



Estimation of Right-of-Way Acquisition Costs in Texas

What We Did...

Right-of-way (ROW) acquisition is a significant element of most transportation projects and can be very expensive, time-consuming, and socially sensitive. While project planning, design, and construction have relatively finite timelines, property acquisition can be much lengthier than expected, primarily due to the condemnation process. Accurate property-value estimation and effective land purchase policies are key to mitigating acquisition issues.

This research studied the ROW acquisition process in depth, in order to identify effective acquisition practices throughout the U.S. and produce reliable cost estimation procedures for whole and partial takings in Texas. This report summarizes the results contained in Report O-4079, which (1) extensively reviews ROW-related literature; (2) describes the results of in-state and out-of state expert interviews; (3) identifies best acquisition practices and laws across various states in the U.S.; (4) details parcel-level cost models for properties acquired in Texas (both whole and partial); (5) describes spreadsheet implementation of these cost estimation models (to aid TxDOT ROW administrators in future budget forecasts); and (6) discusses the performance of this estimation tool when applied to a test set of Texas properties.

What We Found...

The literature review emphasized cost estimation, acquisition strategies, and legal statutes. It found that

location and access characteristics generally are strong determinants of both commercial and residential property values and that the positive impacts of transportation improvements on property values are most dramatic for commercial properties, due to the negative perceptions of noise and vehicular emissions by residential property owners. The review also identified challenges to accurate ROW estimation. These challenges tend to be a lack of information about commercial property transactions, lack of project/plan details, delays between value estimation and property appraisal and purchase, and uncertainties associated with damages and court awards. It also found that formal ROW process requirements have a significant impact on state condemnation rates, thus allowing for identification of best practices/legal statutes.

A survey of state DOTs indicated that most states are experimenting with a variety of acquisition enhancing strategies, to reduce the incidence of condemnation, reduce agency costs, improve service provision, develop quantitative models for project and parcel valuation, manage their information systems, estimate administrative costs, and preserve corridor ROW. A survey of TxDOT ROW administrators found that even though issues and concerns vary greatly by the type and size of district (metro-urban-rural), the accuracy of estimates is felt to be a result of the amount and quality of information available, the need for rapid estimates, and the presence of complex parcels (particularly commercial establishments with parking). More-

over, current state statutes relating to obtaining clear titles are an issue. For most districts, property acquisition problems are primarily technical in nature. However, for Houston the biggest issues are thought to be political and legal.

Various property valuation models were calibrated during the course of this research, based on three distinct databases. There are substantial differences in the data sets, but all have measures of land, improvement size, and age of structure. Their resulting models address glaring gaps in the literature in the areas of commercial and ROW property appraisal. A sample of 285 TxDOT property purchases was collected at the Design Division offices, representing \$70 million in acquisition costs. Approximately 40 percent of the parcels involved the taking of improvements. Projects were chosen from various metropolitan areas since these properties are more complex than rural or agricultural lands and offer more variety in land use and other key cost factors. Many variables were collected, including the area of acquired land, parcel location, land use, and improvement area. The predicted total cost represents only the cost paid for land, improvements, damages and court awards; it does not include appraisal fees, personal or business relocation assistance, utilities, or other direct or indirect costs associated with acquisition. Natural logarithms (ln) were used to transform all variables (resulting in the best model fit). For illustration, key parameters and associated variables of the final model are as follows:



$$\begin{aligned}
&\ln(\text{Cost of Taking}) = 2.738 + \ln(\text{Land Area}) + 0.02105 \ln(\text{Land Area} \times \text{Corner Indicator}) \\
&+ 0.4964 \ln(\text{Land Area} \times \text{Year}) + \dots \\
&+ 0.7252 \ln(\text{Improved Area}) \\
&- 0.3878 \ln(\text{Improved Area} \times \text{Year}) + \dots \\
&+ .03095 \ln(\text{Remainder Area}) \\
&- 0.01723 \ln(\text{Remainder Area} \times \text{Change in Parcel Shape}) + \dots
\end{aligned}$$

The results indicate that land use and location significantly impact acquisition cost; for example, retail uses are more costly, while a Corpus Christi location is less costly. Moreover, improved area is a strong predictor of value. The adjusted R-squared for the log-log model was 0.906, suggesting a strong fit.

To enhance cost estimates, full-parcel commercial sales transactions for Texas's top regions also were obtained and modeled. 1,354 commercial sales records for Travis County were obtained from the Travis Central Appraisal District (TCAD), which serves the central Austin area. Additionally, sales data for almost 11,000 commercial properties in Texas's major metropolitan areas were obtained from the CoStar Group, a national provider of commercial real estate information services. A number of explanatory variables were tested in these models, using sales price as the dependent variable. For illustration, key components of the resulting TCAD model are shown here:

$$\begin{aligned}
&\text{Sales Price of Commercial Property in Travis County} = 126,169 - 0.0004678 (\text{Land Area}) \\
&+ 14.5324 (\text{Land Area} \times \text{NorthWest Location}) + \dots \\
&+ 70.29 (\text{Improved Area}) + 7.292 (\text{Improved Area} \times \text{Condition}) + \dots
\end{aligned}$$

The results of the TCAD model showed that improvement area is a strong predictor of total value. The condition of the structure was both statistically and practically significant in the model; a property in excellent condition was estimated to be worth \$22 more per square foot than a similar property in fair condition. The list price indicator was very practically significant, suggesting that, on average, list prices are 20% higher than final sales prices. The time trend variable for the year of acquisition was positive, reinforcing the speculative nature of commercial real estate and suggesting a strongly positive rate of appreciation for properties in the sample. A few of the improvement types were statistically significant when interacted with the improved area. A high-rise building was worth \$114 more per square foot (and office buildings \$43 more per square foot) than the other, base uses (everything else constant). The adjusted R-squared for the feasible generalized least squares (FGLS) model (a more flexible version of ordinary least squares [OLS] models, permitting variation in error term scatter) was a compelling 0.856.

The Costar Model results indicated that many land use types and location indicator variables are statistically significant when interacted with land area. The differences in value range from around \$0.15 to just over \$5 per square foot, with the highest value for retail use. Regional differences in land value vary from \$0 to \$1.25 per square foot, with Williamson and Montgomery Counties (for the Austin and Houston areas, respectively) on the low end and Denton (Dallas-Ft. Worth) and Collin (Dallas) Counties on the high end of the scale. Improvement area was a strong predictor of value for developed properties. The condition of the structure

is practically significant: a property in excellent condition is worth nearly \$28 more per square foot of improvement than a similar property in fair condition; this is slightly higher than the value predicted by the TCAD model. The adjusted R-squared for the FGLS model was 0.644, which was considerably lower than the OLS result (0.856). The CoStar data contained a number of observations with very high values, which probably biased the OLS estimates.

A cost estimation tool for use by TxDOT ROW personnel was created, based on the calibrated models and using Microsoft Excel software. Accompanied by a supporting instructions document, this product was tested/validated using additional data for TxDOT-acquired parcels, in order to evaluate the tool's accuracy and performance in estimating acquisition costs. Results of this test, as displayed in Table 1, showed that the models mispredict acquisition costs by less than 35% for most cases. However, significant mispredictions can occur. The largest errors occurred in estimation of whole commercial properties in the Dallas district. Estimates generally were biased quite low for (partial) residential takings that did not involve any taking of buildings – and somewhat high for whole residential takings (involving a building). The tool provided very good results for agricultural and vacant land uses in non-metropolitan areas and for commercial properties in Houston.

A comparison of legal statutes affecting ROW acquisition practices across U.S. states was undertaken as one way to evaluate state acquisition processes. Six-year average condemnation rates were divided into five categories, from very low to very high, as shown in Table 2.

Table 1: Test Results for Cost Estimation Tool

Land Use	Location or Other Specifics	Absolute % Misprediction (Averaged across Properties)
Vacant & Agricultural	Rural and Urban Areas	28.38%
Vacant & Agricultural	Metropolitan Areas	40.34%
Residential	No Building Acquired	19.72%
Residential	Building Acquired	28.33%
Commercial	Austin	26.42%
Commercial	San Antonio	46.77%
Commercial	Dallas	31.13%
Commercial	Houston	30.81%



State statutes then were compared across states in different categories, in order to ascertain any general trends or patterns. The percentage of states offering “Yes” responses to key questions by condemnation rate category are displayed in Table 2. These results suggest that states that allow quick takings and the taking of uneconomic remnants tend to suffer from the highest condemnation rates. Although permission of “quick taking” techniques can be useful in expediting the ROW delivery when project timelines are tight, it may be abused by ROW administrators. The power of eminent domain in taking remnants also is open to agency abuse. In contrast, states that do the following—mandate early public involvement; require sharing of appraisal details; allow early takings, land consolidation, and land exchange; emphasize negotiation; encourage flexible methods of mediation; and provide detailed and comprehensive laws governing compensable items—tend to enjoy the lowest condemnation rates. Reasons for the resulting differences in condemnation rates are discussed in this project’s research report. Early public involvement allows an agency to predict what design alignments are likely to be problematic when acquiring ROW, thus helping avoid later litigation. The sharing of appraisal details makes the process more transparent, thus enhancing owners’ trust in agency actions. Early taking of land, if the project plans are known

in advance, prevents interim developments and thus reduces cause for later disagreements. Land consolidation and exchange help make properties “whole,” thus reducing owner dissatisfaction. Finally, mechanisms for mediation and clear laws on compensation also smooth the acquisition process. Those states that require payment of litigation costs and give property owners more than 30 days tend to fare somewhere in between, in terms of condemnation rates. These two provisions tend to put more power in the hands of the property owners, perhaps allowing for more demands and ability to contest acquisitions.

The Researchers Recommend...

The insights obtained and models developed as part of this project add considerably to the literature and research in this area and should prove valuable to ROW administrators and others involved in property valuation and the acquisition process. Commercial properties are particularly troublesome for ROW estimators and professional appraisers, since comparable sales data are often lacking or unavailable. Therefore, the models of commercial sales data should prove helpful in the absence of more accurate information. The commercial property models should also be useful as part of a larger framework to estimate the total costs of

ROW acquisition in early project development. However, all models have their limitations and weaknesses. These models provide predictions of land and improvement values only, and limited treatment of damages. The likelihood and monetary impact of court awards was not captured in the ROW cost model. Some transportation agencies maintain a separate database for administrative settlements and court awards, which they use to predict future costs and prepare estimates. The acquisition of these data sets can be very costly and time-consuming, particularly for ROW purchase data. State DOTs should seek to establish and maintain databases of actual ROW purchase data, which will allow them to track condemnation rates and damage awards, and will facilitate better ROW cost prediction.

The results of comparing/contrasting state ROW laws suggest that states should permit their ROW divisions to employ early taking, land consolidation, and land exchange techniques in the acquisition process. In addition, states not only should encourage but should require their acquiring agencies to engage the public early and report appraisal details to property owners. Finally, more comprehensive and detailed state provisions and laws on compensable items should be sought, as these can significantly smooth the acquisition process.

Table 2: Percentage of U.S. States Having Key ROW Laws, Across Condemnation Rates

State Legal/Regulatory Provisions	Condemnation Rate				
	20%-50%	14%-20%	8%-14%	5%-8%	0%-5%
Laws allow taking of uneconomic remnants?	89%	78%	50%	70%	12%
Allow “quick taking”?	50%	23%	32%	12%	81%
Require the state to pay owner a portion of litigation costs ?	15%	21%	6%	18%	9%
Allow appraisal waiver limit up to \$10000?	10%	2%	12%	8%	11%
Require proof of efforts to reach agreement through negotiation?	18%	25%	26%	51%	76%
Allow land consolidation?	34%	37%	45%	52%	70%
Provide comprehensive and detailed laws on compensable items?	10%	15%	24%	36%	51%
Mandate early public involvement?	25%	31%	35%	40%	46%
Require the sharing of appraisal with the property owners?	23%	27%	37%	43%	54%
Encourage and facilitate meditation?	30%	41%	47%	54%	74%
Allow more than 30 days to petition against the compensation offer?	22%	24%	32%	40%	44%
Allow early taking?	4%	16%	25%	20%	31%
Allow land exchange?	2%	6%	9%	10%	12%



For More Details...

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The research is documented in the following report:

4079-1 *Right-of-Way Costs and Property Values: Estimating the Costs of Texas Takings and Commercial Property Sales Data*

To obtain copies of a report: CTR Library, Center for Transportation Research,
(512) 232-3126, email: ctrlib@uts.cc.utexas.edu

Your Involvement Is Welcome!

Disclaimer

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