The Effects of High Voltage Electric Transmission Lines on Commercial and Industrial Properties

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INTRODUCTION

This paper presents a series of analyses of the effects of high voltage transmission lines on the sales price and value of commercial and industrial properties in Wisconsin. The properties evaluated in this study are located in Madison, Milwaukee and other generally urbanized areas of Wisconsin. The properties represent a broad spectrum of property types, including office, retail, hotels, apartments, restaurants, vacant land, and a range of industrial properties. The sales prices of properties with transmission line easements and those located in proximity to transmission lines are compared to otherwise similar properties of the same type not located in proximity to a transmission line. Of the total of 187 commercial and industrial property sales analyzed, 42 were either encumbered with a transmission line or were in proximity to one, and 145 were otherwise similar comparable non-proximate properties.

The two sets of properties are compared using two generally accepted techniques for such analyses: multiple regression analysis and paired sales analysis (see Jackson, 2003). In multiple regression analysis, the prices of the encumbered or proximate properties are compared to the non-proximate properties after controlling for the physical and other market or locational attributes of the two sets of properties. In this way, price and value effects or differences due the other characteristics of the properties are held constant and the effect, if any, due to the transmission lines is isolated. A second set of analyses involves a series of paired sales analyses whereby the unit prices (price per square foot, etc.) of encumbered or proximate subject properties are compared individually to sets of non-proximate comparable properties.

As will be discussed in the following section (Literature Review), most published studies of transmission line effects on property values have focused on residential properties, usually single-family residences in subdivisions. A limited number of studies address rural properties and there is one article that discusses impacts on industrial properties. This study is the only one of which we are aware that addresses a range of commercial and industrial property types through formal sets of analysis. As will be explained in the following pages, none of our analyses indicated any adverse effects on sales price from transmission line proximity. Prices for the proximate (subject) properties were either consistent with or greater than prices for otherwise similar non-proximate (comparable) properties. Further, the lack of any effect on sales prices for the commercial and industrial properties in this study is consistent with interviews of parties to each of the sales and other market participants.

LITERATURE REVIEW

A review of empirical studies addressing the effects of electric transmission lines on property value lends further insight and perspective to the primary research. Although these studies focus

on residential and rural properties, they use techniques similar to those employed in our study of commercial and industrial properties in the state of Wisconsin. These studies are classified into two categories. The first category includes studies of sales price effects using multiple regression analysis or other closely related statistical techniques. The second category covers a mix of other study types, including paired sales analyses, case studies and sale/resale analyses. The studies in this literature review were conducted from 1964 to 2009, and they primarily address single-family residential properties, although two studies address impacts on rural land and agricultural properties. Overall, the studies reviewed point to small or no effects on sales price due to the presence of electric transmission lines. For additional information on these studies, (see Jackson and Pitts, 2010).

Statistical Analyses of Transmission Line Impacts

The first literature category includes eight statistical studies using multiple regression analysis or other closely related statistical techniques such as the analysis of covariance. Most of the studies reviewed use multivariate analysis whereby important determinants of pricing, such as the detailed physical characteristics of the properties, are held statistically constant in order to isolate the effects, if any, of the presence of transmission lines. Six of these studies focus on single-family residential properties, and two address rural acreage and agricultural land.

One of the two rural land studies is provided by Brown (1976), who uses regression analysis to analyze sales of farm land in south-eastern Saskatchewan, Canada that occurred between 1965 and 1970. The study included sales of "quarter section" (136-199 acre) and "half section" (200-350 acre) parcels. The relationship of land value to the number of power line structures was not found to be statistically significant. To further examine this relationship, very similar parcels, with the main difference being that one had a power line and one did not, were paired and analyzed. Overall, the sales with power lines sold for higher prices than their pairs without power lines. It is unreasonable to conclude that this higher price was due to the power lines and easements, but it appears that the lines did not negatively affect the market value of the farm land. However, Brown does note that the easement required by the power line does reduce the rights of the property owner, and that power line structures normally have an adverse impact on the efficiency of farming operations.

Colwell and Foley (1979) hypothesize that there are costs imposed on residential property stemming from close proximity to electric transmission lines. Two neighborhoods in Decatur, Illinois, were chosen for this research. The sample consisted of 200 sales during the ten-year study period from January 1968 to October 1978. Within 400 feet of all properties in the sample is an electric transmission line of double-circuit 137-thousand-volt conductors. The model consists of an equation that relates selling price, the dependent variable, to ten independent or explanatory variables, including lot size. Lot size is particularly important in this study because

residential lots abutting an electric transmission line tend to be larger than other lots in the subdivision. The results of this study show that selling price becomes higher as distance from the transmission line increases. The selling price increases at a decreasing rate and quickly approaches an asymptote. The most substantial impacts are observed between 50 and 200 feet from the line, but the lines seem to have little or no effect at distances beyond 200 feet.

In a follow up study, Colwell (1990) measures the impacts of power lines and towers on the selling price of residential land with a hedonic price index in which the selling price is a Cobb-Douglas function of a number of property characteristics. The data used in this study is identical to the data used in Colwell and Foley (1979), with additional variables for distance to a tower and the presence of an easement. Like the previous study, these models show that the selling price of residential property increases as distance from a power line increases. The selling price increases at a decreasing rate and quickly approaches an asymptote. The negative impacts tend to diminish or disappear over time.

Rigdon (1991) analyzes the impact of a 138 kV transmission line on vacant recreational land in Marquette County, Michigan using multiple regression techniques. Forty six sold properties ranging from 10 to 160 acres were selected in two large "neighborhoods" during the study period of January 31, 1986 to January 30, 1991. Results indicated no statistically significant relationship between sales price and proximity to a power line easement.

Hamilton and Schwann (1995) present of study of 12,907 arms-length sales of single-family detached homes in four neighborhoods in the Vancouver area between 1985 and 1991. The neighborhoods are in close proximity to existing transmission lines. The authors find that properties adjacent to a line lose 6.3% of value due to proximity and visual impact. Properties more distant from a line lose on average only 1% of their value.

Des Rosiers (1998) looks at the impact of high-voltage transmission lines (HVTLs) on surrounding properties using a microspatial approach. The study area includes three distinct neighborhoods in the city of Brossard, in the greater Montreal area, with a 315 kV transmission line running through the center. 257 residential properties in these neighborhoods sold during the study period between February 1991 and November 1996. The data bank includes 25 property descriptors pertaining to physical, environmental, neighborhood, access, fiscal and sales time attributes as well as a series of HVTL-related descriptors. Standard and stepwise regression procedures are successively used in the analysis. This model shows that a residential property both adjacent to an HVTL easement and facing a pylon experiences a drop in value due to the visual encumbrance (on average the decrease was 9.6% of the mean house price). Properties located one to two lots away from a pylon usually benefit from a market premium (on average 7.4% to 9.2% of the mean house price) due to increased visual clearance and privacy. A property at mid-span will experience a decrease in value (on average 4.7% of the mean house price)

because the low minimal clearance of the lines causes a visual obstruction. Properties with a moderate or limited, rear or side view on an HVTL structure but not adjacent to the easement usually experience a market premium of 2.8% to 3.8% due to the improved visual clearance these properties enjoy. The net visual encumbrance (difference between proximity drawbacks and advantages) reaches a maximum between 50 and 100 meters from the easement external boundary, and diminishes quickly thereafter to fade away entirely beyond 150 meters. Luxury home prices are more sensitive to the visual encumbrance of HVTL structures.

Wolverton and Bottemiller (2003) offer a confirmatory study of an earlier article by Cowger, Bottemiller and Cahill (1996). This more recent study investigates whether the results of the original study hold using more rigorous analytical methods. The original study used a paired sales analysis to determine any difference in sales price between properties abutting transmission line right-of-ways in Portland, Vancouver and Seattle, and properties located in the same cities but away from a transmission line. However, the original study did not control for differences between the subject properties and the comparables. This study attempted to overcome this problem using regression analysis. Analysis of covariance (ANCOVA) was used to test for an "abutting transmission line" effect on sales price. The data from these models does not support any price effect on residential property from being located adjacent to an HVTL. This confirms the results of the original study. The data also shows no difference in appreciation rates between homes along an HVTL right-of-way and homes located further away from the HVTL.

Lastly, Chalmers and Voorvardt (2009) also addressed the issue of impacts on residential property values and prices using a multiple regression framework. Based on a study of residential properties in Connecticut and Massachusetts sold from 1999 to 2007 and located in proximity to 345 kV transmission lines, the authors analyzed the effects of proximity (distance to the lines) and encumbrance (area on a property encumbered by the easement) and found proximity to have an insignificant effect on sales price. They concluded that "the only variable that appears to have any kind of systemic effect is the encumbrance variable," although its statistical significance varied and the effect was "generally small." The authors also addressed potential effects due to the visibility of the transmission line and found a lack of any significant impacts on sales prices.

These statistical studies point to a mix of conclusions regarding the effects of transmission lines on sales prices and property values. Many of the studies found no statistically significant impacts (Brown, Rigdon, Wolverton and Bottemiller, Chalmers and Voorvardt) while others found impacts or lack of impacts under certain conditions. For example, researchers that found effects also generally found that impacts diminish with distance from the lines (Colwell and Foley, Colwell, Hamilton and Schwann, Des Rosiers). The distance at which the effects dissipate varied from 150 meters, or approximately 450 feet (Des Rosiers), to 200 feet (Colwell and Foley). In some cases, visual encumbrance (the placement of a power line structure in relation to the house)

was found to have an impact, and a premium was even noted by one researcher due to increased visual clearance and privacy (Des Rosiers). Some studies suggest a lessening of effects over time (Colwell, Des Rosiers). Where negative effects were found, these impacts were generally small (less than 10% of unimpaired value). The two researchers that addressed rural properties with generally large tracts of land did not find any effects on price and value (Rigdon, Brown). The statistical studies are summarized in Exhibit 1.

Statistical Studies Involving Industrial Properties

A number of statistical studies of industrial properties not involving transmission lines were also reviewed. These studies are relevant because they provide a useful background for developing statistical models of industrial property prices, which is the technique that is used in our analysis of the effects of transmission lines on industrial properties in the state of Wisconsin. For additional information on these studies, see Jackson (2002).

Ambrose (1990) modeled improved industrial property asking prices as a function of various physical and locational attributes. The sample data for this analysis was collected in Atlanta from 1986 and 1987 and consisted of 57 list prices and sets of property attributes. To account for the issue of the use of asking prices instead of sales prices, Ambrose regresses actual sales prices on the asking prices of ten sales. The adjusted R^2 for this bivariate relationship was 0.99. He then estimates the parameters of the multivariate asking price model and finds statistically significant (at the $\alpha = 0.05$ level or better) and positive (prices increase) coefficients for building square footage, office square footage, dock-high and drive-in loading doors, and rail service. The parameter estimates for ceiling height, building age, sprinkler, and build-to-suit office space did not attain significance at the 5% level. To address the significant heteroscedasticity problems in his initial ordinary least squares (OLS) model, Ambrose respecifies the model in a weighted least squares (WLS) format. In the WLS model specification, the adjusted R^2 was 0.76 although none of the independent variables were significant at the 5% level.

Fehribach, Rutherford and Eakin (1993) present a statistical analysis of 170 sales of improved industrial property in the Dallas/Fort Worth area. Their analysis modeled sales price as a function of the physical characteristics of the buildings as well as sets of financial, locational and economic variables. OLS and WLS models are specified, although there are no reported problems with heteroscedasticity. The OLS specification indicated that building size, office space, dock-high loading doors, ceiling height, county (location), distance to the D/FW airport and tenant type (single v. multi-tenant) had the predicted signs and were significant at the 5% level. Building age was significant at the 10% level. In the WLS model, which had a slightly better fit to the data, building age and overall capitalization rate variables were significant at the 5% level.

For the purpose of analyzing environmental impacts on industrial real estate, Guntermann (1995) estimated the parameters of a price model using 153 unimproved industrial land sales from 1984 to 1994 in the Phoenix, AZ area. The Guntermann study included twelve landfills (source sites), as well as industrial sites around landfills (proximate or adjacent sites). The independent variables in the model include parcel size, year of sale, rail availability, investment or speculative sale, and location (near airport or freeway, in an industrial park, and in southwest Phoenix). Guntermann finds that "there is no evidence that solid waste landfills impose external costs on surrounding industrial land," since the variables measuring price impacts were "all statistically insignificant" (Guntermann, 1995, p. 537). On the other hand, Guntermann's study found that landfills (source sites) sell for approximately 51% less than the other industrially zoned properties in his data.

Lockwood and Rutherford (1996) use a linear structural relations (LISREL) statistical technique to measure several valuation concepts. In the LISREL model, a set of constrained factors are estimated for each concept, and the log of sales price is then regressed on the resultant factor scores. Lockwood and Rutherford use 308 sales in the Dallas/Fort Worth area from 1987 to 1991. In this analysis, factors are created for physical property characteristics, national and regional economic conditions, interest rates and location in the local/metro market. Factor loadings are then estimated for several variables related *a priori* to these concepts. The results indicated that the physical characteristics factor was most significant, followed by the regional/Texas factor and location. National market and interest rate factors were not significant. These results highlight the importance of physical characteristics of industrial properties, as well their location, in predicting their price and value.

Jackson (2002) addresses the effects of environmental contamination on the sales prices of industrial properties in California using multiple regression analysis. This study addresses the extent to which sales prices may be impacted by contamination, and whether sales price effects due to contamination persist after remediation of the property occurs. The database for this study was developed using sales in the southern California region from 1995 to 1999. Jackson develops two models, one that includes office space as a variable (although a substantial number of properties were missing data on this attribute), and a second that omits the office space variable to ensure that the exclusion of sales does not have an effect on key parameter estimates. Independent variables that are significant at the 5% level in both models include building and land square footage, building age, several locational indicators, and the environmental indicator for properties that sold before or during remediation. The models find that industrial properties with unremediated contamination sell for approximately 30% less than unimpaired levels and then recover to be indistinguishable from comparable uncontaminated properties once remediated.

Other Studies and Techniques

A third literature category contains a variety of sales price analyses other than regression-based analysis, including sale and resale analysis, average price per square foot comparisons, case studies and paired sales analysis. The findings of these studies are generally consistent with the statistical analyses summarized above.

Bigras (1964) analyzes several case studies in Ste. Foy (Quebec), Three Rivers and Montreal to determine the effects of high voltage power lines on property values. Overall, 1,956 deeds of sale and mortgages were analyzed, and a statistical study was made which brought out the price of the vacant land, the proportion of mortgage to sale price, and the municipal assessment of buildings. This study indicates that prices for vacant land adjacent to the line were generally higher than the average price of all transactions. Municipal assessment values of buildings were also higher for properties adjacent to the line. The proportion of mortgage amount to sales price was about the same for both groups. Land adjacent to the power lines sold faster and was developed to a higher degree than land away from the lines.

In his seminal study of these issues, Kinnard (1967) analyzed over 1,200 sales and resales of residential properties in 17 subdivisions located in nine suburban towns in Metropolitan Hartford, Connecticut. All of these subdivisions, developed between 1954 and 1964, were either intersected by or abutted a tower line right of way. Kinnard found that sales prices did not vary significantly based on proximity to a tower line right of way. However, the lots closest to the right of way were generally larger, which means that more land area can be obtained closer to a power line for the same price as a smaller, more distant lot. The rate of absorption and financing terms of properties close to a power line were not significantly different from those of more distant properties. Over time, negative impacts decreased substantially. Overall, Kinnard concluded that the value of residential property is not significantly affected by proximity to a tower line. Although Kinnard's surveys of market participants revealed that negative attitudes toward these lines do exist, market evidence shows that properties near tower lines are readily salable on competitive market terms.

In addition to survey research concerning power transmission lines and property values, Kung and Seagle (1992) also analyzed sales data of properties in Memphis and Shelby Counties, Tennessee. They used this sales data to formulate a computerized map and database using a GIS system. The average price per square foot for properties adjacent to a transmission line was compared to similar measures for homes further away. The prices of homes adjacent to the power transmission lines are very similar to prices of other homes in the same neighborhood. Any slight differences in price are attributable to the differences in property condition, style, buyer preference and seller motivation. There was no evidence to indicate that the power transmission lines had any significant impact on the sales prices of the residential properties.

Cowger, Bottemiller and Cahill (1996) analyze a market-based study that was conducted by the Bonneville Power Administration (BPA). Utilizing a paired sales analysis technique, this study compares the prices of improved residential properties bordering overhead high voltage power lines to similar properties away from the lines. Residential properties in four counties were chosen for this study, including Washington and Clackamas Counties (Portland, OR); Clark County (Vancouver, WA) and King County (Seattle, WA). All 1990 and 1991 home sales that abutted BPA high-voltage transmission lines in these counties were identified and paired with comparable home sales further away from the lines. On average, homes adjoining a power line in Portland sold for a 0.95% premium, in Vancouver a 1.03% discount, and in Seattle a 1.82% discount. None of these price differences were statistically significant from zero at the 95% probability level. Therefore, it is assumed that proximity to a transmission line has no substantial effect on the prices of these homes. The sales data for this study was subsequently analyzed with the use of multivariate statistical techniques with similar findings (see Wolverton and Bottemiller, 2003, reviewed above).

None of the four studies employing other sales analysis techniques found any effect on sales price due to proximity to a transmission line. These studies are summarized in Exhibit 2. While these four analyses are less detailed and do not in most cases control for the range of variables the regression based studies account for, the conclusions and findings are generally similar to the findings of the statistical sales price analyses. Some of the statistical studies found small effects under certain conditions, but effects generally dissipated with time and distance. Overall, any negative impacts that were found to be attributable to the presence of high voltage transmission lines were less than 10%. Most studies found no effect, and in several cases a premium was observed which was attributable to the additional open area provided by the transmission line easement.

Lastly, we were able to find one article that dealt specifically with the impacts of transmission lines on industrial property values. This article by Chapman (2005) is primarily a discussion of the various factors that should be considered in an appraisal of a property encumbered by a transmission line easement. Chapman incorporates the information from over 100 market interviews that he conducted with buyers, sellers, tenants, property managers and brokers in Northern California, Salt Lake City and Las Vegas. Chapman states that it is the appraiser's responsibility to determine what rights are taken away by the presence of a transmission line easement and whether the denial of these rights impacts value. The size of the easement and the position of the easement on the site must be considered, as well as the placement of any towers, the visual impact of the transmission lines and the market's perception of any health effects. Chapman also discusses matched paired sales analysis (MPSA), saying this technique can be very helpful but only if the sales are confirmed with market participants. The majority of market

participants interviewed by Chapman indicated that the presence of transmission lines had no effect on the sales prices of industrial properties.

REGRESSION ANALYSES

As noted, one of the two types of analyses for our study of transmission line impacts in Wisconsin involves a series of multiple regression analyses of the impacts or effects of proximity to transmission lines on industrial properties. These analyses will evaluate the extent to which any measurable impacts on sales prices can be attributable to the presence or proximity to high voltage transmission lines. Multiple regression analysis is well accepted for purposes of measuring the impacts of potential disamenities on property values (see Jackson, 2005). A related technique known as analysis of covariance with estimated marginal means will be used to derive the adjusted average prices of the two sets of properties. In these types of analysis, sales price is modeled as a function of the characteristics of the property's market and physical characteristics and whether or not the property was proximate to a transmission line. For purposes of these analyses an industrial property is considered proximate if it has a high voltage transmission line easement or is within 500 feet of a high voltage transmission line. High voltage lines are those that are 138 kV or greater. General model specifications are as follows:

General Equations

Price = f (Market Characteristics, Physical Characteristics, Transmission Line Proximity)

$$Price = \beta_O + \beta_1 (Market\ Characteristic_1) + \ldots + \beta_n (Market\ Characteristic_n) + \beta_{n+1} (Physical\ Characteristic_{n+1}) + \ldots + \beta_{n+1+p} (Physical\ Characteristic_{n+1+p}) + \beta_{n+1+p+q} (Proximate\ Sale) + \varepsilon,$$

The first equation posits that sales price is a function of the property's market and physical characteristics and proximity to a transmission line. The second general equation simply allows for the inclusion of multiple market and physical characteristics. These characteristics are considered independent variables while price is considered a dependent variable whose values are to some extent dependent on variation in the values of the independent variables on the right hand side of the equation. Descriptive statistics for the data used in the models are presented in Exhibit 3.

Five model specifications are estimated and reported herein. The first is presented below. In this model specification, price is estimated as a function of year of sale, the size of the industrial improvements as well as whether or not the property was proximate to a transmission line, as defined above.

Model Specification One

$$Price = \beta_O + \beta_1 (Sale\ Year\ 2005) + \beta_2 (Sale\ Year\ 2006) + \beta_3 (Sale\ Year\ 2007) + \beta_4 (Sale\ Year\ 2008) + \beta_5 (Sale\ Year\ 2009) + \beta_6 (Sale\ Year\ 2010) + \beta_7 (Total\ GFA) + \beta_8 (Building\ Age) + \beta_9 (Proximate\ Sale) + \varepsilon$$

Where:

Price = Sales price adjusted for sales concessions where appropriate

Sale Year 2005 to 2010 = Categorical indicator variable for year of sale, with sales prior to 2005 as the omitted or reference category.

Total GFA = Total gross floor area of buildings in square feet

Building Age = Age of main building in years

Proximate Sale = Categorical indicator variable for properties considered proximate to a high voltage transmission line, either with a transmission line easement or location within 500 feet of a transmission line

β_O is the model intercept, the other β_s are coefficients to be estimated for each independent variable and ε is the error term

The results of this analysis are presented in Exhibits 4 and 5. In Exhibit 5, the estimated marginal means result from the analysis of covariance procedure and reflect the mean sales prices in the two categories (proximate and non-proximate) holding constant price differences due to the other independent variables (date of sale, building size and age). These estimates could also be considered sales prices in the two categories adjusted for differences in date of sales, building size and building age. From this perspective, this procedure is similar to the analysis and adjustments an appraiser does in the sales comparison approach to value (see Jackson 2005).

As can be seen in Exhibit 5, before consideration of the aforementioned factors, the average or mean sales price of proximate sales is slightly less than the non-proximate sales but after consideration of price differences due to these other factors, the mean price of proximate properties are 18.7% more than the non-proximate properties. In other words, there is no evidence of any significant price and value effects due to the presence of the electric transmission lines. This finding is consistent with the results of the market interviews with parties to each of the transactions, all of whom indicated that the presence of the transmission lines did not affect the sale or sales price. Indeed, the positive difference in the estimated marginal means would indicate that these locations were superior to the locations of the otherwise similar properties not in proximity to a transmission line.

A second model specification is presented below. In this specification, price is estimated as a linear combination of the effects of the independent variables used in model one but with the addition of office space. This is a similar specification to that used in one of the models

presented by Jackson (2002). Office space at an industrial property is generally considered superior to comparatively unfinished floor or other space and should have a higher unit value.

Model Specification Two

Price = β_O *+ ... other variables… +* β_9 *(Office Size) +* β_{10} *(Proximate Sale) +* ε

Where:

Office Size = Square feet of finished office space

Proximate Sale = Categorical indicator variable for properties considered proximate to a high voltage transmission line, either with a transmission line easement or location within 500 feet of a transmission line

β_O *is the model intercept, the other* β_s *are coefficients to be estimated for each independent variable and* ε *is the error term*

The modeling results with this specification are presented in Exhibit 4 and 5. As noted this specification includes office space. As can be seen in Exhibit 4, office space has a coefficient of 43.273 while total space (gross floor area) including office space has a coefficient of 21.877 indicating office space adds or contributes $65.15 per square foot to the overall sales price. Also of note in all the models presented herein, the specifications omit land area. This variable was found to be highly collinear (correlated) with building size (larger or smaller buildings also have large larger or smaller land areas) and its inclusion was not warranted. Including land area did not alter the findings with respect to transmission line effects.

As can be seen in Exhibit 4, the inclusion of office space reduced the number of sales from 123 (model one) to 119 but increased the explanatory power (adjusted R^2) from approximately 73% to 81%. The net effect and findings with respect to transmission line proximity remained relatively unchanged. The properties in proximity to a transmission line sold at a higher mean adjusted price than the other industrial properties, again indicating no adverse effects.

The third model specification, shown below, adds two more independent variables. The first involves whether or not the industrial property was equipped with sprinklers for fire suppression and the second was the number of dock high loading doors or bays. Dock high loading doors are considered superior to grade level doors because of the relative ease of loading and unloading from trucks.

Model Specification Three

Price = β_O *+ ... other variables… +* β_{10} *(Sprinkler) +* β_{11} *(Dock High Loading Doors) +* β_{12} *(Proximate Sale) +* ε

Where:

Sprinkler = Categorical indicator variable for the presence of a sprinkler system in the buildings

Dock High Loading Doors = Number of dock high loading doors

Proximate Sale = Categorical indicator variable for properties considered proximate to a high voltage transmission line, either with a transmission line easement or location within 500 feet of a transmission line

β_O is the model intercept, the other β_s are coefficients to be estimated for each independent variable and ε is the error term

Results based on this model specification are presented in Exhibit 4 and 5. As can be seen in Exhibit 4, dock high loading doors/bays and sprinkler systems have a positive and statistically significant effect on sales price. A sprinkler system added $281,489 to the sales price for a typical industrial property while each dock high loading door or bay contributed approximately $28,142. In addition, these variables increased the adjusted R^2 to 0.830 although fewer sales were available for analysis (106 compared to 123 sales in the first model) due to missing data. Lastly, the general findings with respect to the lack of any adverse effects of the transmission lines are also evident in this analysis, as can be seen in the estimated marginal means in Exhibit 5.

A fourth model specification, shown below, adds indicator variables for the county in which the property was located. As noted, the sales properties were located in Dane, Waukesha and Milwaukee Counties. Indicator variables for Dane and Milwaukee Counties are included in this model, with Waukesha omitted. The resulting estimates presented in Exhibit 4 show that industrial property sales in both Dane and Milwaukee Counties had lower prices than those in Waukesha County. The inclusion of the county indicator variables increased the R^2 slightly to 0.838, and this model again showed the lack of any adverse effects from proximity to a transmission line. Indeed, the price differences shown in Table 6 below were significantly positive.

Model Specification Four

Price = β_O + ... other variables… + β_{12} (Dane County) + β_{13} (Milwaukee County) + β_{14} (Proximate Sale) + ε

<u>Where</u>:

Dane County = Categorical indicator variable for property location in Dane County. Omitted locational category is Waukesha County.

Milwaukee County = Categorical indicator variable for property location in Milwaukee County. Omitted locational category is Waukesha County.

Proximate Sale = Categorical indicator variable for properties considered proximate to a high voltage transmission line, either with a transmission line easement or location within 500 feet of a transmission line

β_O is the model intercept, the other β_s are coefficients to be estimated for each independent variable and ε is the error term

A fifth and final model was based on a log-linear specification with the natural logarithm of sales price as the dependent variable. This model included the same sales and independent variables as model four. The model specification is shown below and the results are presented in Exhibit 2-10. The coefficient

estimates for this log-linear specification approximate percentages by raising them to base e, subtracting 1.0 and multiplying the result by 100. Performing this operation for the proximity coefficient of 0.297778 indicates a price premium of 0.3469 or approximately 34.7%, well above the estimates calculated from the results of other models.

Model Specification Five

$Ln(Price) = \beta_O + \ldots \text{ other variables } \ldots + \beta_{14} (\text{Proximate Sale}) + \varepsilon$

Where:

Ln(Price)= Natural logarithm of adjusted sales price

Proximate Sale = Categorical indicator variable for properties considered proximate to a high voltage transmission line, either with a transmission line easement or location within 500 feet of a transmission line

β_O is the model intercept, the other β_s are coefficients to be estimated for each independent variable and ε is the error term

Exhibit 6 summarizes the results of all five models. As can be seen, the price differences range from +18.7% to +34.7%. This is opposite of what would be found if transmission lines had an adverse effect on industrial property sales prices and property values. This could be due to proximity to other factors such as transportation access and utilities. However, the non-proximate sales properties also shared these characteristics, and additional model specifications with transportation related variables (traffic counts, proximity to highway interchanges) did not alter the findings. Importantly, proximity to the lines did not have an adverse effect. This finding is consistent with the limited literature on this property type.

PAIRED SALES ANALYSES

The second set of analyses presented herein involves a series of paired sales designed to reveal any effects of proximity to transmission lines on several different commercial property types throughout Dane and Milwaukee Counties in Wisconsin. The paired sale method compares sales of subject properties exposed to a potentially adverse condition (impaired sales) with otherwise similar properties lacking the potentially adverse condition (unimpaired sales). In this case, sales of subject properties proximate to a high voltage transmission line are compared with otherwise comparable properties not near a high voltage transmission line. Adjustments are made to account for all other elements of comparison except for the transmission line proximity. Any difference after considering these adjustments is theoretically attributable to the presence of the transmission lines. For purposes of these analyses, a commercial property is considered proximate if it has a high voltage (138 kV or greater) transmission line easement or is within 500 feet of a high voltage transmission line.

Sale information was obtained through available public records and/or multiple listing service data provided by a local appraiser. Phone, and in some cases in-person interviews, were conducted to confirm the accuracy of the sales data. In the cases where parties to the sale could not be contacted, available public records were checked to ensure that the sale appeared arms-length.

In addition to providing sale confirmation data, parties to each subject sale with whom we spoke were asked if they believed that the transmission lines had any effect on the sale. Those who were reached stated that the proximate lines did not have an effect on the sale. The sale data from the subject and comparable paired sales reflects the assertions of the buyers, sellers, and brokers and shows no discernible discount attributable to the high voltage transmission lines.

Apartment

The subject property at 4741 and 4749 Hayes Rd in the northeast Madison submarket sold in February 2000 for $1,205,000, or **$75,313 per unit**. The 28,056 SF Class-A apartment building was built in 1994 and sits on 1.8 acres. The property includes one 2-story brick and vinyl building and a 9,000 SF basement. Within the 19,056 SF of Class-A apartment space, there are 16 total units: eight 1-bed and eight 2-bed units. The construction quality is very good. All property information comes from the City of Madison Assessor's Office and from an external inspection of the building. Nothing in the available records indicates that the sale was non-arms-length or that there were any unusual conditions of sale. A single circuit 138 kV electric transmission line is located across I-39/90/94, to the east of the property at a distance of 290 feet. The lines are clearly visible from the parking lot and from the eastward facing units in the apartment building. The line was constructed in 1983, prior to the 2000 sale.

Paired Sales: The subject apartment property can be compared with otherwise similar apartment properties that are not located in proximity to high voltage electric transmission lines to determine any value effects from the lines. Three comparable sales were selected for this analysis and a relative comparison chart is shown in Table 1 below.

Table 1. Relative Comparison Analysis for Apartments at 4741-4749 Hayes Road, Madison

	Subject	Comp 1	Comp 2	Comp 3
Element of Comparison	**4741-4749 Hayes Rd**	**1001-1017 Rockefeller Ln**	**5934-5946 Seminole Ct**	**4391-4395 Crescent Rd**
Sale Price	$1,205,000	$1,200,000	$1,350,000	$1,035,000
Adjustments	N.A	N.A.	N.A.	$80,000 CAPX
Adjusted Sale Price	$1,205,000	$1,200,000	$1,350,000	$1,115,000
Sale Date	Feb-00	Aug-01	Dec-09	Nov-10

Table 1. Relative Comparison Analysis for Apartments at 4741-4749 Hayes Road, Madison				
	Subject	**Comp 1**	**Comp 2**	**Comp 3**
Real Property Rights Conveyed	Fee Simple	Fee Simple	Fee Simple	Fee Simple
Conditions of Sale	Arms-Length	Arms-Length	Arms-Length	Arms-Length
Market Conditions	Sold in 2000	Sold in 2001 **(Similar)**	Sold in 2009 **(Superior)**	Sold in 2010 **(Superior)**
Location	Madison	Madison **(Similar)**	Fitchburg **(Slightly Superior)**	Fitchburg **(Slightly Superior)**
Number of Units	16	16	18	16
Year Built/Condition	1994/Good	1994/Good **(Similar)**	1992/Good (**Inferior)**	1990/Good **(Inferior)**
Price per Unit	$75,313	$75,000	$75,000	$69,688
Net Comparison		**Similar**	**Slightly Superior**	**Slightly Superior**

The comparable sales are generally similar in terms of type (Class-A apartment buildings with fewer than 20 one- or two-bedroom units). The relative comparison analysis in Table 1 above considers each comparable's date of sale (market conditions), location, and property age/condition. **The subject property's sale price per unit of $75,313 is higher than the prices per unit of the comparable sales (ranging from $69,688 to $75,000), despite the fact that Comparables 2 and 3 rank as slightly superior. The market evidence indicates that no price discount or diminution in value is attributable to the presence of the high voltage transmission lines.**

Office

A Class-B Milwaukee County office subject at 5445 North 118th Court in Milwaukee sold for $99.96 per square foot in March 2005. Comparable office properties sold for $68.17 - $101.36 per square foot. The buyer, who planned to occupy a portion of the building and lease out the remaining space, spent approximately $250,000 after the sale on tenant improvements, resulting in an adjusted price per square foot of $99.96. The building has a leasable area of 18,320 square feet, and at the time of sale was approximately 90% occupied by a variety of office tenants. Two double circuit 138 kV electric transmission lines and a 70-foot easement bisect the property, passing through the parking lot directly beside the building. The buyer reported that the presence of the lines "wasn't even an issue when purchased" and that he "has owned it for a long time and

the lines have never been a problem." He went on to say that "transmission lines shouldn't affect office or commercial/industrial properties."

Paired Sales: The subject property can be compared to a set of otherwise similar sales of office buildings that are not located in proximity to a high voltage transmission line. Four comparable sales were selected for this purpose. A relative comparison chart of the subject and comparable sales are presented below in Table 2.

Table 2. Relative Comparison Analysis for Office Building at 5445 N 118th Court, Milwaukee

	Subject	**Comp 1**	**Comp 2**	**Comp 3**	**Comp 4**
Element of Comparison	**5445 N 118th Ct**	**8405 W Forest Home Av**	**2363 S 102nd St**	**8112 W Bluemound Rd**	**9800 W Bluemound Rd**
Sale Price	$1,800,000	$1,325,000	$1,100,000	$2,200,000	$1,675,000
Adjustments	$250,000 for TI	N.A.	N.A.	N.A.	$140,000 deferred maintenance
Adjusted Sale Price	$2,050,000	$1,325,000	$1,100,000	$2,200,000	$1,815,000
Sale Date	Mar-05	Aug-03	May-05	Jan-06	Dec-06
Real Property Rights Conveyed	Fee Simple	Fee Simple	Fee Simple	Fee Simple	Fee Simple
Conditions of Sale	Arms-Length	Arms-Length	Arms-Length	Arms-Length	Arms-Length
Market Conditions	Sold in 2005	Sold in 2003 **(Inferior)**	Sold in 2005 **(Similar)**	Sold in 2006 **(Superior)**	Sold in 2006 **(Superior)**
Location	Milwaukee	Greenfield **(Superior)**	West Allis **(Similar)**	Wauwatosa **(Slightly Inferior)**	Wauwatosa **(Similar)**
Building Size (SF)	20509	13072	15780	32272	22066
Year Built/Condition	1989/Good	1986/Good **(Similar)**	1979/Good (**Inferior)**	1973/Good **(Inferior)**	1970 Average **(Inferior)**
Presence of a Basement	None	None **(Similar)**	33% of Leasable Space **(Inferior)**	33% of Leasable Space **(Inferior)**	6% of Leasable Space **(Slightly Inferior)**
Price per SF	$99.96	$101.36	$69.71	$68.17	$82.25
Net Comparison		**Slightly Superior**	**Inferior**	**Inferior**	**Slightly Inferior**

The comparable sales are generally similar in terms of location (I-45 corridor of Milwaukee), and type (low rise office buildings). A relative comparison analysis in Table 2 above considers each comparable's date of sale (market conditions), location, property age/condition, and presence of a basement. **The subject property's sale price per square foot of $99.96 (adjusted for the additional cost of tenant improvements) is bracketed by the prices per square foot of the comparable sales (ranging from $68.17 to $101.36), which indicates no price discount or diminution in value attributable to the presence of the high voltage transmission lines. This market data further confirms the buyer's statement that the transmission lines which bisect the property had no impact on the terms of sale.**

Office Land

Two Madison area office land sales within the American Center Office and Business Park served as subject properties for this set of paired sales analyses. These properties are each located within 500 feet of a high voltage electric transmission line and their sales prices would reflect the impact, if any, of transmission line proximity. The American Center is located in the northeast Madison submarket in between Interstates 39/90/94 and US Highway 151. The park has good visibility from and access to the two major thoroughfares. The American Family Insurance Group has developed the office park since the mid-1990s, and the land is fully equipped with electrical service, municipal water, sewer, and natural gas. The common location of these land sales within the same office park allows for more direct analysis of any potential value impacts from the transmission lines. The same five comparable sales within the office park are used in both analyses.

Subject 1 is a 16.54 acre corner lot at 4602 Eastpark Boulevard that sold in September 2005 for $3,403,500, or **$4.72 per square foot**. A representative of the seller confirmed that the sale was arms-length with no unusual sales conditions. He said that the purchase was a cash deal and that the buyer bought this land as part of a 42 acre assemblage of land to construct a medical complex. The parcel is located along the northwest edge of the park, with excellent access to and from I-39/90/94. A single circuit 138 kV electric transmission line is located across I-39/90/94, 369 feet to the west of the property. The lines are fully visible from all areas of the lot and were constructed in 1983 and upgraded in 2003, prior to the 2005 sale. The seller said that the transmission lines were never discussed during the sale negotiations.

Subject 2 is a 7 acre lot at 4901 Eastpark Boulevard that sold in May 2009 for $1,600,000, or **$5.25 per square foot**. A representative of the seller confirmed that the sale was arms-length with no unusual sales conditions. The buyer immediately began construction of a 31,246 SF office building, which was completed later in 2009. The parcel sits on the west side of the park towards I-39/90/94. A single circuit 138 kV electric transmission line is located to the west of the property at a distance of 100 feet. The lines are clearly visible from the parking lot and from the westward facing suites in the building. The line was constructed in 1983 and upgraded in 2003,

prior to the 2009 sale. The seller said that the transmission lines did not affect the land sale as far as he knew.

Paired Sales: The two subject properties can be compared to a set of otherwise similar sales of office land that are not located in proximity to a high voltage transmission line. Five comparable sales were selected for this purpose. Two relative comparison charts are presented below in Tables 3 and 4.

Table 3. Relative Comparison Analysis for Office Land at 4602 Eastpark Boulevard, Madison

	Subject	**Comp 1**	**Comp 2**	**Comp 3**	**Comp 4**	**Comp 5**
Elements of Comparison	**4602 Eastpark Blvd**	**5202 Eastpark Blvd**	**5201 E Terrace Dr**	**4654 Eastpark Blvd**	**4702 Eastpark Blvd**	**5302 Buttonwood Dr**
Sale Price	$3,403,500	$1,520,000	$576,000	$2,809,800	$2,615,300	$355,000
Sale Date	Sep-05	Apr-07	Dec-08	Mar-07	Jun-09	Jun-09
Real Property Rights Conveyed	Fee Simple	Fee Simple	Fee Simple	Fee Simple	Fee Simple	Fee Simple
Conditions of Sale	Arms-Length	Arms-Length	Arms-Length	Arms-Length	Arms-Length	Arms-Length
Market Conditions	Sold in 2005	Sold in 2007 **(Superior)**	Sold in 2008 **(Superior)**	Sold in 2007 **(Superior)**	Sold in 2009 **(Superior)**	Sold in 2009 **(Superior)**
Location	Madison	Madison **(Similar)**	Madison **(Similar)**	Madison **(Similar)**	Madison **(Similar)**	Madison **(Similar)**
Access	Excellent	Good **(Slightly Inferior)**	Good **(Slightly Inferior)**	Excellent **(Similar)**	Excellent **(Similar)**	Good **(Slightly Inferior)**
Corner Lot	Yes	Yes **(Similar)**	No **(Inferior)**	No **(Inferior)**	No **(Inferior)**	Yes **(Similar)**
Lot Size (SF)	720332	343252	130682	592875	494711	65689
Lot Size (Acres)	16.54	7.88 **(Superior)**	3.00 **(Superior)**	13.61 **(Similar)**	11.36 **(Superior)**	1.51 **(Superior)**
Price per SF	$4.72	$4.43	$4.41	$4.74	$5.29	$5.40
Net Comparison		**Similar**	**Similar**	**Similar**	**Superior**	**Superior**

Table 4. Relative Comparison Analysis for Office Land at 4901 Eastpark Boulevard, Madison						
	Subject	**Comp 1**	**Comp 2**	**Comp 3**	**Comp 4**	**Comp 5**
Element of Comparison	**4901 Eastpark Blvd**	**5202 Eastpark Blvd**	**5201 E Terrace Dr**	**4654 Eastpark Blvd**	**4702 Eastpark Blvd**	**5302 Buttonwood Dr**
Sale Price	$1,600,000	$1,520,000	$576,000	$2,809,800	$2,615,300	$355,000
Sale Date	May-09	Apr-07	Dec-08	Mar-07	Jun-09	Jun-09
Real Property Rights Conveyed	Fee Simple	Fee Simple	Fee Simple	Fee Simple	Fee Simple	Fee Simple
Conditions of Sale	Arms-Length	Arms-Length	Arms-Length	Arms-Length	Arms-Length	Arms-Length
Market Conditions	Sold in 2009	Sold in 2007 **(Inferior)**	Sold in 2008 **(Inferior)**	Sold in 2007 **(Inferior)**	Sold in 2009 **(Similar)**	Sold in 2009 **(Similar)**
Location	Madison **(Similar)**	Madison **(Similar)**	Madison **(Similar)**	Madison **(Similar)**	Madison **(Similar)**	Madison **(Similar)**
Access	Good	Good **(Similar)**	Good **(Similar)**	Excellent **(Superior)**	Excellent **(Superior)**	Good **(Similar)**
Corner Lot	No	Yes **(Superior)**	No **(Similar)**	No **(Similar)**	No **(Similar)**	Yes **(Superior)**
Lot Size (SF)	304920	343252	130682	592875	494711	65689
Lot Size (Acres)	7.00	7.88 **(Similar)**	3.00 **(Superior)**	13.61 **(Inferior)**	11.36 **(Inferior)**	1.51 **(Superior)**
Price per SF	$5.25	$4.43	$4.41	$4.74	$5.29	$5.40
Net Comparison		**Similar**	**Similar**	**Inferior**	**Similar**	**Superior**

The two subject sales prices ($4.72 and $5.25 per square foot) are bracketed by the five comparable sales prices ($4.41 to $5.40 per square foot). Price per square foot appreciation over time also indicates that land prices within the American Center Office and Business Park experienced steady growth throughout the 2000s. Therefore, heavier weight was placed on the market conditions element of comparison. Consistent with market interviews, there is no transactional evidence to suggest any value diminution attributable to the presence of high voltage transmission lines.

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Exhibit 1. Summary of Statistical Analyses of Transmission Line Impacts

Author(s)	Year(s) of Study	Location of Study	Property Type	Power Line Type	Effects Found
Brown	1965 to 1970	Saskatchewan, Canada	Farm Land	Transmission lines varying in voltage	No Effect
Colwell & Foley	1968 to 1978	Decatur, IL	Residential	138 kV transmission line	Diminished property values are associated with proximity to a transmission line. Substantial differences in selling price exist between 50 and 200 feet from the line, but disappear beyond 200 feet.
Colwell	1968 to 1978	Decatur, IL	Residential	138 kV transmission line	Selling price increases at a decreasing rate as distance to a power line increases. These negative impacts typically diminish with time.
Rigdon	1986 to 1991	Marquette County, Michigan	Unimproved Recreational	138 kV transmission line	No Effect
Hamilton & Schwann	1985 to 1991	Metropolitan Vancouver	Residential	Transmission lines varying in voltage from 60 kV to 500 kV	Properties adjacent to a line lose 6.3% of value due to proximity and visual impact. More distant properties are scarcely affected, losing on average only 1% of value.
Des Rosiers	1991 to 1996	City of Brossard, Canada (Greater Montreal Area)	Residential	315 kV transmission line	Effects ranging from a negative impact of 9.6% of mean home price to a 9.2% premium, depending on the visual encumbrance, proximity to the line, and other factors.
Wolverton & Bottemiller	1989 to 1992	Washington & Clackamas Counties (Portland, OR), King County (Seattle, WA) & Clark County (Vancouver, WA)	Residential	6 BPA transmission lines varying in voltage from 115 kV to 500 kV	No Effect
Chalmers & Voorvardt	1999 to 2007	Connecticut and Massachusetts	Residential	345 kV transmission lines	A small effect attributable to the encumbrance of a power line easement. No effect attributable to proximity or visibility of the lines.

Exhibit 2. Summary Table of Sales Studies Using Other Techniques					
Author(s)	**Year(s) of Study**	**Location of Study**	**Property Type**	**Power Line Type**	**Effects Found**
Bigras	1948 to 1961	Ste. Foy (Quebec), Three Rivers & Montreal, Canada	Residential	230 kV, 69 kV & 180 kV transmission lines	No Effect
Kinnard	1954 to 1964	Metropolitan Hartford, Connecticut	Residential	Transmission lines varying in voltage	Larger lots near ROW sold for the same price as smaller lots more distant from the ROW
Kung & Seagle	1989 to 1990	Memphis and Shelby Counties, Tennessee	Residential	Unknown	No Effect
Cowger, Bottemiller & Cahill	1990 to 1991	Washington & Clackamas Counties (Portland, OR), King County (Seattle, WA) & Clark County (Vancouver, WA)	Residential	6 BPA transmission lines varying in voltage from 115 kV to 500 kV	No Effect

Exhibit 3. Descriptive Statistics, Industrial Property Sales

Variable	Number of Sales	Minimum	Maximum	Mean	Std. Deviation
Adjusted Sales Price	129	162500	9100000	1406477.256	1266493.237
Sale year 2005	129	0.00	1.00	0.1163	0.32181
Sale year 2006	129	0.00	1.00	0.2558	0.43802
Sale year 2007	129	0.00	1.00	0.2248	0.41908
Sale year 2008	129	0.00	1.00	0.1240	0.33090
Sale year 2009	129	0.00	1.00	0.0620	0.24212
Sale year 2010	129	0.00	1.00	0.0388	0.19377
Total GFA	129	6000	348000	41074.49	41474.223
Building Age	123	1.00	97.00	29.1707	18.44340
Office Size	124	0.00	85613	5382.39	8925.131
Sprinkler	129	0.00	1.00	0.2868	0.45404
Dock High Doors/Loading Docks	113	0.00	34	2.89	4.965
Dane	129	0.00	1.00	0.5504	0.49939
Milwaukee	129	0.00	1.00	0.3101	0.46433
Waukesha	129	0.00	1.00	0.1395	0.34785
Proximate	129	0.00	1.00	0.1550	0.36335

Note: Industrial property sales in Dane, Milwaukee and Waukesha Counties from May 15, 2001 to December 29, 2010.

Exhibit 4. Multiple Regression Analyses, Improved Industrial Properties

Variable	Model One Parameter estimates	Model Two Parameter estimates	Model Three Parameter estimates	Model Four Parameter estimates	Model Five Parameter estimates
Intercept	1180485.530 (t = 4.950, p=0.001)	841667.490 (t=3.963, p=0.001)	666944.874 (t=2.777, p=0.007)	1065629.612 (t=3.713, p=0.001)	14.320290 (t=68.800, p=0.001)
Sale year 2005	176430.894 (t=0.753, p=0.453)	384603.697 (t=1.886, p=0.062)	366470.387 (t=1.617, p=0.109)	389356.956 (t=1.721, p=0.089)	0.157039 (t=0.957, p=0.341)
Sale year 2006	99190.017 (t=0.524, p=0.601)	248786.708 (t=1.491, p=0.139)	244466.095 (t=1.245, p=0.216)	214845.693 (t=1.041, p=0.301)	0.249741 (t=1.668, p=0.099)
Sale year 2007	155122.972 (t=0.801, p=0.425)	281664.762 (t=1.676, p=0.097)	321376.364 (t=1.631, p=0.106)	214575.011 (t=1.024, p=0.309)	0.243502 (t=1.602, p=0.113)
Sale year 2008	212971.297 (t=0.909, p=0.365)	90020.677 (t=0.433, p=0.666)	89215.526 (t=0.382, p=0.703)	-4523.560 (t=-0.019, p=0.985)	0.161015 (t=0.951, p=0.344)
Sale year 2009	180031.194 (t=0.642, p=0.522)	137241.941 (t=0.570, p=0.570)	198922.797 (t=0.789, p=0.432)	101450.863 (t=0.407, p=0.685)	0.145727 (t=0.806, p=0.422)
Sale year 2010	-164841.547 (t=-0.446, p=0.657)	122365.637 (t=0.383, p=0.703)	56306.475 (t=0.175, p=0.862)	113106.930 (t=0.360, p=0.720)	0.196859 (t=0.863, p=0.391)
Total GFA	23.419 (t=15.441, p=0.001)	21.877 (t=16.536, p=0.001)	19.494 (t=12.004, p=0.001)	19.479 (t=11.873, p=0.001)	0.000006 (t=4.625, p=0.001)
Building Age	-21023.659 (t=-5.976, t=0.001)	-17945.405 (t=-5.794, p=0.001)	-14196.489 (t=-4.405, p=0.001)	-12751.383 (t=-3.514, t=0.001)	-0.013875 (t=-5.272, p=0.001)
Office Size		43.273 (t=6.763, p=0.001)	43.659 (t=6.584, t=0.001)	44.845 (t=6.919, t=0.001)	0.000017 (t=3.512, p=0.001)
Sprinkler			281488.809 (t=2.303, p=0.023)	185943.865 (t=1.495, p=0.138)	0.081716 (t=0.906, p=0.367)
Dock High Doors/Loading Docks			28141.705 (t=2.064, p=0.042)	32465.550 (t=2.417, p=0.018)	0.018095 (t=.857, p=0.066)
Dane				-393948.348 (t=-2.369, p=0.020)	-0.274697 (t=-2.278, p=0.025)
Milwaukee				-435987.882 (t=-2.348, p=0.021)	-0.609039 (t=-4.523, p=0.001)
Proximate	257398.981 (t=1.529, p=0.129)	259000.033 (p=1.796, t=0.075)	294825.600 (t=2.150, p=0.034)	337943.209 (t=2.431, p=0.017)	0.297778 (t=2.953, p=0.004)
Adjusted R^2	0.726	0.806	0.830	0.838	0.705

Notes: Model one based on 123 sales (20 proximate and 103 non-proximate). Model two based on 119 sales (20 proximate and 99 non-proximate). Model three based on 106 sales (19 proximate and 87 non-proximate). Models four and five based on 106 sales (19 proximate and 87 non-proximate). Proximate properties include those with transmission line easements as well as properties within 500 feet of a high voltage (138kV or greater) transmission line.

Exhibit 5. Estimated Marginal Means, Proximate and Non-Proximate Industrial Property Sales					
	Unadjusted Sales Prices, All Sales	**Estimated Marginal Means, Model One**	**Estimated Marginal Means, Model Two**	**Estimated Marginal Means, Model Three**	**Estimated Marginal Means, Model Four**
Proximate sales	$1,367,930 (n =20)	$1,630,835	$1,626,047	$1,624,467	$1,659,856
Non-Proximate sales	$1,424,485 (n=103)	$1,373,436	$1,367,047	$1,329,641	$1,321,913
Proximate sales price difference		**+257,399**	**+259,000**	**+294,826**	**+337,943**
Proximate sales price percent difference		**+18.7%**	**+18.9%**	**+22.2%**	**+25.6%**
p-value for difference		p = 0.129	p = 0.075	p = 0.034	p = 0.017

Notes: (1) Estimated marginal means are based on estimates for a typical or average industrial property with building space of 40,422.72 square feet at an age of 29.61 years when sold and other characteristics.

(2) Proximate properties include those with transmission line easements as well as properties within 500 feet of a high voltage (138kV or greater) transmission line.

Exhibit 6. Regression Analysis Summary			
	Number of sales	**Adjusted R^2**	**Sales Price Difference for Proximate Properties**
Model One (Year of Sale, Building Size and Age)	123	0.726	+18.7% (t = 1.511)
Model Two (Year of Sale, Building Size and Age, Office Space)	119	0.806	+18.9% (t = 1.796)
Model Three (Year of Sale, Building Size and Age, Office Space, Sprinklers, Dock High Loading Doors)	106	0.830	+22.2% (t = 2.150)
Model Four (Year of Sale, Building Size and Age, Office Space, Sprinklers, Dock High Loading Doors, County)	106	0.838	+25.6% (t = 2.431)
Model Five (Year of Sale, Building Size and Age, Office Space, Sprinklers, Dock High Loading Doors, County in Log-Linear Form)	106	0.705	+34.7% (t = 2.953)

Notes: (1) Proximate sales price per cent difference represents the difference in the estimated marginal means (EMM) for industrial properties proximate to a high voltage transmission compared to non-proximate properties. Proximate properties include those with transmission line easements as well as properties within 500 feet of a high voltage (138kV or greater) transmission line.

(2) Industrial property sales in Dane, Milwaukee and Waukesha Counties from May 15, 2001 to December 29, 2010. Differences in the number of sales used in each model are due to missing data on one or more of the variables in the model.