

**Rahall Transportation Institute
Research Project Description Form**

Project Number: TRP 09-03

Project Title: Integrated Track Infrastructure Assessment

Primary Investigator Contact Information:

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Project Objective: The objective of the project is to create automated methods for collecting, processing and interpreting data collected from instruments into a user friendly format for track inspectors. Additionally, the human factors associated with installing, calibrating, activating, and deploying these instruments will be evaluated, with the purpose of simplifying these tasks.

Abstract: The Federal Railroad Administration's (FRA) Office of Research and Development sponsored a project to further the development of a mobile track surveying system that utilizes Real Time Kinematic (RTK) GPS technology for comparing track alignments over time; and, develop its capabilities to integrate with additional instruments used during routine track inspections. A light weight, modular steel frame was designed and fabricated with the capability of mounting contact and non-contact instruments for measuring gage, cross level, etc. and combined with a hardware and software system developed to allow these data streams to be synchronized with the hi-rail mounted GPS data stream. The system was designed to: "plug and play" different instruments; display the data on a lap top computer in real time; and, download data on demand. Several dozen surveys were conducted both on and off the tracks to refine the data collection and processing steps utilizing an evolving GPS Virtual Reference System (VRS) along the border of Ohio and West Virginia for GPS augmentation purposes. The surveys were conducted on track segments ranging from 5 to 116 miles over a two year time period; and, a suite of software tools were customized as needed for track alignment modeling, in addition to facilitating quick comparisons between multiple surveys. Results demonstrate the repeatability of GPS measurements augmented via a VRS at typical hi-rail speeds and their potential for evaluating track positional behavior over time. Integration of the multiple instrument data streams was successful after procedures were developed to permit the output of the GPS data stream to non-brand equipment.

This enabled positional accuracies of 2 cm for gage and cross level measurements to be recorded at speeds up to 35 mph.

Task Descriptions:

- 1) Project Management and Planning
- 2) Prototype Instruments and Software Configurations
- 3) Data Collection, Processing, and Comparative Analysis
- 4) Field Testing

Milestones, Dates, Schedule:

Quarterly reporting with a project end date of June 30, 2011