

## TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Date: 11/3/11

Lead Agency (FHWA or State DOT): Virginia 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.*

|  |   |  |
|--|---|--|
| <p><b>Transportation Pooled Fund Program Project #</b><br/>(i.e., SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX))</p> <p><b>TPF(5)-226</b></p> | <p><b>Transportation Pooled Fund Program - Report Period:</b></p> <p><input type="checkbox"/> Quarter 1 (January 1 – March 31)</p> <p><input type="checkbox"/> Quarter 2 (April 1 – June 30)</p> <p><input checked="" type="checkbox"/> Quarter 3 (July 1 – September 30)</p> <p><input type="checkbox"/> Quarter 4 (October 1 – December 31)</p> |  |
| <p><b>Project Title:</b> Instrumentation to Aid in Steel Bridge Fabrication</p>  |   |  |
| <p><b>Name of Project Manager(s):</b><br/>Jose Gomez (VDOT)</p>  | <p><b>Phone Number:</b><br/>(434) 293-1936</p>  | <p><b>E-Mail:</b><br/>jose.gomez@vdot.virginia.gov</p> |
| <p><b>Lead Agency Project ID:</b></p>  | <p><b>Other Project ID (i.e., contract #):</b><br/>100-CMW</p>  | <p><b>Project Start Date:</b><br/>7/20/10</p>          |
| <p><b>Original Project End Date:</b><br/>7/19/11</p>   | <p><b>Current Project End Date:</b><br/>7/19/12</p>   | <p><b>Number of Extensions:</b><br/>0</p>              |

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 |
|----------------------|--------------------------------|--------------------------------------|
| \$250,000            | \$168,553                      | 75%                                  |

Quarterly Project Statistics:

| Total Project Expenses and Percentage This Quarter | Total Amount of Funds Expended This Quarter | Total Percentage of Time Used to Date |
|--|---|---------------------------------------|
| \$33,858   | \$49,042                                    | 75%                                   |

**Project Description:**

Transportation Pooled Fund Project TPF(5)-226 "Instrumentation to Aid in Steel Bridge Fabrication" will deliver a laser based bridge measurement system that will greatly improve the quality and reduce the cost of complex bridge fabrication. This system will reduce or eliminate the need for shop fit-up and assembly by providing a virtual assembly capability using specialized solid modelling and analysis software specifically targeted at large-scale complex structures. This laser system will be specifically designed for steel bridge fabrication and will accurately and precisely measure all aspects of a bridge component, including splice hole locations, camber, sweep, and end-kick in a nearly full-automated manner. The completed system can be used as a quality control tool to document as-built conditions of girders and as a virtual fit-up tool to eliminate shop assembly.

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

Phase I of this project has been completed. Phase II has begun and work is focusing on production fabrication measurements. Tennessee DOT (TN DOT) has agreed to allow laser measurements and virtual assembly procedures on a bridge job being fabricated by Hirschfeld Industries - Bridge. Two lines of girders (12) will be fabricated and subsequently measured with the laser system. Virtual fit-up and splice plate design will then be completed.

***Phase II Task 5 – System Design and Testing (100%)***

Substantial system modifications were completed to prepare for the production fabrication work. System design was specifically focused on creating a system with the ability to measure the very large girders (from 120-154 feet length, 10-foot deep web) for the TN DOT bridge job. This includes components to allow the system to be moved easily around the shop and to be quickly setup for measurements. After system design was completed, the system modifications were fabricated, assembled, and tested.

***Phase II Task 6 – Production Fabrication Test Planning (100%)***

Final preparations were made for the production fabrication measurements. Meetings were held with Hirschfeld Industries to plan this work. Pre-production meetings were held with Tennessee DOT and Hirschfeld Industries to coordinate work on this bridge job.

A procedure to quickly and efficiently convert 2D shop drawings to 3D solid models has been developed. This conversion process has been made very efficient such that 3D models can be created in a very short period of time with minimal operator intervention. This process of converting 2D shop drawings to 3D models is needed for measurement and analysis and was completed for the 12 girders to be measured in production testing. The 3D models created from the shop drawings were used to setup and pre-plan all laser measurements. Virtual assembly preparation files were created for assembly of individual girder data sets and are used to create splice plate sets.

***Phase II Task 7 – Production Fabrication Testing (50%)***

Production testing has begun on a large three-span bridge for TN DOT with a total length of over 830 feet. This structure has 5 lines of girders, each with 6 girders. The girders are straight with a taper at the ends and have a maximum web depth of 10-feet. Girder lengths vary from about 120 feet to 154 feet. Laser measurements are planned on 2 of the 5 lines of girders (12 girders total). This includes virtual assembly of multiple girder pairs.

The FCI Laser System has been operating in the Hirschfeld Abingdon Plant since September 7, 2011. As of 9/30/11 measurements have been made on 6 of 12 planned girders in a production setting. The FCI Laser System has been performing very well and the system is able to work in and around the normal shop processes. Girder measurements are very efficient and optimal setups have been established. Extensive work has been completed on assessment of the fabrication processes with regard to advanced measurement integration.

**Anticipated work next quarter:**

- Continue Tennessee DOT production measurements at the Hirschfeld Industries - Bridge Plant
- Continue out-reach efforts to discuss the project with State Departments of Transportation, bridge fabricators, and other appropriate parties

**Significant Results:**

Several weeks of operation of the FCI Laser System has been completed in a production setting at a Hirschfeld Industries – Bridge plant. Measurements have successfully been made of multiple girders within the plant. The measurements being collected represent a very unique set of data on a very large, complex bridge structure.

**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. The project is on-budget and is ahead of schedule.

**Potential Implementation:**

The current testing in Phase II involves operation of the project system in an actual production environment. The project is currently addressing issues related to the integration of this advanced laser measurement system into a steel bridge fabrication plant.