.

Improving time estimates will also support new STA initiatives for program and cash management, and the ability to more accurately budget cash drawdowns. And finally, the availability of historic production rates will help construction project managers to analyze contractor method statements, critical path schedule submittals, and other important components of project management.

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

During this quarter, the team cleaned data received from GaDOT, which will provide robustness to the models developed. At the same time, the first Machine Learning models were developed and shared with CDOT. The team also provided a sketch of what the tool would look like if the decision is made to chose Machine Learning over Multivariate Linear Regression (MLR). The comments and concerns from a previous meeting with CDOT were addressed and incorporated into the model.

Anticipated work next quarter:

For the next quarter, the team plans to finish the development of the models in order to be able to incorporate them into a the final tool. The team is also going to be working in the user manual for such a tool, as well as testing the tool with new data, pending that the data being provided.

The team will also analyze and compare the models developed with the one developed by KYTC and will try to incorporate this data into the model. If achieved, this will help improve the reliability, precision, and accuracy of this TCM Project,

So far, the team is still aiming to finish the project by the end of 2017

Significant Results:

The Deep Learning model developed provided time estimations in which the median absolute error was less than 10% when using Engineers' Estimates as one of the predictors) and close to 10% without using EE. These results are very promising, considering that for the MLR model, the same metric is closer to the 28% range.

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).

In the meeting with CDOT, a time extension was given - at no cost for the project - until December 2017

Potential Implementation:

The team believes that the tool will be a great aid in contract time determination for the DOTs involved, providing an accurate estimation of the duration by using the bid quantities involved in the project. One of the biggest things, is that running the estimation won't be time consuming and will be easy to re-run if any changes are made to the project.