



# Project Summary

Texas Department of Transportation

## 9-1523: Electronic Appraisal Development Study

### *Background*

State Departments of Transportation (DOTs) must construct new infrastructure facilities to provide safe and efficient movement of people and goods. The construction effort often requires right-of-way (R/W) acquisition. The process of acquiring R/W generally constitutes a substantial portion of the project cost and time. It can be an exceedingly complicated process requiring multiple stages and involving numerous participants.

One significant component of the R/W acquisition process is the determination of the compensation to property owners for their loss suffered in terms of the value of the land acquired, the improvements acquired, and any other financial damages resulting from the acquisition of the property. This process can be extremely complex depending on the type of property being acquired and its location. In addition, it is not uncommon to find substantial variance in values from two different fee appraisers for properties similar in nature. The primary factor responsible for the prevalence of these divergences in the valuation of similar properties is the lack of proper data. Inadequate documentation of the appraisals has also contributed to these discrepancies. Thus, it was desirable to develop a system that could overcome the shortcomings of the current procedures used by state DOTs for R/W valuations. Since the inconsistencies in the appraised values are difficult to detect and can often go unnoticed by the reviewer, it was desirable to develop a mechanism to identify these abnormalities in the property values to make the process more efficient. With ongoing developments in the field of information technology, the opportunity existed to employ the emerging as well as the established technologies in the field of R/W acquisition.

The objectives of this research project were: 1) to gather and analyze requirements for, and document a plan for, a prototype design of an Electronic Appraisal System (EAS) that would effectively support the transmission, analysis, and storage of appraisal information; and 2) to build a prototype EAS, demonstrating its salient features.

### *What the Researchers Did*

A literature review was performed in order to better understand the current procedures and advancements made in the field of R/W acquisition. A series of meetings was held with the Right of Way Division staff at the Texas Department of Transportation (TxDOT) and independent fee appraisers. Based on the input received, the draft versions of the Conceptual Framework of the EAS, the User Functional Needs of EAS, and the Data Requirements of the EAS were prepared. These documents were then sent to participating state DOTs for their suggestions, ratings and comments. Based on their input, the aforementioned documents were finalized. Next, a comprehensive list, Technical Requirements of the EAS, was generated outlining the various available strategies for meeting the requirements specified in the User Functional Needs of the EAS.

### *Research Performed by:*

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#### **Project Completed:**

8-31-06

Researchers then developed a prototype EAS. To assist in production, an analysis of various options specified in the Technical Requirements was conducted to determine the optimal alternative for its development. A testing plan was prepared so as to assure the proper functioning of the developed EAS. The plan included the details of the various tests that would be carried out on the prototype EAS. Based on the development plan, a design for the prototype of the EAS was created. The design included key functionalities that were necessary to demonstrate essential features of the proposed EAS.

Researchers developed a Statistical Process Control (SPC) mechanism for the EAS which could assist in the review process by warning users in advance of possible inconsistencies in the appraised values provided by the appraiser. This was achieved by conducting a thorough review of various available SPC techniques, and choosing the technique most suitable to meet project objectives.

The EAS prototype was taken for exhaustive testing to ensure proper functioning of its various components. Dummy appraisals were used to test its key functionalities like appraisal creations, submissions, reviews, and data storage. The SPC mechanism was tested using actual data from different districts in Texas.

## *What They Found*

Currently most state DOTs use a paper-based appraisal system. These systems can be arguably ineffective, laborious, and are subject to divergences in appraised values. Based on the testing process and the subsequent analysis of the results obtained, researchers found that the use of a web-based system for an EAS resulted in a more efficient, flexible, sustainable, and user-friendly system for R/W acquisition. Researchers were also able to establish data clustering as the preferred method for implementing an SPC mechanism. It was discovered that data clustering could be effectively used as a statistical analysis tool to create a benchmark to test the accuracy of a subject appraisal.

The proposed EAS system demonstrated the applicability of the latest technologies in R/W acquisition providing a safe archiving feature to maintain proper documentation. Lastly, the EAS was able to provide a secure and prompt communication channel that will allow appraisers and DOT R/W personnel to interact with one another, accelerating and simplifying the entire R/W evaluation process.

## *What This Means*

Based on the analysis of the prototype EAS, it is recommended that state DOTs move from a paper-based system to a more robust Electronic Appraisal System. The prototype EAS is a good first step in this effort. Additional enhancements can be made to the prototype EAS to convert it into an operational EAS. The enhancements would consist of fine-tuning the prototype system to move it beyond the prototype, customizing the system according to the specific requirements of the individual DOTs, and improving the security of the system. The researchers also recommend the use of a pilot study to identify potential problems that might occur during a large-scale implementation of an EAS.

### *For More Information:*

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