



# Project Summary

Texas Department of Transportation

## 0-6142: Feasibility and Applications of RFID Technologies to Support Right-of-Way Functions

### *Background*

Radio frequency identification device (RFID) technology provides the capability to store a unique identification number and some basic attribute information, which can be retrieved wirelessly when the markers detect a radio signal from a remote reader. RFID technology is currently used in many applications including inventory management and highway toll tags. The use of RFID technology offers the potential for the Texas Department of Transportation (TxDOT) to improve its right-of-way (ROW) functions and the manner in which it manages the assets located within the ROW.

TxDOT established this research project as a feasibility study of how RFID technology can be used to support various TxDOT ROW functions. The project identified RFID technologies and their potential applications to support ROW activities in the management of utilities, outdoor advertising, ROW marker/survey control, and other highway infrastructure features and attributes. The research team included researchers from the Texas Transportation Institute and Prairie View A&M University.

### *What the Researchers Did*

This project assessed the feasibility of using RFID technology for various applications of managing assets located in TxDOT right-of-way. It did not include actual evaluations of the use of such technologies, although the research team did conduct evaluations of RFID performance in a limited number of test scenarios. As part of this project, the research team conducted the following activities:

- Synthesized information on RFID technologies.
- Documented current practices for RFID technologies in applications related to managing assets located in the right-of-way.
- Identified potential applications of RFID technology for managing assets in the right-of-way.
- Conducted a webinar on the Virginia DOT application of RFID markers to identify underground utilities during a utility relocation project.
- Conducted a laboratory evaluation of the performance of several RFID tags in a range of buried applications.
- Developed a high-level RFID software integration schema for RFID application to asset management.
- Developed a cost-benefit analysis of RFID technologies.
- Assessed the feasibility of using RFID technology for several different applications.
- Identified implementation opportunities for RFID technologies.

### *Research Performed by:*

Texas Transportation Institute (TTI),  
The Texas A&M University System

Prairie View A&M University, (PVAMU),  
The Texas A&M University System

### **Research Supervisor:**

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**Project Completed:** 12-31-09

## What They Found

As a result of the various activities conducted through this project, the research team found that RFID technology, while widely used for inventory control, has limited application for a transportation agency in the highway right-of-way. RFID markers are commercially available for identifying underground utilities and are used by some utility companies for this purpose. But no state transportation agency has required their use on a widespread basis. The Virginia DOT has used such markers during a utility relocation project and found the application to have significant benefits.

Widespread implementation of RFID technologies in the TxDOT right-of-way would be a challenging undertaking because of the extensive implementation that would be necessary before benefits could be realized. Such a retroactive installation would be expensive and would require continued use of the status quo methods of locating utilities until the system is fully marked with RFID. Furthermore, there is some concern whether the technology would be useable over the life of the buried utilities (20-50 years) due to the rapid advancement of technology.

## What This Means

Based on the findings generated from the activities of this project, the research team does not recommend the widespread use of RFID technologies for managing assets located in the TxDOT right-of-way. However, the research team found that there may be some benefits to using RFID technology in limited applications. These include utility relocation projects and survey monumentation.

The research team recommends a trial implementation of RFID markers for underground utilities for a utility relocation project that precedes a roadway construction project. Because of the large number of utilities that are identified and moved during such a project, and the need to be able to identify the location of utilities during the relocation and roadway construction projects, there are two aspects of such a project that make it feasible. The first aspect is the large number of utilities that are identified/moved in a short period of time. This makes it practical and cost-effective to mark the utilities with RFID. The second is the payoff time period. The information on utility location, and the benefits derived, would be of greatest value during the period of utility relocation and roadway construction. Any benefits realized after the roadway construction is complete would be additional and beyond those needed to justify use of the RFID technology.

The research team also recommends a trial implementation of RFID tags in survey monuments along a highway corridor within which significant surveying activity will be occurring. Such a trial application would provide an opportunity to evaluate the extent to which the RFID tags assist surveyors in locating monuments and whether the identification number provided by the RFID tag is of value to the surveyors in acquiring information about the monument.

### *For More Information:*

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