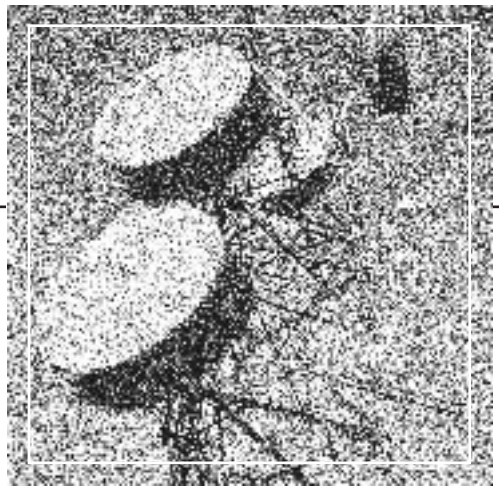


The Impact of Communication Towers on Residential Property Values

Overview

A major cellular phone provider recently hired our firm to conduct a study of the impact on residential property values due to proximity or view of communication towers. A sufficient amount of empirical data was available to develop a comparative analysis model to demonstrate the findings of this study.

By Allen G. Dorin, Jr., MAI, SRA and Joseph W. Smith, III

RICHMOND MSA

The methodology employed indicated that the presence of communication towers resulted in essentially no impact on residential values in the price range of $70,000 to $150,000 in those areas investigated. The upper part of this range is above the average sales price of a single-family dwelling in the Richmond MSA.

Introduction

The crux of the market study was to inform the client of the economic impact that communication towers may have on nearby improved residential housing values within the Richmond Metropolitan Statistical Area. The client specifically wanted to use the findings of the study to determine whether there was sufficient market evidence to conclude that the presence of communication towers does in fact, negatively influence the market value of improved residential dwellings by reason of proximity or view. In turn, the client intends to use the findings and conclusions of the report to assist in the acquisition of new tower sites.

Background

The subject study area is in the Richmond-Petersburg Metropolitan Statistical Area (MSA), which consists of the cities of Richmond, Petersburg, Colonial Heights, and Hopewell; and the counties of Chesterfield, Henrico, Hanover, Goochland, Powhatan, New Kent, Charles City, Dinwiddie, and Prince George in central Virginia. The following map provides a brief overview of the Richmond MSA market study area.

At the request of the client, the market study was restricted to the counties of Chesterfield, Goochland, Hanover, Henrico, and New Kent and the city of Richmond. A thorough search for adequate market data on which to base the findings of the study required a great deal of research and analysis from the counties previously mentioned. By process of elimination, the study parameters were reduced to the counties of Chesterfield and Henrico. The counties of Goochland, Hanover, New Kent, and city of Richmond were excluded, due to the lack of sufficient market evidence available to prove the existence, if any, of any adverse effects upon residential values because of an individual tower location. The individual test sites were eliminated for reasons such as location in remote undeveloped areas, industrial neighborhoods, commercial corridors, or along interstate highways.

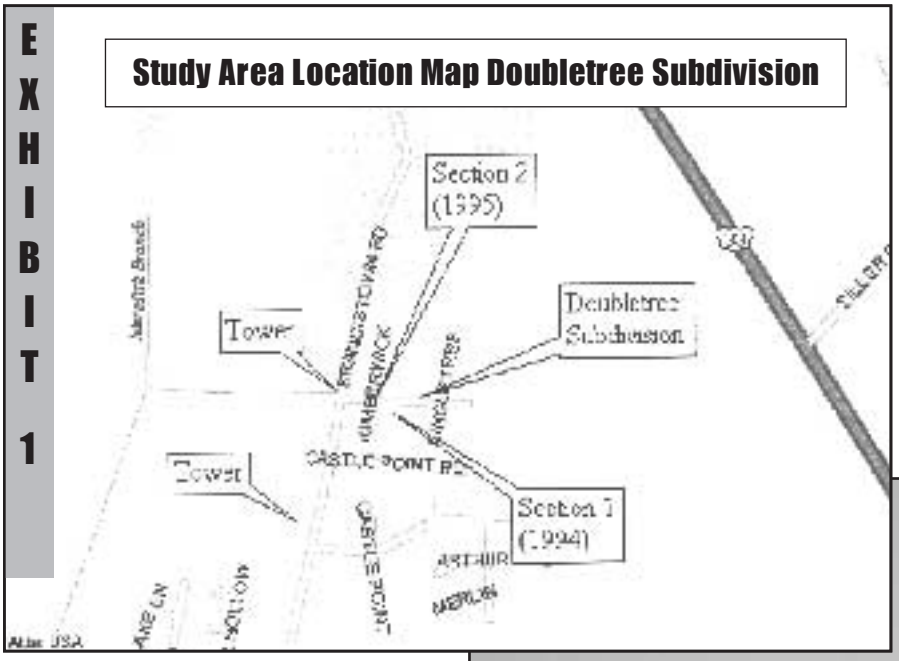
From the research available, six test sites were located. These tower sites were selected based on their proximity to or visibility from residential properties that were deemed to have the possibility of potential negative impact upon property values.

Location of Test Sites

The county of Chesterfield, located in the south and southwest quadrants of the MSA had one test site located just east of a townhouse project. This county was traditionally a bedroom community of the city of Richmond until the 1970s during a period when a building boom occurred. It has become a heavily populated suburban county with a full complement of residential, commercial, and industrial land uses.

The county of Henrico, located in the western, northern, and eastern quadrants of the MSA had the remaining

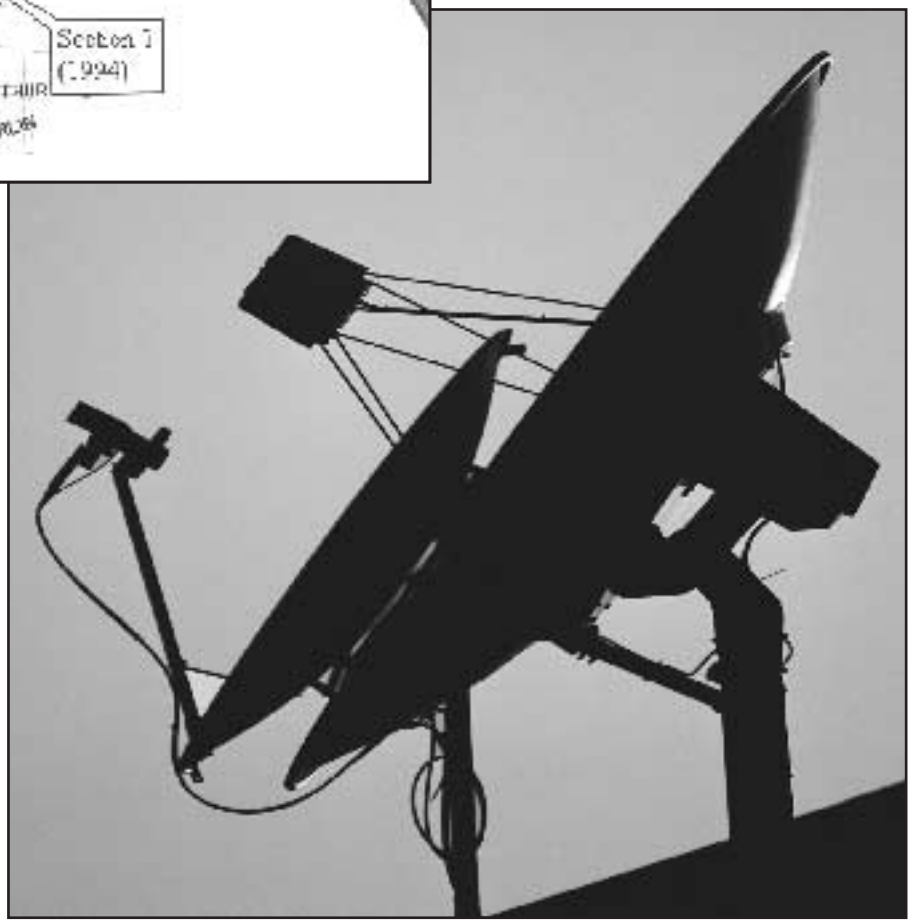
EXHIBIT 1



five test sites used in this study. The county was the original bedroom community of the city of Richmond. Because of proximity to major linkages with the city of Richmond, its establishment as a significant suburban entity preceded that of Chesterfield County.

Tower Research

The client was particularly interested in identifying and locating communication towers in excess of 150 feet in height that may have potential negative impact on nearby residential property values. Only six existing tower sites were deemed applicable to this study out of the 77 sites inspected. The structure of the towers varied from steel lattice type to steel columnar type with guy-wire supports. Three of the tower sites were located within close proximity of single family detached residential subdivisions ranging in price from $70,000 to $150,000. This price range is typical of most first time homebuyers in the areas investigated. Of the three remaining tower sites, one was located near a multi-family residential apartment complex and the other two within view of a single family townhouse development. To clarify the methodology and analysis used to arrive at a conclusion, only one of the three residential subdivisions studied will be discussed.



Explanation of Research Methodology

Research was conducted at each of the respective localities previously mentioned in order to locate existing communication tower sites. This task was primarily accomplished by interviewing planning department officials familiar with this type improvement, obtaining copies of meeting minutes of the governing boards or council authorizing the construction of the towers, and familiarity with the general vicinity of the Richmond MSA. Based on the data obtained from research, the tower sites were plotted on maps showing their relative proximity to residential development.

Primary attention was focused upon residential properties adjacent to or surrounding each of the tower sites investigated. Those properties deemed to be located in sparsely developed areas, industrial neighborhoods, or commercial corridors were eliminated from further study.

After selecting the six test sites, further information was gathered including physical information on the respective towers, correspondence regarding the permitting process, specific public data on the residential sites deemed to be

within the potential impact area of the tower, and sales/physical data on similarly improved properties in the general vicinity but not considered impacted by the tower. If possible, interviews were conducted with property owners and real estate agents who had current listings of properties included in the analysis.

After assimilating the gathered data, a summary of each test site neighborhood was prepared by means of quantitative and qualitative adjustment techniques for a comparative analysis.

Brief Overview of Analysis

According to the Eleventh Edition of *The Appraisal of Real Estate,* published by the Appraisal Institute (Chicago: 1996, page 414), "A comparative analysis includes the consideration of both quantitative and qualitative factors. Quantitative adjustments are developed as either dollar or percentage amounts. Factors that cannot be quantified are dealt with in qualitative analysis." In essence, the quantitative method is a mathematical procedure that is typically accomplished through a paired sales or cost comparison analysis. The qualitative analysis is much more subjective in its approach, and is commonly used when no basis for a quantitative adjustment can be concluded.

The sales of the properties included in the analysis were sorted according to price paid per square foot of dwelling area after adjusting each property to a common denominator (quantitative). The potential impact of the respective tower sites was rated for each property based upon observation. The impact rating was then compared to the adjusted prices paid per square foot as an indication of any definitive correlation (qualitative).

Analysis

Doubletree Subdivision, one of the three subdivisions studied, will be examined in order to explain the methodology and thought process used throughout the study analysis. Doubletree is a 67-lot subdivision located

in a developing area in Henrico County on the east line of Francistown Road between Hungary and Springfield Roads (See Exhibit 1, page 11). Section 1 was approved in 1994 and Section 2 in 1995. Construction of the dwellings began in 1995. The majority of the lots sold over a two-year period, a rate considered average for this price range. The average lot size is .204 acre (8,903 square feet) with a minimum width of 63 feet. Improved properties sold mostly in the $135,000 to $145,000 price range. All of the dwellings are two story and most have front-loading garages.

There are two communication towers visible to properties in this subdivision. One is located on the west side of Francistown Road at the west end of Wildtree Drive. It is a 168-foot high steel lattice structure, which was built in 1964. It is visible from all of the front yards of the lots fronting on Wildtree Drive and the rear yards of those lots backing to Francistown Road.

The other tower is also located on the west side of Francistown Road but south of the subdivision. It is a 305-foot high steel lattice tower, which was constructed in 1982. Because of the wooded area between it and the subject subdivision, its visual impact is less dramatic; however, it is within noticeable sight of the lots in Section 1 backing to Francistown Road.

Out of 67 lots, 25 improved properties were studied within the subdivision. In analyzing the properties, all those adjacent and nearby lots deemed to be impacted by their proximity to and/or view of the two towers in question were researched. In addition, several other properties in the subdivision considered to have only minor or no impact at all were also researched. The recorded sales price for each of the 25 properties was broken down to a unit price per square foot for the purposes of comparison. The unit prices, before adjustments, range from $64.54 to $93.75 per square foot, with a median unit price of $77.47 per square foot.

For the comparative analysis model, a hypothetical base dwelling was created to represent the typical improved dwelling in Doubletree Subdivision. The hypothetical dwelling was a 1,800 square foot two story, colonial style having central air and heat, 2 1/2 baths, no fireplace, attached one car garage, no frontage on Francistown Road, and sold in 1997. All of the 25 improved sales were then compared to the base dwelling with adjustments being made relative to time of sale and major physical and location differences. A 5 percent annual appreciation rate for time was used in the model.

Those property owners adjacent to Francistown Road did state that the seller discounted the lots for exposure to that road.

In an effort to achieve total sellout, the lots abutting Francistown Road were given a $4,000 discount, according to the developer/builder. Thus, an upward adjustment of $4,000 was made to the improved lots that abut Francistown Road for inferior location on a busy thoroughfare.

The remaining adjustments were based on differences in the costs of the various building components. After application of the adjustments, the properties were then sorted in ascending order by the indicated adjusted sale price per square foot. The spreadsheet in (See Exhibit 2.) provides a descriptive summary of the comparative analysis model.

Primary attention was focused upon seven improved lots that were deemed to have major impact potential, due to their proximity to the tower located on the west side of Francistown Road directly across from the entrance of the subdivision via Wildtree Drive. Two out of the eight lots are situated at the northeast entrance of Doubletree Subdivision fronting the intersection of Wildtree and Kimberwick Drives. The remaining six contiguous lots are located along the northeast line of the subdivision fronting Kimberwick Drive. Each of these lots has direct rear exposure to Francistown Road and the 168-foot high tower.

A total of seven improved lots were classified as having significant impact potential due to their exposure to the two towers. Five of the lots are located along the northeastern line of the subdivision facing Kimberwick Drive and abutting Francistown Road to the rear. The two remaining lots in this classification are located along the northern line of the subdivision facing the intersection of Kimberwick Drive.

The classifications of minor and no impact were given to properties that were considered to have little or no impact at all due to a buffered view or sufficient proximity away from the two towers.

Eleven of the lots studied in this subdivision, located along the northwestern and southwestern lines of the subdivision via Singletree Lane, Singletree Court, and Wildtree Court fell under these two classifications.

Summary of Analysis

The adjustment process used was an attempt to equalize the properties. Overall, the range in unit prices paid per square foot was narrower after adjustments were made in the comparative analysis model. After making adjustments for the major items categorized in the adjustment grid (See Exhibit 2.), a range of $66.29 to $92.31 in indicated price per square foot was reflected. Even after making adjustments for these items, a significant range in unit price per square foot remained evident.

However, the fluctuation in these

adjusted unit prices per square foot can be attributed to a variety of amenity packages that the individual homeowner may have purchased in an attempt to customize their homes, such as upgrades in appliances or finish features. Although, no adjustments for the varying degree of amenities or custom work were made, the range of adjusted unit prices per square foot is deemed to be supportive of showing the effect, if any, of the two towers on property values within the subdivision.

From on site observations, each property was rated relative to the impact of the tower due to proximity or view in one of four categories: major, significant, minor, or none. Those properties in which the tower was deemed to have a "major" impact were mostly adjacent to and/or having full view of the tower. "Significant" impact was assigned to those properties having full or obvious view of the tower.

"Minor" impact was assigned to those having a "winter view" or noticeable presence of the tower. Those rated as "none" had little or no view of the tower.

The rationale behind this rating system is that if there were a noticeable trend where those properties rated as having a major or significant impact were at the lower end of the range of unit prices paid per square foot, further research would then be warranted as to the cause of this tendency. In an effort to further substantiate the findings of the comparative model, personal interviews were held with property owners whose property was ranked in the major to significant categories. All of the respondents stated the towers had no impact on their purchase decisions. However, those property owners adjacent to Francistown Road did state that the seller discounted the lots for exposure to that road.

Summary of Study

The chart on page 16 is a summary categorizing the results of the investigation of the six existing communications towers in each of the localities included in this study:

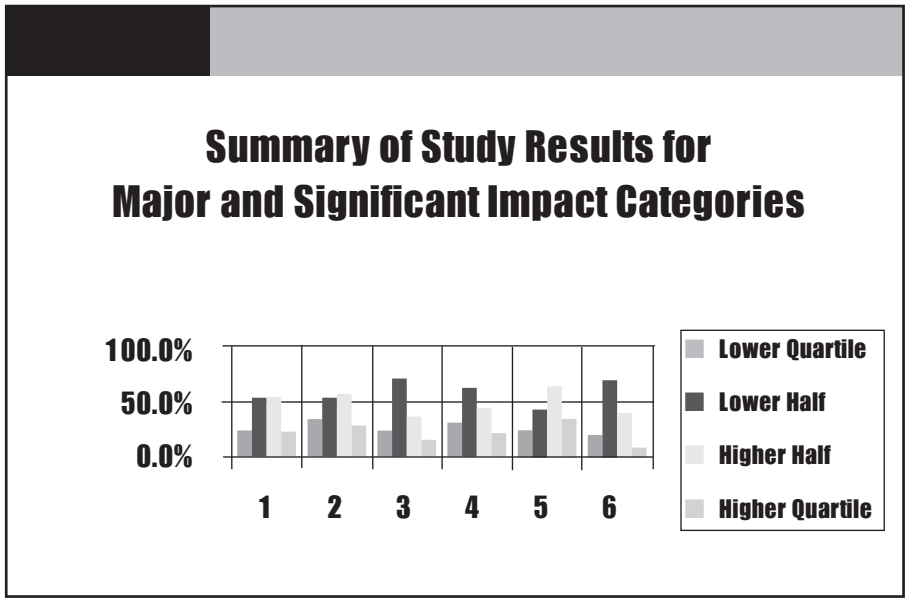
SUMMARY OF STUDY

Locality	Subdivision	No. of Properties Studied	No./Percentage of Properties Considered as Being Impacted In Either a Major or Significant Category	Lower Quartile Major or Significant Impact *	Lower Half Major or Significant Impact *	Higher Half Major or Significant Impact *	Higher Quartile Major or Significant Impact *
(1) Chesterfield	Rolling Hills at Buford	23	10/44%	20.0%	50.0%	50.0%	20.0%
(2) Henrico	*Doubletree*	*25*	*17/68%*	*29.4%*	*47.1%*	*52.9%*	*23.5%*
(3) Henrico	Eagles Ridge	18	9/50%	22.2%	66.7%	33.3%	11.1%
(4) Henrico	Edenberry	21	11/52%	27.3%	59.1%	40.9%	18.2%
(5) Henrico	The Timbers	22	10/46%	20.0%	40.0%	60.0%	30.0%
(6) Henrico	Wilkinson Estates	31	14/45%	14.3%	64.3%	35.7%	7.1%

* Allocation of the percentage of properties considered as being impacted in a major or significant category; range in comparison units based on adjusted sale price per square foot of finished living area.

The graph below represents the results of the investigation of the six existing communication towers. Graphical representation is a useful technique that provides the reader with an overall picture of the empirical data previously mentioned.

In each of the study areas, approximately half the properties were deemed as being impacted in a Major or Significant category. The remaining properties were in the Minor or None category. The allocation of the percentages was based upon the number of properties impacted in the Significant or Major categories in the lower and upper quartiles and lower and upper halves divided by the total number of properties impacted as such.



For example, in the Doubletree subdivision, 25 properties were included in the study. Of those 25 properties, 17 were considered as being in the Significant or Major impact category (68 percent). Five of those 17 properties impacted as such, (representing 29.4 percent of the total number of properties in those categories) were in the lower quartile (bottom 25 percent) of the range in adjusted unit prices paid. Eight properties (47.1 percent) were in the lower half of the range. However, nine (52.9 percent) were in the upper half and four (23.5 percent) in the upper quartile of the range in unit prices paid.

Because of the diversity of representation in each of the allocated segments of the range in adjusted unit prices, it is concluded that there is insufficient evidence to suggest there was any measurable impact on value. This is further supported by the responses from personal interviews with the property

owners who stated that the towers had no detrimental impact on their decision to purchase their homes. Several listing agents and the builder stated that the two towers were never an issue. The impact of Francistown Road was the only concern that came from potential purchasers and a discount of $4,000 was made for this reason.

Statistical analysis can provide background information to enhance the understanding of a given environment and directly assist in making specific decisions. It can range from simple summaries of data to the identification of patterns of data that can form the basis for a conclusion of central tendencies. For the purpose of this study, measures of relative standing for characterizing the distribution of empirical data were used. This technique served as a useful alternative to frequency distribution and was indicative of particular data values relative to the entire data set for each test site.

Similar findings occurred with the other study areas where properties in the Significant and Major impact categories were found at both ends of the range in adjusted unit prices paid. Again, interviews with the affected property owners revealed no impact upon purchase decisions. On site managers were interviewed in regards the potential tower impact upon individual units for both the apartment complex and town house development in an effort to establish a basis for any potential rent loss. Not one negative impact response could be attributed to the towers.

Overall, there were 52 interviews conducted with individual property owners. None of the interviews resulted in a negative response. In fact, several of the interviewees said that they paid a premium for their homes in order to be within close proximity to the towers. When asked the reasoning behind this decision, the most common reply was that the tower was perceived as being a potential asset because it served as a buffer against further development. The only adversities noted throughout the entire interviewing process were towards busy thoroughfares running adjacent to the residential developments and close proximity to shopping/retail centers.

Conclusion

Based upon the comparative analysis methodology used in this study, as well as interviews with purchasers of properties located adjacent to and/or in full view of communication tower structures, it was concluded that there was no consistent market evidence suggesting any negative impact upon improved residential properties exposed to such facilities in the areas included in the study.

The model used in this study could be applied to any type of perceived adverse influence such as a water tower, overhead transmission line or sanit ary landfill. The validity of the study is enhanced where the comparative analysis includes similar type properties that require minimal and well supported adjustments as well as interviews with market participants potentially affected by the respective adverse influence. The statistical measure of central tendency not only validates a typical variate but also the lack thereof. ■

Allen Dorin, Jr. *is President of Knight, Dorin & Rountrey Real Estate Services, Richmond, Virginia. He earned a bachelor's degree in Commerce from the University of Virginia and a master's in Real Estate and Urban Land Economics from Virginia Commonwealth University. His appraisal practice has most recently focused on property acquisition for public and semi-public rights of way.*

Joseph Smith *is an MAI candidate in the Appraisal Institute's Graduate Valuation Program at Virginia Commonwealth University located in Richmond, Virginia. He is currently working as intern for the appraisal firm of Knight, Dorin & Rountrey gaining experience credit hours to apply toward his MAI designation. Mr. Smith earned his bachelor's degree in history from Hampden-Sydney College, Hampden-Sydney, Virginia.*