# Measuring Urban Commercial Land Value Impacts of Access Management Techniques

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**Abstract**
The safety benefits of access management, the controlling of access points on roadways, have been proven and have been well documented in past research. However, there is limited research on the economic impacts of access management, and most existing research is qualitative. Further quantitative research is needed because commercial business owners believing that direct and complete access to their land is an integral part of sales do not always accept access management practices. However, using sales data as an economic indicator in analysis presents problems, for sales data cannot be gathered per land parcel. Commercial land values are useful in this regard.

This research measures the urban commercial land value impacts of access management applications in Des Moines, Iowa through a regression model. The regression model is based on the hedonic property value model, a regression model measuring relationships between non-market variables and property values. The regression model used in this study measures relationships between commercial land values per square foot to parcel square footage, average annual daily traffic (AADT) counts, and scaled access control for each study parcel.

The results of the study regression model found that both parcel square footage and AADT have negative relationships to commercial land values, while access control has virtually no influence on commercial land values. This finding could help demonstrate to business owners that access control should not negatively impact their land values, and be one step to further access management acceptance in the business community.

## INTRODUCTION

The practice of controlling access points on roadways, known as access management, has been proven to reduce traffic conflicts, preserve roadway functional classification, and improve roadway safety (*1*). Safety impacts of access management strategies have been well documented; however, the economic impacts of access management are less understood. Past research on the economic impacts of access management techniques use qualitative measures of study that may not accurately represent how access control affects business owners. This research will explore the economic impact of access management on businesses surrounding an access-controlled corridor using quantitative methods. The most logical indicator of business vitality is sales data. However, sales data are proprietary and difficult to obtain for individual parcels. For this reason, an alternative indicator was studied to determine the economic impacts of access management techniques.

One economic indicator that may be measured quantitatively is commercial land values. Commercial land values are influenced by a number of factors such as location, socio-economic characteristics of the surrounding area, etc. This research hypothesizes that commercial land values are be influenced by roadway characteristics such as access control. Using land values instead of property values as an economic indicator has benefits as well. Property values are the sum of land values and structural values per parcel, and including structural values as an economic indicator could lead to problems due to frequent structural value changes from building updates.

### Need for Research

The safety benefits of access management have been demonstrated in past research, but commercial property owners have expressed concerns about the practice out of fear that limiting access may deter customers desiring direct and complete access to businesses. If research could determine quantitatively that access management techniques do not negatively impact commercial land values, more business owners may be willing to incorporate access management techniques into new or existing site designs. As found in previous research, measures of customer satisfaction could determine this, as could an inventory of business sales. However, this past research has all used qualitative data, since most related quantitative data, such as sales data, is not available publicly.

### Project Definition

This research will determine the commercial land value impacts of access management techniques within the city of Des Moines in Polk County, Iowa, through analysis of land parcel values with varied levels of access control. This study presents both descriptive statistics to show overall land value change and inferential statistics that demonstrate the strength of the relationship between access control and land value, as well as other variables. The analysis was completed using two computer programs: a geographic information system (GIS) to create data sets, project maps, and process descriptive statistics, and a statistical program to process inferential statistics. The hedonic property value model (*2*), a regression model used in other types of research but not yet access management research, is introduced as a tool to find the true non-market impacts of access management on commercial land values. The regression model contains other variables that could explain variation in land values, and will test those variables' relationships with commercial land value as well. Analyzing and comparing the results of the regression models with descriptive statistics of relevant data sets provides insight on access management's and other variables' influences on commercial land values.

**Hypothesis**

Land valuation is a balance of many unique factors, and these factors do not influence land values similarly. A parcel's roadway access could influence commercial land valuation to varying degrees. In hopes that minimal negative commercial land valuation change may create higher favor for the practice of access management among commercial property owners, the hypothesis for this research is that access management techniques will have minimal or no negative impacts on land values in Des Moines, Iowa.

## METHODOLOGY

This study used both descriptive and inferential statistics to measure commercial land value changes and to what degree certain factors influence this change. The use of both types of statistics in this study will help to overcome the problem of a smaller data set by providing more in-depth analysis of the dataset prior to model fitting. Descriptive statistics provide an overview of a sample dataset, but while these statistics are necessary to understand how parcels on various roadways differ from one another, they do not provide a full analysis of why these commercial parcels' land values differ based on parcel characteristics. Multivariate regression was used to analyze how these land values are influenced by parcel characteristics by determining the strength of the relationship between each characteristic to parcel land values. The "hedonic property value model" is a method used in past research to define the strength of relationships between property value and its determinants. It is simply a multivariate regression model with property values as the dependent variable, and non-market factors as explanatory variables (*3*). Principles from the hedonic property value model, such as the use of non-market explanatory variables, will be used to create the regression model for this study. For this study, the characteristics used were related to non-market influences on land value as well as parcel access control. The combination of descriptive and inferential statistics provided a comprehensive view of commercial land values as related to access control in Polk County.

ArcView and ArcGIS, two geographic information systems (GIS), were used in this process to create descriptive statistics and create maps. An innate benefit of using GIS over traditional mapping techniques is the ability to integrate data into the maps. This allows for a much "smarter" map; this allows for data analysis to occur within the program, and for results to be displayed graphically in map form.

SPSS Statistical Software was used to create the hedonic property value model, or more simply, to create a regression model detailing the relationship between commercial land values and explanatory variables chosen for this research.

**Data Preparation**

The corridors chosen for this study were all multilane arterial roadways in Des Moines, including portions of: Southeast 14th Street, 63rd Avenue, Army Post Road, Euclid Avenue, and Grand Avenue. Land parcels were collected from the Polk County Assessor's Office for portions of these roadways, and these parcels were narrowed for study based on data availability. Parcel values were collected for the present year (2002) as well as a "historic" year. The historic year refers to a time before raised medians were constructed on study roadways with raised medians presently. Southeast 14th Street received raised medians in 1984 and 1985 (*5*), while 63rd Avenue received raised medians in 1991 (*6*). At this time, the data set was reduced drastically due to land value data restrictions, for selected raised medians on corridors originally included in the study were constructed long ago, and historic land values were not available for those time periods (*4*, *7*).

Because the land values being compared for this study are from different years, the values needed to be brought to a constant year to control for inflation in order to be effectively analyzed. Inflation occurs when the average level of prices in an economy rises, and conversely, deflation occurs when this average level of price declines (*8*). An alternative view of deflation is that it removes the effects of price changes upon current values (*9*). Price indices can perform this function in practice.

There are different types of indices that can account for deflation and inflation. However, land is economically viewed as an investment, which removes the use of the standard inflation accounting device, the Consumer Price Index (CPI), from this study. The method chosen for this study was the Gross Domestic Product (GDP) deflator. The CPI is best suited for use with commodities, while the GDP may be used for investments such as land (*8*). The GDP Deflator deflates the value of the nation's Gross Domestic Product, the measured market value of all goods produced in an economy in one year (*8*).

**INFERENTIAL STATISTICS**

Regression models have three purposes: to determine if an association exists between two variables, to analyze the strength of that relationship, and to investigate the form of that relationship (*10*). Multivariate regression is regression with more than one explanatory variable; it can analyze partial relationships between two variables while controlling for other variables in the model. Multivariate regression can incorporate more than one explanatory variable, so it is be useful for land value models; since land value is dependent upon more than one factor, it is crucial to account for all these factors in regression models seeking to relate land value to its determinants.

The sets of regression models used for this study were projected to have three explanatory variables. In accordance with previous hedonic models, the regression model may not include any market-related factors, such as sales. The projected explanatory variables are parcel square footage, average annual daily traffic (AADT) counts, and access control. The first two explanatory variables are quantitative and can easily be used in the regression model. Access control, however, is a qualitative measure, and has been quantified for use in the regression model through the development of an access scale measuring many types of access control per land parcel.

The regression models were created using stepwise regression, which is a modified version of the forward selection method of regression model creation. Stepwise regression begins with no explanatory (x) variables and then adds them one at a time. Stepwise regression then drops explanatory variables from the model if they lose their significance as other variables are added (*10*).

**Dependent Variable- Commercial Land Value per Square Foot**

The dependent variable used for all regression models in this research was commercial land value per square foot, the indicator used here to measure economic impacts of access management techniques. Two types of commercial land value were collected for the regression model sets. Current commercial land values were collected for study parcels, as well as the "historic" land values (from before raised medians were constructed on study corridors with raised medians). To fully analyze the dataset in the regression models, the data were split into two groups, one for current land values as the dependent variable and another for historic land values as the dependent variable.

Simply using overall land value for each parcel may lead to incorrect regression results. Parcel square footage is also strongly linked to land value in the sense that larger land parcels are generally valued at higher prices due to their size. Using overall parcel land value as the dependent variable in a regression model would skew the results, for the model would be accounting for the large impact of square footage on land value. A dependent variable such as land value per square foot should remedy this problem, for the obvious value differences from larger to smaller land parcels will be controlled for. Even if square footage is included as an explanatory variable, the regression model measures how land value per square foot is related to overall parcel square footage; in other words, the model will measure how value per square foot changes as overall square footage changes.

**Explanatory Variables**

The explanatory variables in a regression model were used to explain variation in the commercial land value datasets. These variables included parcel square footage, annual average daily traffic counts, and access control. Because the type of regression model used is a stepwise regression model, the explanatory variables were removed from the model as their significance dropped out, leaving a model with only significant relationships to commercial land values per square foot.

*Parcel square footage*

Parcel square footage needed to be accounted for in the regression model, for larger parcels of land should have higher value. Square footage was tracked in the regression model in two ways. First, the independent variable of commercial land value was found per square foot to control for land value fluctuations due to parcel size. Then, the explanatory variable of parcel square footage was used in the regression model to determine the strength of the relationship between land value per square foot and parcel size. The range of square footage is important to note; out of the study corridors, 63$^{rd}$ Street and Grand Avenue have the largest average parcel size by far, and then followed by the smaller average parcel sizes of Euclid Avenue, SE 14$^{th}$ Street, and Army Post

Road. The square footage factor in the regression model was transformed to make error terms more normal. Using square footage alone as an explanatory variable lead to poor residual versus explanatory variable plots, and using the logarithm of square footage instead made errors more normal.

*Average annual daily traffic*

Annual average daily traffic was another important factor to measure in the regression model. Because all corridors used in this study are either principal or minor arterial roadways, the AADT range among them is similar due to similar functional classifications. Due to this, AADT could also be viewed as a rough measure of congestion on the corridors; the arterial roadways all have high AADT counts, and the variation in AADT could describe possible congestion levels on these roadways. For the study corridors, AADT trends were opposite to parcel square footage trends: SE 14th Street has the highest AADT, followed by Army Post Road and then Euclid Avenue. 63rd Street and Grand Avenue both have lower AADT ranges than the other study corridors.

*Access Control*

The level of access control on the study corridors is a very important measure to include in this regression model, for the purpose of the model was to determine how access control is correlated to land values. To include access control in the model, it must become a quantifiable measure; therefore, an access scale was created evaluating driveway density, medians and two-way left turning lanes, and other measures of access control. The value given to each access level was the value used in the hedonic model. As seen in Table 1, the access scale has a total value of 15 points, awarded in three categories: driveway spacing, median type, and other factors including right turning lanes, frontage roads, good internal circulation, shared driveways, and the formality of driveways. The presence of these factors resulted in one point for each factor on the access scale.

Tables 2 and 3 provide an overview of the dataset used in this research. These tables show the range of AADT, average square footage of study parcels, most frequently occurring access scale scores for historic and current conditions, and average current and historic commercial land value per square foot. The data trends seen in these tables can be compared to the regression model created later.

*Location influences on data*

Location is another important issue in land value, but rather than quantify this factor, it was controlled for in the regression model through certain methods of corridor selection. The corridors chosen for study had to meet certain assumptions in order to control the sample for land value variations. All corridors were urban arterials, either access controlled or not managed at all, with primarily commercial adjacent land uses. The first step necessary to selecting study corridors was to perform windshield surveys of urban arterial corridors with primarily commercial adjacent land uses in Polk County. The windshield surveys were used to determine roadway segments with these characteristics, and were also used to analyze access control techniques. In addition to windshield surveys, aerial photographs from the Polk County Assessor's website were used to clarify access control on the first group of corridors selected for study (*4*).

Another important issue in fitting a model to this data was to ensure the study corridors had similar characteristics. However, trends in parcel square footage, AADT, and access control differ among the study corridors. The corridors on the north and east sides of Des Moines, Euclid, SE 14th, and Army Post, the older portions of the city, have similar data trends, while the corridors on the west side of the city, 63rd and Grand, the more newly developed portions of the city, have similar data trends. Of course, these two groups of data trends are slightly different, and this may have an impact on the regression model. Testing regression model sets to determine how location affects model fit was important for this research.

**Model Methodology**

The hypothesis for this research was that access control does not have a significant impact on commercial land values (measured as commercial land values per square foot). Regression model hypotheses include a null hypothesis and an alternative hypothesis. The null hypothesis is directly tested through the regression model, and the alternative hypothesis contradicts this hypothesis.

The null hypothesis states that the mean of the response variables does not depend on the values of the explanatory variables

$$H_o: B_1 = B_2 = B_3 = 0$$

The alternative hypothesis (or research hypothesis) states that at least one explanatory variable is related to the response variable when controlling for the other explanatory variables.

$$H_a: \text{At least one } B_i \neq 0$$

To determine if corridor location has an effect on the regression model, two regression model sets were created; the first model set used a dataset of all five study corridors, and the second model set used a dataset of only the northern and eastern corridors, excluding 63rd Street and Grand Avenue.

*Stepwise regression*

There were two sets of stepwise regression models created for this research. The two sets were necessary to compare the effects of location on land value as well as the effects of access management techniques. The first regression model set included all five study corridors, while the second regression model set only used data for the northern (Euclid Avenue) and eastern (Army Post Road and Southeast 14th Avenue). Each model set contained a regression model with current land values as the dependent variable, and a model with historic land values as the dependent variable. After the stepwise regression was completed, it showed that the second regression model set using data for the northern and eastern study corridors provided slightly better results than the data set containing all five study corridors. This result showed some differences in land value trends between the newer western and older northern and eastern sections of Des Moines.

The regression outputs to be discussed here include multiple correlation, model summary, and regression coefficients. Multiple correlation describes the strength of bivariate relationships, and is the Pearson correlation between observed and predicted values in a model (*10*). The Pearson correlation is denoted by R in multiple regression. R always falls between 0 and 1, and correlations closer to 1 yield better prediction values, or the relationship between the two variables is stronger (*10*). The multiple correlations found between variables are similar for both historic and current land values. All three independent variables are inversely related to land values per square foot on the three corridors. However, all three variables have weak to moderately strong relationships with land value per square foot, because the correlations range from 0.202 to –0.556.

Tables 4 and 5 provide a summary of the regression models for the three corridor model set. The summary includes multiple regression (R), used again to describe how well a regression model predicts data. The coefficient of multiple determination ($R^2$) is the proportion of total variation in Y that is explained by simultaneous predictive power of all explanatory variables through the multiple regression model (*10*), and is also in these tables. The coefficient of multiple determination shows how well each model predicts values- the higher the percentage, the better the model predicts. The F statistic helps to determine if the null hypothesis is true; the higher the F statistic, the more evidence exists against $H_o$ (*10*).

Tables 4 and 5 are the model summary tables for the three-corridor regression model set. The two model sets had similar results; because of this, the model summary tables were not used as the final indicator of which regression model was the best fit. The five corridor historic data model (R = .450) fit the data better than the three corridor historic data model (R = .446), and the three corridor current data model (R = .630) fit the data better than the five corridor current data model (R = .625). Correlations alone are not sufficient measures to determine model quality, so although the correlations showed how similarly the two model sets fit the data, the correlations could not be used to ultimately choose either model set as the predictor for this research (*11*). The model sets were chosen were based on significance testing and residual plots.

The coefficients of multiple determination for the two model sets follow the same trend as the correlation; however, for both model sets, the current land value regression models have higher $R^2$ values, and have a higher reduction in errors (or predict values better) than the historic land value regression models.

Tables 6 and 7 show the coefficients for each regression model in the three corridor set. This table can be used to develop the finalized regression models (using model 2 in these tables, including AADT and log of square footage as independent variables) for each time period, which are:

$E\,(Y) = 12.792 - 0.000116X_1 - 1.517X_2$

Where: $E\,(Y)$ = Historic land value per square foot
12.792 is the constant term
$X_1$ = AADT
$X_2$ = log of square footage

$E\,(Y) = 9.482 - 0.00012X_1 - 0.839X_2$

Where: $E\,(Y)$ = Current land value per square foot
9.482 is the constant term
$X_1$ = AADT
$X_2$ = log of square footage

The stepwise regression process removed predictors that were not significant, and this model did not find access control as a significant explanatory variable at the .05 level of significance. The predictor of AADT was found to have an inverse relationship with land value per square foot, and the predictor of the log of square footage also had an inverse relationship with the dependent variable. Tables 6-5 and 6-6 also include test statistic (t) information as well as each variable's significance in the model. Model 2 in these tables show that AADT and the log of square footage are significant at the .000 and .001 levels, respectively. Tables 6-5 and 6-6 may be compared to Tables B-5 and B-6 in Appendix B.

*Regression Diagnostics*

Regression diagnostics are used to determine if a model fits the data correctly. In particular, regression diagnostics determine if model assumptions are violated, and also find which observations are influential in affecting the model (*10*). Residual versus explanatory variables plots are used to determine model normality (*10*). Originally, a stepwise regression model was created by entering AADT, square footage, and access control as variables- this model yielded residual versus explanatory variable plots that indicated possible regression model violation. To remedy this, the square footage variable was transformed by using the log of square footage as a variable did make the error terms more normal. After this, the residual versus explanatory variables plots found the model set containing only three of the original five study corridors had slightly more normal error terms than the model set containing all five study corridors.

*Interpreting the regression model sets*

The resulting regression model set found to be the best fit for the Des Moines data (the three corridor model set) does contain some irregularities that should be addressed through additional analysis. First, square footage was found to be inversely related to commercial land value, which means that as parcels increase in size, their value per square foot (not overall value) decreases. Second, AADT was found to be inversely related to commercial land value, which contradicts conventional thought on commercial properties that increased exposure (or traffic volumes) to a property could result in more economic prosperity.

The regression model found that the log of square footage is inversely related to land values per square foot. To further analyze the possible impacts of land use on square footage, the 15 parcels with the highest square footage in the dataset were analyzed against the 15 parcels with the lowest square footage in the dataset, using Tables 2 and 3. First, the two groups of land parcels were analyzed by value per square foot; the smallest parcels had mean values per square foot of $3.94 (historic values) and $3.00 (current values), while the largest parcels had mean values per square foot of $2.84 (historic values) and $2.14 (current values). This finding is consistent with that of the regression model- as square footage increases, value per square foot decreases. However, comparing these trends to other factors on the land parcels could better explain the value variations by square foot. Comparing land use types on these two groups of land parcels could account for some of the land value variations by square footage. The most frequently occurring land uses on the largest land parcels included regional shopping centers, auto service, auto dealer, and retail. Conversely, the most frequently occurring land uses on the smallest land parcels included service and repair shops, offices, medical offices, and retail.

The regression model also found that AADT is inversely related to land values per square foot. AADT could be treated as a congestion factor in the model for all corridors were arterial roadways as well as multilane corridors. The corridors should have similar traffic counts, and therefore AADT could be used as a measure of congestion- if AADT was much higher on one corridor than another, it could be an indication of congestion. Or, perhaps AADT is not actually measuring congestion in this study at all. It is plausible to think that as congestion increases, land value decreases; however, this goes against traditional business thought that as traffic (or exposure to businesses) increases, economic prosperity should increase. Although sales were not measured in this study, and no conclusive evidence shows that sales decrease as AADT increases, commercial land values as an economic indicator did decrease as AADT increases. Future research should be performed to determine the extent of the relationships among AADT, congestion, and access control.

## CONCLUSIONS

The stepwise regression model determined that access control is not a significant factor on commercial land values in Des Moines. However, the model did find that both AADT and the log of square footage had inverse relationships with commercial land values in Des Moines.

This study found that although corridors with raised medians could be considered access managed, evaluating the same corridor using an access scale with many determinants of access control could find a corridor with raised medians to be “less” access controlled than a corridor with no medians. A prime example in this research is the comparison of Southeast 14$^{th}$ Street and Army Post Road. Southeast 14$^{th}$ Street has raised medians, but these medians have frequent breaks, and the corridor has many driveways spaced closely together. Army Post Road does not have raised medians, but has better driveway spacing practices. Using the access scale derived in this research, it was found that Army Post Road (with no raised median) was actually considered to be a higher access managed road than Southeast 14$^{th}$ (with a raised median). Descriptive statistics alone may indicate that commercial land value trends are lower on corridors with raised medians, the access scale variable clearly indicated access control levels on each corridor beyond raised medians.

The regression model can be further analyzed by examining variable relationships shown previously in Tables 2 and 3. 63rd Street had the highest average access scale score of the study corridors. 63rd Street also had the second-lowest AADT, the highest average square footage, and the second lowest average historic and current land values per square foot. Conversely, Euclid Avenue had the lowest average access scale score of the study corridors. Euclid Avenue also had the third highest AADT, the third average square footage, and second highest average historic and current land values per square foot. These two examples do follow the relationships established by the regression model; access control on a corridor does not seem to fluctuate with the other variables, but AADT and square footage do seem to have varied relationships with land value.

**Reject or accept hypothesis**

The inferential statistics used for this research found that access control was not a significant influence on commercial property values in Des Moines, Iowa. The hypothesis for this research was that commercial property values in Des Moines were not influenced by access management techniques, and these research findings support that hypothesis.

**Need for future research**

There is currently little quantitative research on the economic impacts of access management practices. This research conveys the need for further research on the economic impacts of access management, similar research using more case studies and more varied datasets, and more research on the determinants of commercial land value.

One important finding of this research is the need to reproduce this study or perform similar studies in different cities. Different cities or areas of the world may have different commercial property value determinants, and although access control was not shown as a significant determinant of commercial property values in Des Moines, findings may not be the same elsewhere. Additionally, there should be further study on corridors designed to be access managed. The "access managed" corridors used in this study (during corridor selection) had raised medians, but the driveway spacing on one of the corridors did not meet access spacing guidelines. Therefore, some corridors without medians actually scored higher than corridors with medians on the access control scale.

Similarly, future studies should be tested on corridors with more consistent access management techniques. This research was limited because the "access managed" corridors used for this study had raised medians, but many of these medians had frequent breaks for turning traffic, as well as large numbers of driveways. It would be valuable to see how access influences land values on a more consistently access managed roadway, with consolidated or controlled driveway numbers and fewer median breaks. Performing this study on more access-managed corridors may provide more conclusive results.

Additionally, there is a need to further study the impacts of traffic counts and/or congestion on commercial land values. Although increased numbers of traffic driving past commercial land parcels could increase customer exposure to businesses, oversaturated roadways could lead to congestion. Higher levels of congestion could make the roadway less desirable to travel unless people have a destination on the roadway or cannot avoid it in their travel path. If reduced numbers of people use the corridor for through travel, or on the way to another destination, the higher exposure to businesses will not matter; most people using the corridor will already have a destination on the corridor, and increasing business exposure may not increase sales.

Further research on the relationship between access management and commercial property values would be valuable by expanding current literature on the economic impacts of access management, and also as a tool for local access management implementation. If there was evidence that access management was not found to influence property values, transportation officials could have an easier job of implementing access control on local roadways. Access management has been proven to reduce crashes due to turning movements, but showing business owners that access control may not negatively impact their land values could be one step to further access management acceptance in the business community.

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## LIST OF TABLES

TABLE 1 Access Control Scale

| Type of Access Control | Points Awarded |
|---|---|
| **Driveway Spacing** | |
| Both driveways on a parcel spaced at least 300-500 ft from next | 5 |
| One driveway on a parcel spaced at least 300-500 ft from next | 3 |
| No driveways on a parcel spaced at least 300-500 ft from next | 0 |
| **Median Type** | |
| Raised median with breaks 1/4 or more miles apart | |
| Raised median with breaks for left turns 1/4 mile apart | 5 |
| Painted median (no two-way left turning lane) | 4 |
| Two-way left turning lanes (3 or 5 lane roadways) | 3 |
| Undivided roadway (2 or 4 lane roadways) | 2 |
| **Other Factors** | 1 |
| Right turning lanes on roadway adjacent to land parcel | |
| Right turning lanes | 1 |
| No right turning lanes | 0 |
| Frontage roads adjacent to land parcel | |
| Frontage roads | 1 |
| No frontage roads | 0 |
| Good internal circulation on land parcel | |
| Good internal circulation | 1 |
| No good internal circulation | 0 |
| Shared driveways | |
| Shared driveways | 1 |
| No shared driveways | 0 |
| Formality of driveways | |
| Formal driveways | 1 |
| Unspecific driveways | 0 |

TABLE 2 Explanatory variables comparison

| Corridor | AADT | Ave. Square Footage | Frequent Historic Access Scale Scores | Frequent Current Access Scale Scores |
|---|---|---|---|---|
| SE 14th Street | 28500 – 34300 | 35,788 | 0 to 1 | 4 to 5 |
| 63rd Street | 19100 | 60,470 | 2 to 3 | 6 to 7 |
| Army Post Road | 22300 - 24600 | 27,685 | 5 to 6 | 5 to 6 |
| Euclid Avenue | 20900 - 22200 | 42,980 | 1 to 2 | 1 to 2 |
| Grand Avenue | 11700 - 18400 | 56,406 | Variable: 3-9 | Variable: 3-9 |

TABLE 3 Dependent variables

| Corridor | Ave. Current Land Value per Sq Ft | Ave. Historic Land Value per Sq Ft |
|---|---|---|
| SE 14th Street | $1.93 | $2.15 |
| 63rd Street | $2.25 | $2.18 |
| Army Post Road | $2.82 | $3.64 |
| Euclid Avenue | $3.37 | $3.83 |
| Grand Avenue | $4.21 | $4.02 |

# TABLE 4 Model Summary, Historic Land Values

**Model Summary[c]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .330[a] | .109 | .100 | 1.81990 | .109 | 12.452 | 1 | 102 | .001 |
| 2 | .446[b] | .199 | .183 | 1.73371 | .090 | 11.393 | 1 | 101 | .001 |

a. Predictors: (Constant), AADT

b. Predictors: (Constant), AADT, Log of Square Footage

c. Dependent Variable: Historic value per square foot

TABLE 5 Model Summary, Current Land Values

**Model Summary[c]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics: R Square Change | F Change | df1 | df2 | Sig. F Change |
|---|---|---|---|---|---|---|---|---|---|
| 1 | .566[a] | .320 | .314 | .95440 | .320 | 48.108 | 1 | 102 | .000 |
| 2 | .630[b] | .397 | .385 | .90370 | .076 | 12.765 | 1 | 101 | .001 |

a. Predictors: (Constant), AADT

b. Predictors: (Constant), AADT, Log of Square Footage

c. Dependent Variable: Current Land Value per sq ft

# TABLE 6 Regression coefficients, historic land value

**Coefficients**[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | | 95% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 5.947 | .856 | | 6.947 | .000 | 4.249 | 7.645 | | | | | |
| | AADT | -1.16E-04 | .000 | -.330 | -3.529 | .001 | .000 | .000 | -.330 | -.330 | -.330 | 1.000 | 1.000 |
| 2 | (Constant) | 12.792 | 2.186 | | 5.853 | .000 | 8.456 | 17.128 | | | | | |
| | AADT | -1.23E-04 | .000 | -.350 | -3.924 | .000 | .000 | .000 | -.330 | -.364 | -.349 | .995 | 1.005 |
| | Log of Square Footage | -1.517 | .449 | -.301 | -3.375 | .001 | -2.409 | -.625 | -.278 | -.318 | -.301 | .995 | 1.005 |

a. Dependent Variable: Historic value per square foot

TABLE 7 Regression coefficients, current land values

**Coefficients**[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | | 95% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 5.698 | .449 | | 12.692 | .000 | 4.808 | 6.589 | | | | | |
| | AADT | -1.20E-04 | .000 | -.566 | -6.936 | .000 | .000 | .000 | -.566 | -.566 | -.566 | 1.000 | 1.000 |
| 2 | (Constant) | 9.482 | 1.139 | | 8.325 | .000 | 7.223 | 11.742 | | | | | |
| | AADT | -1.24E-04 | .000 | -.585 | -7.553 | .000 | .000 | .000 | -.566 | -.601 | -.584 | .995 | 1.005 |
| | Log of Square Footage | -.839 | .234 | -.277 | -3.581 | .001 | -1.303 | -.374 | -.238 | -.336 | -.277 | .995 | 1.005 |

a. Dependent Variable: Current value per square foot