



RESEARCH PROJECT CAPSULE [13-6GT]

December 2013

TECHNOLOGY TRANSFER PROGRAM

DOTD Standards for GPS Data Collection Accuracy

JUST THE FACTS:

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12 months

End Date:
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Funding:
SPR: TT-Fed/TT-Reg

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POINTS OF INTEREST:

*Problem Addressed / Objective of
Research / Methodology Used
Implementation Potential*

PROBLEM

Global Navigational Satellite Systems (GNSS), which includes GPS technologies maintained by the United States, are used extensively throughout government and industry. These technologies continue to revolutionize positional data collection activities. Despite the increased accuracy, reduced cost, and improved data acquisition efficiencies, the Louisiana Department of Transportation and Development (DOTD) has no established standards or methods to guide its general staff and contractors in the appropriate use of GNSS technology to ensure application-specific data accuracy requirements and that a Department minimum are met. Because the DOTD Surveying Section already collects highly accurate and precise data, these standards are not intended for them. Instead, these standards are intended for staff that collect GPS data from mapping-grade applications. There is a need to develop standards and techniques for staff who collect GPS Data, separate from the survey section, to ensure a minimum standard and level of accuracy, not only for a confidence level in the data, but also to ensure compatible software and equipment support and training.

In addition to standards, the quality and consistency of measurements are essential to surveying, engineering design, and other positional measurement practices. Recent advancements to the national spatial reference framework from which horizontal and vertical positions are measured (i.e., datums) have resulted in fundamental changes to the way positions are measured when using GPS technologies. As a consequence, many professionals, surveyors, engineers, and scientists have inquired about the short and long-term implications of these changes. Accordingly, DOTD requires a summary of these changes and their impact on existing operational practices, which will be used by various engineering, scientific, and surveying professionals within the Department.

Finally, quality assurance and quality control relating to GPS positional accuracy is essential for all sections within DOTD, particularly the Pavement Management System (PMS) section, which maintains a spatially referenced inventory of all state-maintained roads. This inventory utilizes advanced GPS and inertial navigation technologies to capture the horizontal and vertical position of regularly spaced points along the road. To assess and ensure the accuracy and precision of this inventory, the PMS section requires the collection of control point measurements that will be used to assess the quality of the data products received by contractors.

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OBJECTIVE

The Center for Geoinformatics (C4G) at Louisiana State University (LSU) will conduct a three-part study addressing accurate, precise, and consistent positional control for DOTD. First, this study will focus on Departmental standards of practice when utilizing GNSS technology for mapping-grade applications. Second, the recent enhancements to the nationwide horizontal and vertical spatial reference framework (i.e., datums) will be summarized in order to support consistent and accurate access to the National Spatial Reference System (NSRS). Third, the center will provide quality control information to the PMS section against which Moving Vehicle Rapid Mapping (MVRM) data will may be compared and assessed.

METHODOLOGY

This project will be implemented in four tasks briefly described below:

1. Field survey of several roadway test sites utilized by PMS, including additional speed variances tests at a site in Port Allen, La. This will create benchmarks across the state for PMS to compare against contractor measurements.
2. Research on standard operating and collection procedures for GNSS technologies at DOTD. The research will follow up on previous research (LTRC Final Report 489) and the need for standardization of measurements, equipment, and IT support regarding the collection and storage of data, and the utilization and mapping of such by the GIS section and other sections.
3. Datum and GEOID research will be conducted and documented to provide DOTD staff with insight and recommendations on these items and how they can be utilized in current and future operations to provide consistency between recent GEOID changes to ensure old and new data translation and longevity.
4. The deliverables of this research will benefit all sections and outside agencies in that it will assist with ways to ensure that data is useful and transformable (recoverable) for years to come, which will allow the Department to function with consistency and confidence.

IMPLEMENTATION POTENTIAL

The survey data produced by this study will be in the final report and made available to the DOTD PMS staff via FTP server maintained by the C4G. The deliverables from this report will help DOTD GPS users meet minimum standards for mapping, clarify and recommend ways to deal with the recent GEOID changes, and perform quality assurance measurements on MVRM data. Research findings and recommendations will be compiled within the final report.