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)*	**Transportation Pooled Fund Program - Report Period:**
TPF-5(337) - Project No. 1 Assessing Gazex Avalanche Control Effectiveness with Terrestrial Laser Scanning	☑ 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:		
Next-Generation Transportation Construction Management		
Name of Project Manager(s):	**Phone Number:**	**E-Mail**
David Reeves	303-757-9518	david.reeves@dot.state.co.us
Lead Agency Project ID:	**Other Project ID (i.e., contract #):**	**Project Start Date:**
SAP# 411008170		01/08/2016
Original Project End Date:	**Current Project End Date:**	**Number of Extensions:**
06/30/2019	06/30/2019	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	Percentage of Work Completed to Date
$41,504	0	10%

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:

Project:
Assessing Gazex Avalanche Control Effectiveness with Terrestrial Laser Scanning

Project Objective:
This project aims to use terrestrial laser scanning (TLS) technology to create snow depth maps in avalanche starting zones for an effectiveness assessment of the new Gazex systems in reducing avalanche hazard in the Loveland Pass (Seven Sisters) and Berthoud Pass (Stanley) highway corridors. Snow depth maps created prior and post Gazex activation will allow the quantification of avalanche areas and volumes, as well as the mapping of snow slabs remaining after control operations.

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

Task 1: Conduct site assessments, study feasibility, coordinate workflow and site access details with CDOT/CAIC collaborators
Deliverable 1: Initial scan data images
Progress on Task 1:
All Task 1 elements are complete at the Loveland Pass/7 Sisters site. Loveland Pass initial scan images (Deliverable 1) are included in Appendix A in this report. Three scan locations were initially examined and used for snow-free scan acquisition, with the resulting scan data merged into a single dataset. It was determined that a single scan location would suffice for the great majority of snow-on situations. Some communication and coordination challenges remain, as individual storm and road closure events often do not follow a predictable evolution, nor are weather and access always conducive to scan acquisition.

Task 1 is not yet complete at the Berthoud Pass/Stanley Path site. Due to delays in contracting, the site assessment, feasibility, and site access components are all still in-work.

Task 2: Collect snow-free TLS scans of both sites after construction of Gazex systems.
Deliverable 2: Snow-free elevation point cloud
Deliverable 3: Snow-free bare-earth digital elevation model
Progress on Task 2:
Task 2 The snow-free scan was conducted in September 2015 at the Loveland Pass/7 Sisters site. This was accomplished on a volunteer basis prior to establishment of the contract. Production of Deliverables 2 and 3 are in work and near completion. Decision of best data product format will be determined in collaboration with CDOT and CAIC staff.

Anticipated work next quarter:

Work will continue through end of 2016 snow season and until snow-free conditions predominate. Additional snow-on data sets will be collected during winter 2016/17. Work and results to-date will be presented to the avalanche community at the International Snow Science Workshop in Breckenridge, CO, October 2016.

Loveland Pass/7 Sisters:
- Finish scan data postprocessing and final product generation (summer 2016)
- Analyze results in collaboration with CDOT and CAIC staff (summer 2016)
- Additional snow-on scans (Winter 2017)

Berthoud Pass/Stanley:
- Conduct snow-free scans (summer 2016)
- Evaluate scan locations and access (summer 2016)
- Evaluate need for VZ-6000 scanner, and eye safety logistics (summer 2016)

Significant Results:

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).

None

Potential Implementation: