



Project Summary

Texas Department of Transportation

0-5534: Asset Management - Texas Style

Background

Right-of-way (ROW) costs have escalated dramatically for some Texas Department of Transportation (TxDOT) projects as they progress through planning stages. Acquiring parcels early in the planning process could potentially save taxpayers a considerable amount of money. Currently, early acquisition of right-of-way parcels is allowable in only closely defined circumstances. Tools for quantifying potential taxpayer savings are needed to facilitate optimal application of currently allowed early acquisition practices and to determine desirability of pursuing legislative changes.

What the Researchers Did

The research team investigated the potential of simulation, optimization, and decision analysis management science tools to provide decision support for TxDOT in determining when and how much to pursue early acquisition of ROW. Investigation showed that simulation and optimization were best suited for this application, and development of two tools proceeded.

Historical ROW acquisition data were statistically analyzed to obtain needed data attributes for creating the simulation tool. Time durations between steps in the acquisition process, both with and without early acquisition, and the resulting costs of ROW were the focus. The research team also interviewed senior TxDOT right-of-way professionals in the Right of Way Division, the Texas Turnpike Authority Division, and also in the San Antonio, Houston, Tyler, and Fort Worth district offices to obtain additional information.

This project developed TAMSIM as the simulation tool to provide statistical measures of the impact that ROW acquisition timing can have on an individual project's cost and completion date. TAMSIM takes into account inherent variabilities that are part of the ROW acquisition process, such as the probability of condemnation proceedings, for just one example.

The TAMSIM user selects how many project realizations, or replications, will be developed during simulation. Each realization generates parcel purchase times according to probability distributions defined on the data input screen. Individual parcel purchase costs are also generated according to probability distributions. All data points are statistically analyzed, and TAMSIM displays estimates for mean and standard deviation for total parcel costs with and without early acquisition of parcels as well as time durations to complete parcel purchasing. Potential savings from early acquisition of parcels is estimated from these results.

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EROW is an optimization-based tool utilizing linear programming for simultaneously considering numerous projects to develop recommendations for optimal system-wide use of early acquisition procedures. EROW analyzes TAMSIM output files. EROW features incremental rate of return analyses, comparing incremental returns to a minimum attractive rate of return specified by the user, thereby determining when additional early parcel purchases are no longer more beneficial to taxpayers than other uses of these funds. Output from EROW includes two early acquisition budget possibilities: the budget amount likely to provide the highest rate of return, and the budget amount likely to provide the maximum amount of taxpayer savings.

What They Found

Less than 1 percent of historical right-of-way acquisition data available to the researchers involved early acquisition. This data volume was minimal but believed adequate for developing initial TAMSIM statistical criteria.

Speculation, property improvements, and damages to remainders of properties are major factors causing increasing land costs. District personnel reported that speculator activity has increased ROW costs, sometimes doubling, tripling, or more State costs. One method used by speculators to realize these cost increases is subdividing larger properties, thereby requiring numerous smaller purchases by the State at generally higher per unit costs. In some cases, engineering plans are developed for new commercial or residential subdivisions, apparently with owner knowledge of impending State of Texas purchase. The State is compelled to arrive at a purchase price considering these higher property uses. To maximize taxpayer benefits possible through early acquisition, laws and policies will require modification to allow early acquisition with less restriction.

What This Means

Tools are now available for district offices and the Right of Way Division to quantitatively analyze potential taxpayer cost savings from early acquisition of right-of-way parcels. These tools will enable improved early acquisition decision making under currently allowed procedures as well as allow assessment of probable impact should legislative changes occur to expand use of this practice. Right-of-way early acquisition will foster smoother negotiations, saving money, time, and human resources.

For More Information:

0-5534-1 - Asset Management Literature Review and Potential Applications of Simulation, Optimization, and Decision Analysis Techniques for Right-of-Way and Transportation Planning and Programming

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