GEOSPATIAL PROCEDURES FOR IDENTIFYING A PROSPECTIVE DEVELOPMENT LOCATION: APARTMENT ORIGIN WALKABLE DESTINATION SCENARIO

By

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A THESIS PRESENTED TO THE GRADUATE SCHOOL
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To my Mom, Colin, Grandma and Grandpa, Aunt Kathy, Great Grandma and the rest of my family.

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I thank Dr. Thrall for his patience and guidance. I would like to thank my family for all of their support. I would also like to thank Richard Sheffler for all of his statistical recommendations. Finally, I would like to thank all of my friends here in Florida, without whom I never would have made it.

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LIST OF ABBREVIATIONS

DG	Demand Generator
GIS	Geographical Information System
LSP	Life Style Segmentation Profile
SFCC	Santa Fe Community College
UF	University of Florida

Abstract of Thesis Presented to the Graduate School
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GEOSPATIAL PROCEDURES FOR IDENTIFYING A PROSPECTIVE DEVELOPMENT LOCATION: APARTMENT ORIGIN WALKABLE DESTINATION SCENARIO

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Chair: Grant Ian Thrall
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We set forth a set of procedures for determining the best location for a new apartment complex in Gainesville, Florida. An apartments' location is central to its economic performance, thus it is important to find a location that would be optimal for a new apartment complex. We reviewed literature on apartment complexes and set forth a set of procedures for locating an apartment complex. It adds to the existing literature on apartments, and apartment markets, and can help to improve the decision making process for real estate professionals.

Different methods were used to determine the proper site of a new apartment complex. Psychographics were used to determine the demand and trade areas of apartments in Gainesville. Hedonic modeling was used to determine the characteristics that go into rent in the Gainesville market. Once everything was analyzed, an algorithm was developed to determine the best site for a new apartment complex. The algorithm has seven steps for identifying a potential location for development of an apartment complex, these steps are composed by analyzing the Demand Generator, Population Identification, Hedonic Pricing Model, Pipeline Construction, Locational Amenities, Locational Necessities, and finally Site Availability. This paper is the first to set out a specific list of rules for locating a new building.

CHAPTER 1
INTRODUCTION

The location of a new apartment development can mean the difference between successful business investments, versus investments that may not even break even. These are the steps that an analyst can follow to identify and evaluate the best prospective locations for new apartment developments. Data for Gainesville, Florida, were used to illustrate the steps. The procedures introduced here can be replicated for any location if the appropriate data is available.

Among the data required for the study is the location and amount of competitive supply of apartments, and historic trends of apartment construction, property values, and rental rates. In addition to current supply, apartment development scheduled for construction and therefore adding to future supply must be considered; this is known as the supply “pipeline” which is assembled from building permits. This information is compiled to predict future values and rental rates by location, a necessary component for making business decisions that will lead to a higher likelihood of generating a profitable return.

Often ignored in apartment studies, is the human component of a successful apartment development. People will be living at the location. The location and the amenities of the apartment development must be amenable with the people making the choice to live there. A contribution of this study is the use of psychographic measurements which will identify the type of person most likely to find the amenities and location suitable. Conversely, with the target psychographic group identified, the appropriate location and amenity bundle can be selected by the developer. Psychographic measurements are also known as Life-style Segmentation Profiles (LSPs). Here, ESRI’s Tapestry LSPs are used which breaks the population into twelve Life Mode Groups. Tapestry also offers a more granular set of 65 LSP groups. The more granular the segmentation, the more narrow the demographic profile. The benefits of narrowing the demographic profile are that the selection of amenities and therefore costs of development can more closely fit the target population. A disadvantage of a highly granular segmentation approach, however, is that the developer might appeal to only a very small demographic market leading to a thin demand and therefore higher risk. Balancing these tradeoffs, this study therefore uses the boarder 12 Tapestry segments.

Hedonic modeling is used to determine the relationship between rent, and apartment location and their amenities. An algorithm assembling the above information is introduced to evaluate the geographic trend of apartment rents and thereby prospective rents for the new apartment development. Following Grant Thrall's "hierarchical categories of geographic reasoning," the penultimate stage of geospatial reasoning is "judgment" (Thrall, 2002). Judgment is the "so what" stage of analysis. Improving the judgmental decision is the ultimate objective of business geography. Therefore, a recommendation will be made for a new apartment complex. The primary data used for the analysis was compiled through 2 years of research beginning in 2005. Development in the pipeline and development that has actually occurred since the termination date of the data collection is used to document if this study actually anticipated future development trends.

Thesis Questions: Where are the locations that can best take advantage of the increasing student market demand for housing? What are the characteristics of the UF student market; in other words, what can we learn from the students' psychographic LSP profile that can inform the developer of the composition of amenities that are best included in a new apartment complex targeted to this market?

CHAPTER 2
LITERATURE REVIEW

Psychographics

Psychographics provide a complete description of consumer behavior based on demographics but also components of consumer behavior not captured by demographics alone. Reynolds and Darden (1972) used psychographics to determine the trend of women shoppers in Dublin, Georgia. Through traditional methods and the use of psychographics they were able to determine which type of women is more likely to shop outside Dublin. These researchers revealed that women who are more likely to shop greater distances outside the local area tended to have more wealth, be more highly educated, and tended to be middle aged in comparison to women that shopped predominantly in the local area (1972). This pioneering study corroborates the above finding and helps explain why UF's young student population is tightly clustered near the core campus area. Tassiopoulos, Nuntsu and Haydam (2004) used psychographics to determine the makeup of the average wine tourist in South Africa. Their research showed that the average wine tourist for that region is a young professional woman without children. The current generation that fits that profile are referred to in the popular press as a "Generation Xer" (Tassiopoulos, Nuntsu, Haydam, 2004).

Psychographics have been used to identify the characteristics of people that visit specific areas. Dutta-Bergman (2002) was able to extrapolate the picture of the average internet user. Dutta-Bergman discovered that the average internet user is a young person who exercises, is a crafty consumer, and is "innovative" (2002). This research has allowed web-masters to design internet pages better more specific and relevant to the needs of the average web site viewer. Psychographics are an important area of study because it allows an individual to explore variables not covered by conventional demographics and thereby get a better understanding of demand and prospective changing demand.

Apartment Studies: Hedonic Pricing Models

Hedonic pricing models have been used on all areas of the real estate market to evaluate property value or rental rates, it involves running a regression to capture trends in the real estate market of interest. Stephen Malpezzi states that, "The method of hedonic equations is one way expenditures on housing can be decomposed into measurable prices and quantities, so that rents for different dwellings or for identical dwellings in different places can be predicted and compared. At its simplest, a hedonic equation is a regression of expenditures (rents or values) on housing characteristics" (Malpezzi, 2002). Hedonic modeling has been used to calculate the impact that "quality of life" has on rental rates. John Kain, and John Quigley (1970), used hedonic modeling to determine how the quality of housing affects value; their findings were that the quality of a dwelling had as much impact on property value as does other standard components of a hedonic model, such as square footage, age, number of bathrooms, fireplace, and bedrooms (Kain and Quigley, 1970).

Determinants of market housing rent have focused on how various amenities affect valuation. Hedonic modeling is used to distinguish the impact of how the various amenities affect rent. Pagliari and Webb (1996) successfully modeled monthly rent as a function of occupancy rates and rental incentives. They were also able to set the appropriate rental rate through the results of their regression. Benjamin, Sirmans, and Sirmans (1989) studied the effect of amenities, services and external factors on apartment rental rates. They used 188 observations from 92 apartment complexes in Lafayette, Louisiana. They demonstrated that size of the apartment, size of the complex, and age of the complex were the primary factors that affected rent. Amenities such as 'covered parking, all utilities paid and a modern kitchen' were highly prized in their sample, as were swimming pools. Amenities internal to the apartment complex affected rent the most. Only one external factor affected rent in their sample: the degree of congestion was the main external determinant affecting rent. Bible and Hsieh's (1996) study of apartments in the Shreveport-Bossier, Louisiana, used GIS to explore the spatial relationships of the local market. They found that the age of an apartment building and the size of the apartments have a negative impact on apartment rent, while the presence of swimming pools and fireplaces result in higher apartment rents. They also found that the distance to a college or university has a negative impact on rent. The conclusion of these studies is that location is an amenity, and that the amenity of location matters.

The impact of absolute location versus relative location has been examined by Frew and Wilson (1990). Their hedonic model calculated a rent gradient for apartments in Portland, Oregon. They included amenities of the apartment complex as well as dummy variables to represent distance relative to the downtown. They found that location was crucial in determining land values and rent. "The results clearly show that rent values drop substantially for the first ten miles outside the city center, indicating that the downtown area is the central urban hub" (Frew and Wilson, 1990, pp. 22). Their results also revealed that a 'rent gradient ridge occurs' around freeway corridors; they hypothesized the ridge was attributable to accessibility to transportation. The highest apartment rents do not necessarily concentrate around the center of the city; local maximums can occur in other areas because of neighborhood (location) effects, and amenities of the apartment complex itself. Nevertheless, the general trend is for rent to decline away from a central node, while rising with proximity to other albeit comparatively minor nodes. Twelve years following their publication on apartment rents, Frew and Wilson revisited their earlier study and confirmed that the highest rents are not solely concentrated in the downtown area, but that different areas command different rents based on their access to transportation corridors. Their model showed that rent was highly correlated to access to a “highway” and “highway intersection” (Frew and Wilson, 2002). Frew and Wilson confirmed that apartment rent varies with location to different nodes and access to transportation. Therefore, minimizing distance to a central node and good access to transportation is important when choosing a location for a new apartment complex.[1]

Asabere and Huffman (1996) evaluate the actual value of the apartment building rather than apartment rents. Their analysis concludes that proximity to freeways, and “thoroughfares” in Philadelphia correlates with higher property values, as does proximity to the central business district. Benjamin and Sirmans too looked at the impact of proximity to transportation on apartment rent. Their study incorporated 250 apartments in the Washington D.C area that were near ‘Metrorail Stations.’ They found that rent decreases as distance from a ‘Metrorail station’ increases. Internalizing Benjamin and Sirmans’ conclusions into framework for improving apartment location decisions would suggest that developers give higher priority to locations near to transportation hubs. If locating near the desired central node is not possible, then a second best solution would be to locate near a transportation hub that accesses that specific node.[2] Song and Garrit-Jan (2003) in their study of willingness to pay for “new urbanist” features found that people are willing to pay more for access to transportation, and better walking access to commercial uses; however, these same people consider disamenities to include higher density, nearby multifamily housing, and proximity of commercial real estate.

[1] Access to transportation or transportation corridors is important for people commuting to work on a daily basis. Most people would rather live closer to their occupation but when that is not an option those same people prefer to live where it is easiest to get to work. Researchers have used hedonic modeling to assess the distance of transportation hubs to apartments and the resultant affect on their rental rates.

[2] This result was proven in Thrall (1988, ch. 7). Thrall demonstrates that as transportation cost and time decrease, access to a transportation hub, or the central node accessed via the hub becomes equivalent.

The literature indicates that there are a wide variety of destinations that people want to access (Cervero and Duncan, 2003). Generally, places of work and shopping rank as the most important destinations. Destinations affecting apartment rents include hospitals, downtown city centers, shopping locations, and universities. Each destination requires unique analysis to capture the characteristics of the population placing high priority on accessing the specific destination. The importance of transportation access cannot be underestimated. Is the destination a Walkable (Cheadle, Garvin, Johnson, Lee, Lin, Moudon, Schmid, Weathers, 2006) place, with public transit access, or is the destination a car environment accessed only by private transportation? The type of destination and the mode of travel linking apartment origin and destination must be considered. The example of this thesis is the walkable environment of University of Florida which has limited automobile parking; therefore, the transportation linkage between proposed apartment development and the UF destination is critical to the success of the development.

A university's effect on rental rates has been studied by Ogur (1973). His study evaluated the rental housing market in comparison to the population of students enrolled in school *versus* employment in the manufacturing sector. The study consisted of information gathered from 62 counties in New York State in 1960. His hedonic regression documented that a university has a significant impact on nearby rental housing. His results further revealed that there was no clear distinction between rents that "non-whites versus whites" pay. Instead, it was the presence of a university that incremented rents to a higher level (Ogur, 1973).

Distance to a university is important to the students attending the university, and consequently may be willing to pay more than others for premium university access. Guntermann and Norbinn (1987) demonstrated that variation in rents in Mesa and Tempe Arizona depended on access to the university. Their primary data base of 104 apartments was created via personal contact with property managers. Their hedonic model revealed that university students rank as high priority both access to the university and the condition of the apartment. Condition of the apartment was not depending upon age; rather, condition as measured by Guntermann and Norbinn (1987) was dependent upon the characteristics of the amenities of the apartment and apartment complex. Therefore, good access to University of Florida is hypothesized to be the most important factor when selecting the best locations for new apartment complexes targeted to UF students. UF is the primary destination for the target rental population. Walking and bicycling proximity to UF is one measure of access; availability of public transportation is a second best location. The bundle of amenities offered is hypothesized to also important to the UF student when choosing an apartment.

CHAPTER 3
APPLICATION OF ALGORITHM

Procedural Issues

The procedure followed here for the large part follows the general framework introduced by Thrall (2002); namely, first calculate trade area; second calculate demand; third, calculate competitive supply; and fourth, integrate these findings to make a recommendation. However, to calculate the relevant trade area, the target student population will need to be derived, and this implicitly calculates demand. So the order of Thrall's (2002) procedure will need to be rearranged, and indeed even iterated between steps.

Heuristic Algorithm

The Heuristics algorithm allows for a standardized set of procedures for locating an apartment complex, for our purposes the algorithm addresses the needs that must be met to locate a prospective apartment site. Seven heuristic steps or rules are introduced to identify prospective sites for a new apartment complex.

1. **Demand Generator (DG) -** identify a demand generator and the area surrounding the node that prospective renters are willing and able to commute between the demand generator and a prospective apartment complex location. The distance will vary by demand generator, population characteristics, and transportation access.

2. **Population Identification -** identify the psychographic LSP group to target. Confirm the current demand of the target LSP accessing the DG. Identification of the target LSP group gives rise to necessary amenities and affordability requirements of the new housing. Project the increase in target LSP population accessing the DG. If there is no increase in target LSP population, then the new development must compete solely on the basis of price, higher level amenities, and superior location. The developer must be so forewarned and then calculate if the proposed development with the necessary characteristics and price is financially viable.

3. **Hedonic Pricing Model-** Construct a database of rents and amenities by location (address). Thematically map the current rents adjusted by bedrooms and other amenities. Derive the in apartment surface, including distance decay of rents from the DG.

4. **Pipeline Analysis-** Construct a database of competitive pipeline supply. Identify locations of clusters of competitive supply. Avoid the location if the competitive supply will require the new development to compete on the basis of price in order to achieve occupancy over 94%

(Thrall, 2002). Hot spot development areas can also serve as gravitational attractants, as "the" place to reside.

5. **Locational Amenities-** identify second order locational amenities that will piggy back onto the primary DG. Secondary locational amenities include good proximity to restaurants, nightlife, and so on.

6. **Locational Necessities-** A successful development will also have available those necessities that prospective renters expect to obtain on a daily or weekly basis. If the apartment complex and the DG are walking environments, then the nearby necessities must also be available via waking or public transportation. If the target population group is likely to have children, then the quality of schools must be assessed. The crime rate must be considered. While all desire a low crime rate, the rate is more important when making a location decision for some LSP groups than others.

7. **Site Availability -** identify sites that can be acquired to support the development, and estimate their necessary cost of acquisition. Without adequate prospective development sites, there can be no new development.

Demand Generator

Florida is the third fastest growing state in the nation. Even during the recent downturn in the economy and migration to Florida, "despite a recent slowing in the rate of growth in new residents, Florida remains on of the fastest growing states in the nation" (Schenker, 2007). As our economy slows down Florida remains an affordable place to live: which makes it an attractive destination. "During the 1990's, Florida's population increased by 3 million. Only California and Texas experienced population increases equal to or exceeding Florida during the decade" (Schenker, 2007). Florida's population increase is attributable to in-migration from other states and other nations; natural increase, the difference between birth and death rates, contributed less in population increase. Most of the population increase has been in the southeastern region of Florida however, this population increase has implications for north central Florida, particularly Gainesville Florida. As the state's population increases, the increase translates into greater enrollments at University of Florida and Santa Fe Community College. In 1997, UF's student population equaled 42,053, and SFCC equaled 12,486. UF's student numbers in 2008 exceed 51,000 (http://www.ir.ufl.edu/factbook/i-05.a_hist.xls), and SFCC exceeds 16,000 (Jim Lewis, Office of Institutional Research, SFCC). The surge in increase in population results in an increase in the demand for student housing.

Gainesville's economic base remains concentrated in education and government services, most of which are located in the downtown to UF campus corridor, an exception being the SFCC main campus in NW Gainesville[1]. Gainesville's metropolitan area hosts a population projected at 251,332 people (www.ams.usda.gov), while 108,655 people reside within the city limits (www.bestplaces.net). Gainesville's spatial population trend has been westward, away from the historic central downtown , and toward the Interstate and its concentration of retail shopping opportunities. (see for example, Smersh, Smith and Schwartz, 2004)[2].

In 2004, the University of Florida admitted 46,441, and in 2005, the university admitted 49,780, resulting in a net increase of student enrollment at UF of 3,339 students (http://www.ir.ufl.edu/factbook/i-05.a_hist.xls). Assuming that students were adequately housed in 2004, and that the market over time had adjusted so that there was not an oversupply of student housing, then an increase of 3,339 students represents a significant increase in demand for additional student housing. To accommodate and take advantage of the growth in student population, where should new student housing be located? Answering that question is the central focus of this thesis. Applying a gamut of geospatial procedures, that question is answered here.

[1] According to ESRI's business analyst, 19% of Alachua County's working population is engaged in education based upon NAICS employment data.

[2] It is conventional in Real Estate Market Analysis to provide an overall description of trade area that places the population in context.

The registrar at University of Florida allowed Dr. Grant Thrall to have access to the student records. The confidentiality and sensitivity of accessing individual student records necessitated that Dr. Thrall perform the basic geospatial analysis, the results of which were provided to me for subsequent analysis and synthesis. Among the information in the student database is permanent address and address on campus, as well as personally identifying demographic characteristics such as age, gender, year in school, and other educational curriculum information. Dr. Thrall's and my analysis determined that 80% of the students at UF have campus addresses within 3.65 miles of the core UF campus as defined by the intersection of University Avenue and 13th Street, this area makes up the University of Florida's primary trade area[3]. The University of Florida's trade area is the entire state of Florida and to a lesser extent the entire nation, and even globally; however the primary trade area is concentrated around the university[4]. Grant Thrall explains states that, "The primary trade area is the geographic core from which a real estate project will get the majority of its business. Applebaum (1996) used supermarket data for metropolitan areas to reveal that the core trade area accounted for 60-70 percent of the real estate project's customers. Analysts today often define the primary trade area as having 80 percent of the customers" (2002), this rule still remains relevant for defining the University of Florida's primary trade area[5]. The University Avenue and 13th Street location is adjacent to UF's College of Business and near to the College of Liberal Arts and Sciences. Both colleges account for over 40% of total student enrollment at UF (www.ir.ufl.edu/factbook/i-01.a_hist.xls). The intersection of University Avenue and 13th Street was chosen because the

[6] The highest density of students is at the North East corner of the campus. The North East corner was selected because that is the destination for the majority of the student population.

[4] Using the primary trade area allows the largest and most dominant group to be identified, and this revealed group is then used to establish the value platform of the apartment complex including its location.

[5] The whole issue of calculating trade areas is very debatable. Using any locus will enter bias into the analysis. The NE corner as a locus will capture the general market trend.

University is so expansive that if we were to use the entire circumference of the University you would get apartments that were within in a mile of the university but outside a walkable distance to the core. University Avenue and 13th Street represents a focal point as to base walking distance. The 3.65 mile UF primary trade area, as shown in Figure 3-1, provides a spatial delineation of what distance a student targeted apartment complex should not exceed from UF[6].

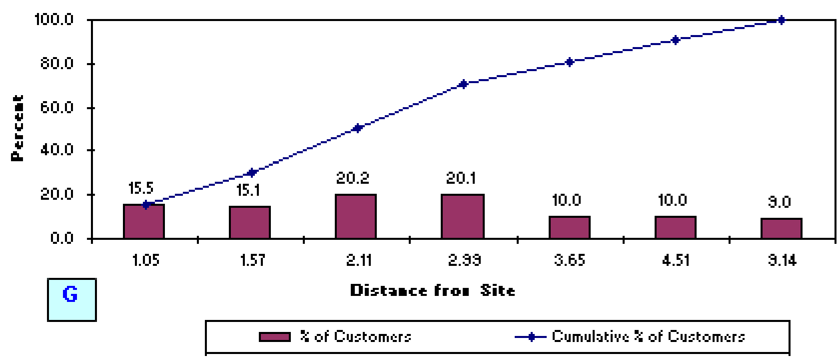

Figure 3-1. Student population by distance from campus

Taking the overall population of Gainesville (108,655) and the student population of the university (51,599) reveals that about 48% of the Gainesville's population is made up of university students. Given the historic increases in student population, and large student population base, it is reasonable for this demonstration to restrict the example to decisions on prospective locations for new apartment complexes that are targeted to UF students. Thrall (2002) states that:

> Apartments are targeted to a specific target population niche. Competing apartments can be identified in a variety of ways, including geocoding databases of apartment addresses, visualizing the resulting mapped data, and calculating the lifestyle segmentation profiles (LSPs) [Life Mode Group] of apartments that are derived using addresses of the apartments. The LSPs (Life Mode Group) can be used as surrogate measures of apartment type and revealed target demographic niche (2002).

[6] This figure is automatically generated by ESRI's Community Coder when geocoding the data set. It allows the input of only one locus for the market core. The graphical output has no user options.

Population Identification

The derivation of UF students' psychographics is preliminary to calculation of trade area and demand. Psychographics allows researchers to evaluate trends in human behavior not accounted for by demographics alone.

UF student information was used to calculate the students' psychographic profile by submarket within UF's larger 3.65 mile primary campus trade area. This is accomplished by first calculating each student's LSP based upon their permanent address. That derived characteristic was then mapped using each student's campus address. ESRI's Tapestry twelve category Life Mode LSP was used for the study. A life mode group is a combination of the more granular 65 category ESRI Tapestry LSP database. A student's permanent address is generally their parent's addresses. This allows calculation of their propensity to consume. Without their parent's addresses, commercial LSP databases like Tapestry merely list the student as an unknown "student" consumption profile. Students at UF have different propensity to consume than SFCC, and other colleges and universities. Subsequent to analysis of the students' LSP profiles, it is possible to determine which LSP group comprises the largest increase in student population, thereby revealing a granular insight into what type of housing is demanded, and where.

Life mode groups "arise via geo-statistical procedures that allow myriad descriptive measurements to be combined into a small set of commonalities that explain the variation among the population subgroups" (Thrall, 2002). Life mode groups range from the elite at the top of the society to the poverty stricken at the bottom of society. Once it is determined which Life Mode Group represents the largest increase in students, that group can be mapped out to discover any trends associated with that Life Mode Groups housing habits.

Iterative Procedure for Calculating Trade Area and Apartment Demand

ESRI's *Business Analyst* (www.esri.com) was used to calculate the number of UF students by their Life Mode Groups, and the change in their numbers between years. This is shown in Table 3-1.

Table 3-1: 2004-2005 Change in ESRI tapestry lifemode groups for University of Florida students

Lifemode Segment	Change In Students 2004 to 2005 By Lifemode	% Of Student Change By Lifemode Segment
L1: High Society	1,364	44%
L2: Upscale Avenues	247	8%
L3: Metropolis	88	3%
L4: Solo Acts	52	2%
L5: Senior Styles	324	11%
L6: Scholars & Patriots	-20	-1%
L7: High Hopes	69	2%
L8: Global Roots	91	3%
L9: Family Portrait	461	15%
L10: Traditional Living	120	4%
L11: Factories & Farms	13	0%
L12: American Quilt	262	9%
Student Record Change By Lifemode Segment	3,071	
Not accounted for	268	
Total Change In Student Records	3,339	

Lifemode" (www.esribis.com) psychographics of UF students for 2004 and 2005 are calculated, and the difference by year derived for count of students by Lifemode segment.

The largest change in Life Mode Group between 2004 and 2005 was the L1: High Society life mode group with 44% of the total incoming student population. Second ranked was the L9 Family Portrait group with 15%, the third ranked was the L5 Senior Styles life mode group with 11%. Because L1 life mode group represents the largest segment of incoming UF students, that group will be the focus for deriving prospective apartment demand[7].

[7] It is assumed that investment would have lower risk by targeting the largest market, which the North East corner of campus and the L1 segment group.

Geospatial Characteristics of UF's L1-High Society Students

People in the L1 category tend to enjoy fine dining, the arts, social activities and travel. These people place importance on family and leisure time, they are also considered active investors and savvy financial planners[8]. L1s are at the top of the financial ladder. L1's have a median household income of $185,415 dollars a year. L1's own at least one home, the average median home value of people in the L1 life mode group is $1,078,501 dollars. This life mode group will not just live anywhere; instead, the apartment in which they reside must have certain amenities or the L1 population will not be attracted to that apartment complex. L1's are used to a certain lifestyle that they will not want to part with once they get to college[9]. Neighborhood is also important to the L1 student. The L1 neighborhood must provide good access to UF, and also be clean, prestigious, and safe (http://www.esri.com/library/brochures/pdfs/community-tapestry-handbook.pdf).

Following the derivation of the Life Mode segment for each student based upon their permanent address, the campus address locations of students with L1 Life Mode segments was mapped to reveal which neighborhoods L1 students choose. It was found that L1 students primarily resided to the north and west of the university. This is documented in Figure 2-1.

Each dot in Figure 3-2 represents the location of one ore more students with the L1 characteristic. The map that results from the application of this procedure identifies the campus locations of students with the L1 characteristic, and therefore the primary trade area of L1 students attending UF.

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[8] There is an implicit assumption made and am aware of it, but I am trying to capture the general market trend.

[9] The methodology employed follows standard business geography procedures. People can be segmented into segments (LSPs, psychographics, demographics), parents have behavioral traits that are passed down to their children, however, they may not always be the same.

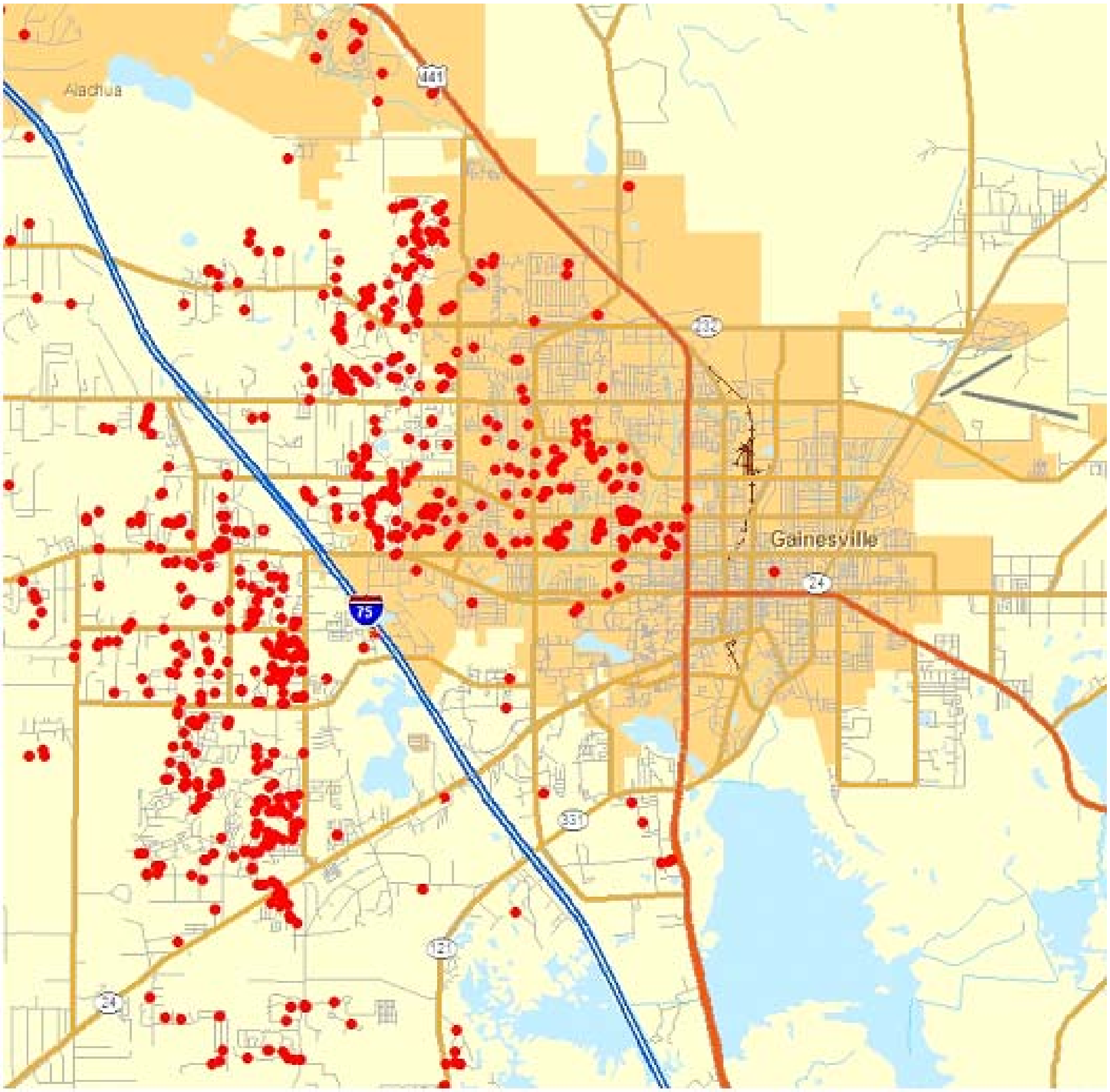

Figure 3-2. Location of UF students with LifeMode L1. Note: Because many students reside in apartment complexes, and the geocoding procedure assigns a geographic coordinate based upon address, and also since each apartment complex is assigned only one address, therefore many students may be positioned at the same geographic coordinate and represented by the same dot in the map.

The trade area is visualized in Figure 3-2. The L1 trade area is within the 80% primary trade area for all UF students; namely, within 3.65 radial miles from the NE corner of campus. Now that it has been determined where L1 students live, it is important to find a suitable location for an apartment marketed toward L1 students[10].

Apartment Supply

The next step in conducting geospatial market analysis for a new development (Thrall, 2002) is to calculate competitive supply. The existing apartments in the city of Gainesville need to be enumerated, along with their locations. Also, the known future supply of apartments needs to be considered when calculating competitive supply[11].

Existing apartment supply was compiled from information gathered from three local apartment guides; *Apartment Finder (2007), Gainesville Apartment* and *Condominium Guide (2007),* and *Gainesville's Premier Apartment Guide* (2007). All three publications are marketed both to university students and the general population. These guides were used instead of the property assessment data files because they contained more information relevant to this study than is available in the assessment property records.[12] The database comprised 109 apartments.

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[10] A question was raised as to "that segment of L1 students whose parents believe they should make it on their own." To this I respond by stating that we do make certain assumptions, however, in all likelihood things will continue to stay the same. L1 dominance is assumed to continue. The assumption is not heroic that they will conform to behavior associated with the L1 life mode group.

[11] A question was raised as to why single family homes were not included in this study. The reason single family dwellings were not included in the study is because we are not competing with single family housing. We are looking at multi-family housing. Also, it does not make sense to try and develop affordable housing around UF because of high property costs. The objective was to have a location close enough to be able to walk, bike or take a short bus ride to the Demand Generator. Few Houses are walkable to the core of our primary trade area.

[12] To view the property assessment data records for any property in Alachua County, see http://www.acpafl.org/search.html

The map in Figure 3-3 reveals that the majority of apartments listed in the apartment guides are located within the 3.65 mile primary trade area[13]. Figure 3-3 provides the analyst the opportunity to visualize the location of relevant existing supply of apartments.

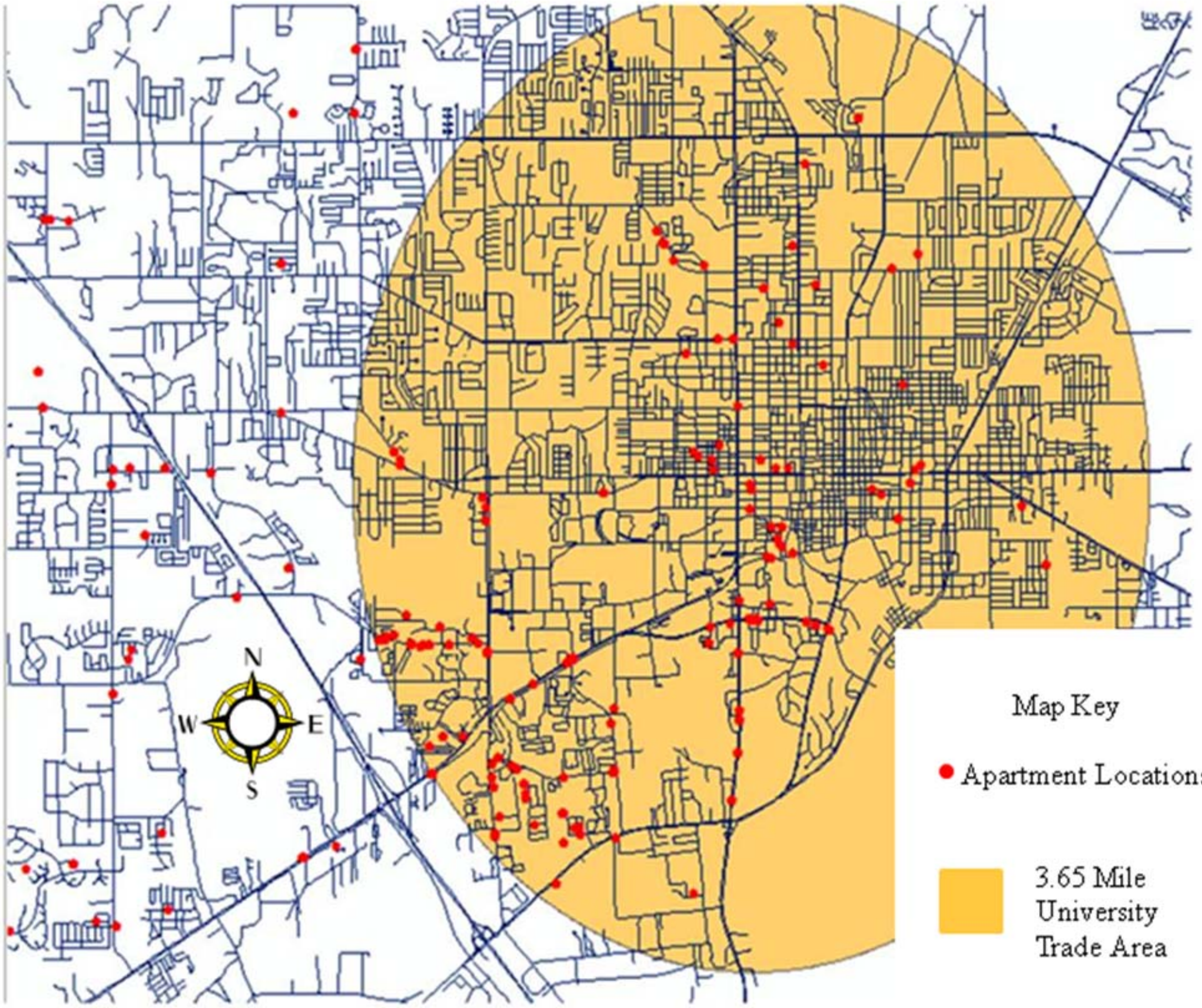

Figure 3-3. Primary trade area for university of Florida student campus addresses, and locations of apartments with that trade area

To calculate the proportionate share of apartments in Gainesville that fall within UF's 80% trade area for resident students, the count of apartments within the trade area were divided by the total number of apartments in the Gainesville. In Gainesville 72% of the apartments are located

[13] Note: The trade area calculated here is 3.65 radial miles. The map projection used in Business Analyst distorts the circular trade area to instead appear egg shaped.

within the University of Florida's 3.65 mile primary trade area[14]. Developers, therefore, consider proximity to the university to be a key aspect of apartment location in Gainesville.

Most apartment market analysis studies are proprietary to the client and the analyst, including studies specific to market analysis of apartments targeted to university students.[15] For that reason, with the exception of Thrall (2002), few articles have been published specifically on campus area apartment market analysis. Generally, there is a lack of research into the housing side of the University experience. The publications readily available to those researching real estate have been concerned with the presence of Universities on property values (See Jaffe and Bussa, 1977, for example). These publications rely upon hedonic modeling to extrapolate the relationship between rent and amenities.

Development of a Hedonic Model

According to Rogerson the regression equation used in SPSS is:

$$\hat{y} = a + b_1 + x_1 + b_2 x_2 + \ldots + b_p x_p \qquad (1)$$

where $\hat{y}$ is the predicted value of the dependent variable, with a given set of observations on the dependent variable (y) and the independent variables (x) (2004).

The dependent variable is monthly rent and the independent variables are made up of variables based on different amenities as well as dummy variables.

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[14] The fact that 72% of UF apartments are within the 3.65 mile marker, which makes it the place for straight line analysis, is confirmatory.

[15] For example, PricewaterhouseCoopers' Financial Advisory Services Real Estate division produces market analyses of student apartments for their clients. PwC's procedure is very different from that which is introduced here. PwC relies on survey questionnaires administered to prospective tenants.

Data

An experiment is conducted to document the effect of distance from UF upon rental rates, and to document the effect of amenities on rental rates. A primary data base of 109 apartments was created. Three locally published and readily available apartment guides were used to establish the addresses, names, rental rates and amenity bundles of each apartment. Different sized apartments were maintained in the database as separate observations, resulting in 350 observations for 109 apartments. The database included number of *bedrooms*, number of *bathrooms*, whether it was a *studio* or not, whether the apartment complex had a *clubhouse* or not, and if the apartment unit was a *townhouse*. Number of bedrooms was used for an approximation of size because square footage was not available for all of the records in the database. "Dummy" variables were created identifying the characteristics of amenities hypothesized to be relevant, including *Pets Allowed*, *Furnished*, *Patio*, *Balcony*, *Dishwasher*, apartment complex *Laundry*, *Washer and Dryer* in the unit, apartment complex *Pool*, apartment complex *Tennis Court*, apartment unit *Fireplace*. The apartment complex's age was included in the database as a measure of condition or architectural style.

The actual driving distance from the apartment to the University's Admissions Office was taken and then divided into five concentric zones in order to create "dummy" variables representing which mile marker the apartment complex is located in.[16] The Admissions administrative office was chosen to represent the campus location because that is a location that all students must periodically access, and that location is nestled in between the main classrooms of the College of Business and the College of Liberal Arts and Sciences; together representing

[16] Each one mile increment is expected to be correlated with a different mode of transportation: walking, bicycling, bus, automobile, and beyond that locations are competing with different markets. The objective is to capture the general market trend.

40% of UF students' major colleges (www.ir.ufl.edu). Subsequent to documenting that distance is significant, and then dummy variables representing concentric circles of a mile each around the university will be used to determine differences by distance from the university, if any. Segmenting the market by concentric circles arises from the work of William Applebaum and his *Customer Spotting Technique.* Applebaum used concentric circles around grocery stores to capture potential "drawing power" (1966). The concentric circle method allows for the determination of which distance has the greatest impact on rent[17]. The "dummy" variables were created by designating 1 for the apartment if it fell with in the corresponding mile range, and a 0 if not. The *1 mile* variable included every apartment that was less than or equal to one mile, this process was followed for the *2 mile, 3 mile, 4mile,* until the *4plus mile* variable which consisted of all of the other apartments within the Gainesville. Prior to executing the analysis it was hypothesized that monthly rents decline with increasing distance from the university; the experiment is designed to allow for this hypothesis to be tested.

Figure 3-4 shows a map of apartment location and amount rent per bedroom. Rent is the rate, while bedroom is an approximation for the size of the apartment. While the resulting map displayed in Figure 3-4 is descriptive, it does convey that there is a relationship between availability of apartment supply and proximity to UF. Also, the higher rental rates are close to UF.

It is expected that each of the variables collected in the primary database will affect monthly rent. However, it is not known how each characteristic affects apartment rent in the

[17] The rational for choosing the NE corner as an origin for the concentric circles surrounding the campus is because I am not addressing housing for people working at Shand's Hospital but rather I am addressing housing that is targeted to students.

Gainesville market. Regression analysis is used to calibrate the hedonic model and thereby reveal how each variable affects monthly rent.

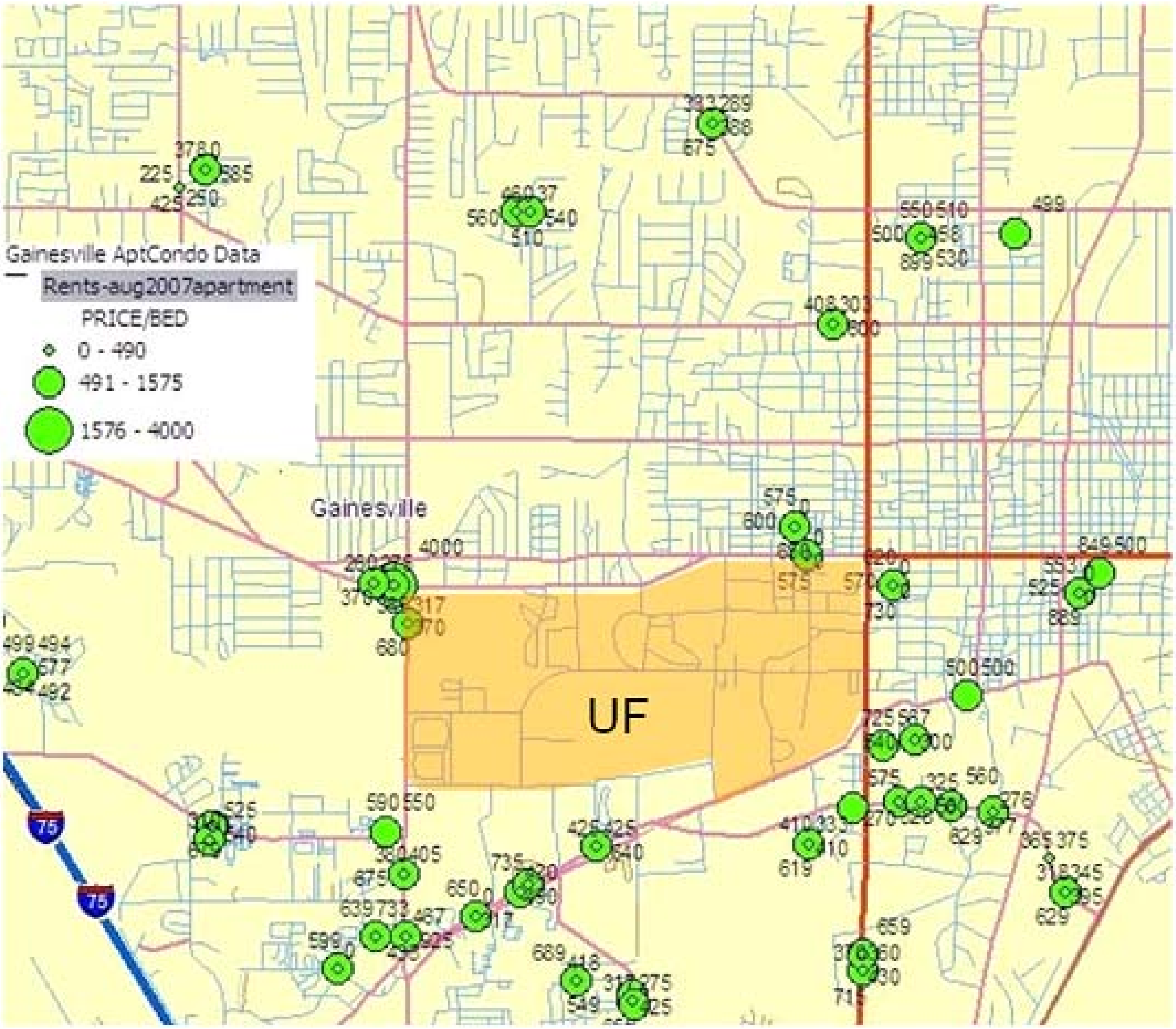

Figure 3-4. Apartment rent per bedroom by location, Gainesville FL. Data updated as of 21 August 2007

It is expected that number of bedrooms will have a significant positive impact on rent because the more bedrooms the larger the apartment, hence higher rent. The relationship between bathrooms and rent is less clear, however it is expected to be positive because all apartments contain at least one bathroom, people probably would not live in an apartment without a bathroom. The relationship between clubhouses, townhouses, and rent is not clear. It is expected that a pool will have a positive impact on rent and thus be significant, as well as the presence of a washer and dryer in the unit. The proximity to UF variable is expected to have a significant positive relationship with the price of monthly rent. Moreover it is expected that the distances within the three mile range of the university will also have a significant positive impact on rent, while anything over four miles will have less.

Hedonic Model Test Result

The Hedonic Model Test modifies the distance variable so that it is partitioned into five zones of decreasing proximity to UF's core NE campus. With an F-Statistic of 110.894 the regression equation can be accepted as greater than 99.99% confidence level as generating significant explanatory power. The multiple correlation coefficient, R is .864, demonstrating a strong relationship between rent and the hypothesized variables model[18]. The coefficient of determination, r^2, is equal to .746, which means that about ¾ of the variation in price is explained by the model. The histogram and P-P plot show that the model fits the assumptions of normality. There is a high co-linearity with bed, and price, as well as, bathroom and price based on VIF score of 3.377 and 3.626 respectively. The VIF is the "variance inflation factor," a score greater than 5 for the VIF indicates problems with multi-colinearity, the VIF is also the reciprocal of the tolerance (Rogerson, 2004). This is expected as bedrooms and bathrooms are the two most dominant features in apartments. The Step Wise regression returned ten models, although the ninth was the one selected to use. The ninth model returned from the model was used because the condition index for *Townhouses* was greater than 15, which indicates a possible problem with co-linearity. In model 9 the highest condition index returned was 14.929, which

[18] Thereby confirming the hypothesized reasonableness of assuming five rings.

being less than 15 was acceptable for this study. The tables and charts for this regression are in Appendix B.

Table 3-2 Variable table

	Mean	Std. Deviation	N
Price	$950.89	$379.355	350
Studio	.03	.182	350
Bed	2.04	.975	350
Bath	1.80	.800	350
TownHouse	.18	.382	350
PatioBalcony	.89	.315	350
Pet	.86	.344	350
Furnished	.31	.465	350
Dishwasher	.91	.289	350
LaundryRoom	.80	.401	350
WasherDryer	.45	.498	350
Fireplace	.18	.385	350
Pool	.89	.308	350
Tennis	.34	.473	350
Clubhouse	.53	.500	350
Age	14.73	10.395	350
OneMile	.08	.272	350
TwoMile	.16	.364	350
ThreeMile	.17	.380	350
FourMile	.19	.396	350
FourPlusMiles	.39	.489	350

The first variable[19] that is returned in the regression report is the bathrooms variable. The *bathroom* variable has an expected value of 149.872 (with a confidence interval between 100.97 and 198.78 at the 95% confidence level). Adding an extra bathroom will command $149.87 more dollars to the monthly rent on average.

[19] In forward stepwise regression, the first variable returned is the most significant in explaining the variation in the dependent model.

The next variable, as in the first model, was *Pet*; it was negative as well. The model returned an expected value of negative 138.781, (with a confidence interval between -73.43 to -204.13 at the 95% confidence level). This is interpreted as apartments that allow pets are less costly per month than places that do not allow pets. The presence of a *club house* returned an expected value of 123.529, (with a confidence interval between 74.37 and 172.69 at the 95% confidence level). Apartment complexes that have clubhouses (basically common areas, different clubhouses have different amenities associated with them but this was not factored in here, only whether or not it had one), command an extra $138.78 dollars on average.

The next variable returned in the model was the dummy variable representing less than or equal to *1 mile*. The expected value for the *1 mile* variable was 329.435, which was the highest expected value in the model (with a confidence interval of 247.37 to 410.90 at the 95% confidence level). Apartments within the one mile radius fetch $329.43 dollars on average than those outside that range.

The *bedroom* variable came up next in the model, the addition of an additional bedroom to an apartment unit will increase the monthly rent by $145.41. The expected value of the model was 145.407 with a confidence interval of 106.69 to 184.13 at the 95% confidence level. The *age* variable followed bedroom and this has negative significance associated with it. The expected value for the *age* variable was -4.566 with a confidence interval between -2.23 to -6.9 at the 95% confidence level. The *furnished* variable returned an expected value of 97.566 meaning that on average, apartments that are furnished cost $97.57 more a month than non-furnished apartments. The *furnished* variable had a confidence interval between 49.62 and 145.52 at the 95% confidence level.

The *4 mile* variable was next. This is interesting because it suggests that there is a rent gradient ridge in Gainesville. The expected value for the *4 mile* variable is 76.682 (with a confidence interval at the 95th percentile at 23.44 to 129.92). Apartments at the four mile zone command $76.68 more dollars a month in rent than apartments in the other zones except for the one mile zone. This reinforces previous literature on rent gradient ridges by Frew and Wilson who found that rent increases around "freeway corridors" (1990). The four mile zone corresponds to the I-75 freeway and shopping at Gainesville's two highest order retail centers (Butler Plaza, Oaks Mall). Access to transportation and other important destinations increase rent[20].

The final variable in the model was the *fireplace* variable. The expected value for this variable was 67.851 (with a confidence interval of 12.99 to 122.71 at the 95% confidence level). An apartment with a fireplace can command $67.85 more dollars a month than apartments that do not have a fireplace. The fireplace variable was not expected to significant however, it makes sense that a fireplace would contribute greatly to rent because it is considered a luxury in apartment living.

Using the predicted values and residuals at the 95% level will reveal what the predicted rent of an apartment should be. For a two bedroom, two bathroom apartment, that does not have a townhouse or allow pets, that is furnished with a patio or balcony, a dishwasher and a communal laundry room, that is a within a mile of the school and five years old, returns a predicted monthly rent at the 95% confidence level between $1207.06 and $1444.43 dollars a month. Predicted values can reveal where properties are properly priced. Comparing the

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[21] For documentation on the theory and standard model, see Thrall, Grant I., 1998, *Land Use and Urban Form: The Consumption Theory of Land Rents;* Rutledge/Methuen: London and New York.

predicted monthly rent to the actual monthly rent will reveal which apartments in Gainesville are priced properly. This regression allows for the formation of a rental platform that can be used to calculate the proper amount of rent to charge for a new apartment complex in Gainesville. The variables returned in the model show what variables or rather amenities are important to rent valuation and that the variables selected should be used in the development of a new apartment building.

Pipeline

To get an idea of what was being planned on being built in Gainesville projects in the development pipeline were considered. Thrall (2002) states that "the pipeline is real estate at various stages of construction from conceptualization to the awarding of a certificate of occupancy. What is in the pipeline can be used as a measure of the prospective increase in the supply of real estate." Both condominiums and apartments are considered the competitive supply. Single family dwellings while part of housing supply are not competitive in most circumstances with condominiums and apartment.

Visual display of the locations of L1 students revealed (see Figure 1) the existing L1 submarket. The question arises "is the supply in the pipeline focused on L1 students in their revealed trade area?" The pipeline data will also give insight to whether the L1 apartment market will soon be saturated.

To obtain the pipeline information in Gainesville, a visit to the Alachua County Building Department "First Step" Program was required. Developers applying for building permits must begin the permitting process at "First Step." The developments recorded at First Step are either in the planning phase, construction phase, or are finished but yet to receive a certificate of occupancy (CO). First Step records are held in a folder containing forms of "completed" building permit applications. Regrettably, the permitting office prior to 2007 neither required that the forms be filled out in their entirety, nor required information be updated as plans became more specific. The First Step Program has not yet gone digital so the person assembling the data must hand transcribe the records, and then later convert them to digital format. Because the proposed construction is in the planning phase when First Step begins its process, information is often missing, including proposed number of apartment units, number of floors, and square footage. As plans solidify, the First Step forms are not updated. Accurate and complete information is not publically available until after the project has been completed and a CO awarded. The pipeline supply is important for the big spatial picture of future competition by location, and which sub markets are receiving developer's attention; however, the pipeline supply data for Alachua County is not sufficiently accurate for statistical analysis.

While 2005 and 2006 pipeline data was of a quality that restricted its use to being purely qualitative and visual, pipeline for 2007 was much improved as compared to recent previous years. Pipeline supply for 2007 is shown in Figure 3-6.

The pipeline supply collected for 2007 more complete, allowing for density plots of planned apartments and condominiums by the number of units planned. Considering the information in the pipeline supply allows the analyst to guide the developer away from small submarkets that might in the near future have an over supply of competing units, and at the same time provide guidance as to the near future locations of high levels of development before construction is readily apparent on the ground. The benefits of agglomeration might guide the development toward others in the pipeline; avoidance of high levels of competitive supply might guide the development away from concentrations of new development in the pipeline.

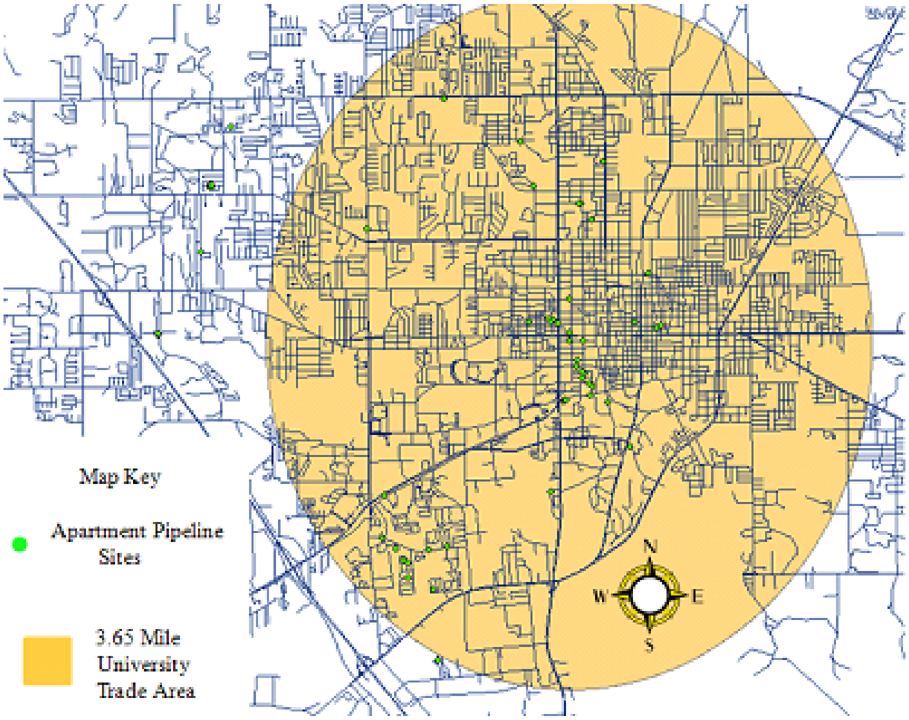

Figure 3-5. Map of apartments and condominiums in the pipeline for 2005 and 2006. Pipeline data obtained from Alachua County Building Permits office "First Step." Data accurate as of 24 August 2006.

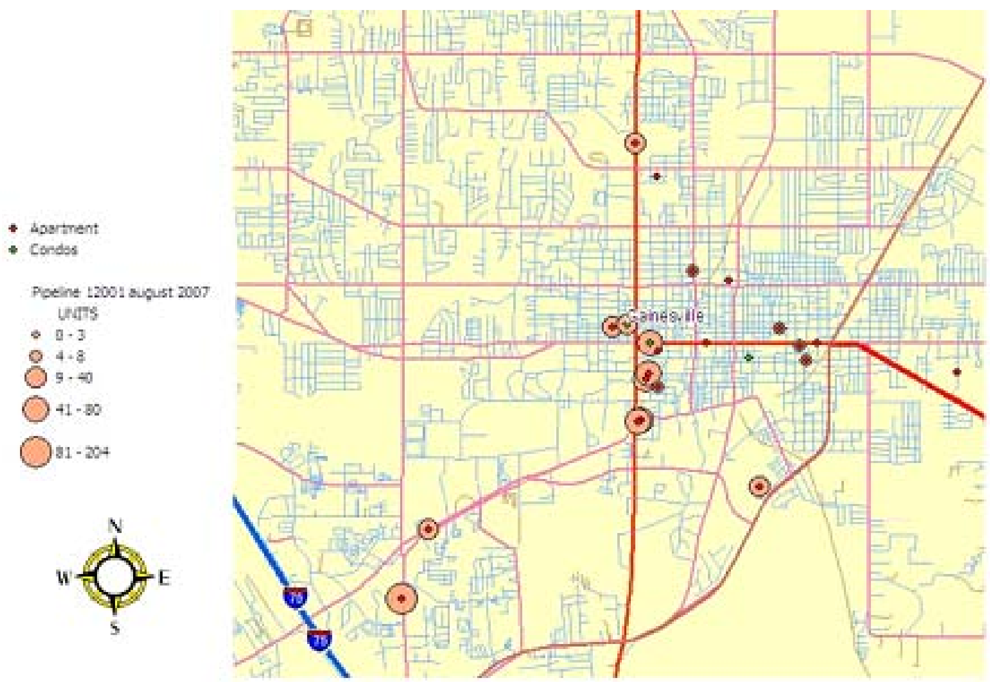

Figure 3-6.Map of apartments and condominiums in the pipeline for 2007. Pipeline data obtained from Alachua County Building Permits office "First Step." Data accurate as of 24 August 2007.

Qualitative Analysis

The objective of business geography is for geospatial analysis to improve the business decision (Thrall, 2002). Not all real estate development decisions can be based solely on quantitative analysis. Qualitative analysis based upon reliable data is equally if not more important than quantitative analysis. When locating an apartment complex qualitative analysis, which includes a large measure of what is often referred to as "common sense," should be drawn upon to account for goods and services that potential renters will need on a regular basis. Without large pantries for storage, the apartment dweller will need either to go frequently to the grocery store or regularly to nearby restaurants. Renters value good proximity of grocery stores and pharmacies, as well as good proximity to retail shops offering goods and services consumed on a daily or weekly basis.

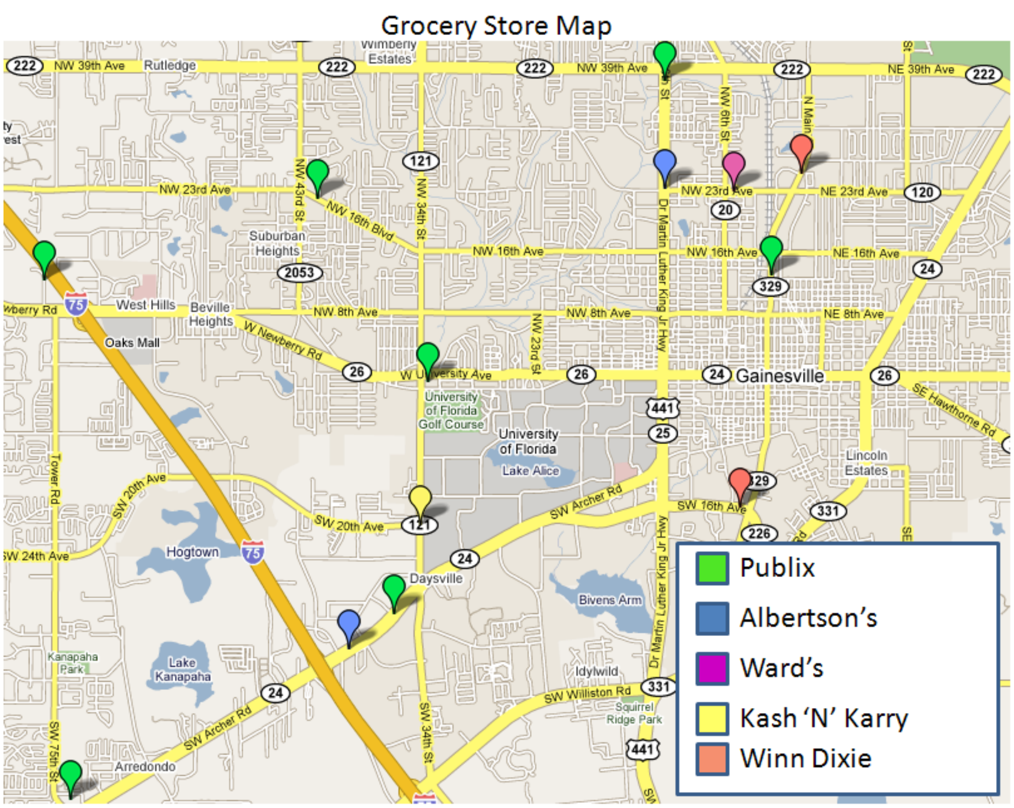

Figure 3-7. Map of grocery stores in Gainesville, Florida.

This map allows for the visualization of grocery stores across the city of Gainesville. The map shows a lack of grocery stores concentrated in the downtown and eastside of Gainesville. This area may be in need of a new grocery store to meet the needs of a larger population. Publix, grocery store, is the franchise that has the most stores in Gainesville, the distribution of Publix' stores seem dispersed enough to cover every section of Gainesville, except the eastside.

Also, the size of the lot that you are trying to build on should also be considered. Although not impossible, getting parcels rezoned is a hurdle that does not need to be encountered during the process of locating an apartment, choosing the proper parcel size for avoid going through the hassle of rezoning. It is difficult to get permission to build a large apartment building where it is zoned for a single family development and adjacent to existing single family homes.

CHAPTER 4
ALGORITHM SUMMARY AND SITE SELECTION

The above seven step algorithm is followed for identification of a set of prospective sites for new apartment development.

- **Demand generator**: In Gainesville the most important DG is the University of Florida. The target population for the new development is students attending UF.

- **Population identification**: Given the UF student population as the target renters of the new development, the L1 LSP segment has the greatest base at UF, and is expected to increase more than other LSP groups in the near future. Therefore, the target group is the L1 students.

- **Hedonic pricing model:** The regression model revealed that

  a. pets should not be allowed
  b. a clubhouse designed for student use should be included in the development
  c. location should be within a mile of UF

- **Pipeline analysis:** The pipeline for Gainesville revealed that potential market saturation is occurring along 13th Street north and south of University Avenue, as well as SW Archer Road east and west of the interstate, and along SW 24th Avenue between SW 34th Street and the interstate.

- **Locational amenities**: L1 students are financially able to enjoy nightlife and fine restaurants. The student oriented nightlife in Gainesville is clustered near the downtown and midtown areas. Therefore, proximity to both UF and downtown must be considered as a primary locational asset.

- **Locational necessities:** A map of grocery stores in Gainesville reveals that downtown and the east side of UF are not served by grocery stores. This is both an opportunity for new grocery store development, and a prerequisite for a successful new apartment development.

- **Site availability:** the analyst is at times required to perform “muddy boots geography” and qualitatively assess sites visually, as well as within a layer of parcels displayed within a GIS. Three sites were identified and will be compared.

Three Sites: Three prospective sites for the new apartment development were identified by viewing the Alachua County Land Parcel Database (http://www.acpafl.org/search.html) within a GIS, and by personal inspection, based on the visualization of the sites, on a map, and in real life. The three sites were chosen based upon their close location to UF, proximity to other L1 students, proximity to downtown, proximity to shopping, and size of the parcel. These three sites are then ranked based upon the above discussed criteria. The locations of the three sites are displayed in Figure 4-1. Images of the three sites are displayed in Figures 4-2, 4-3 and Figure 4-4.

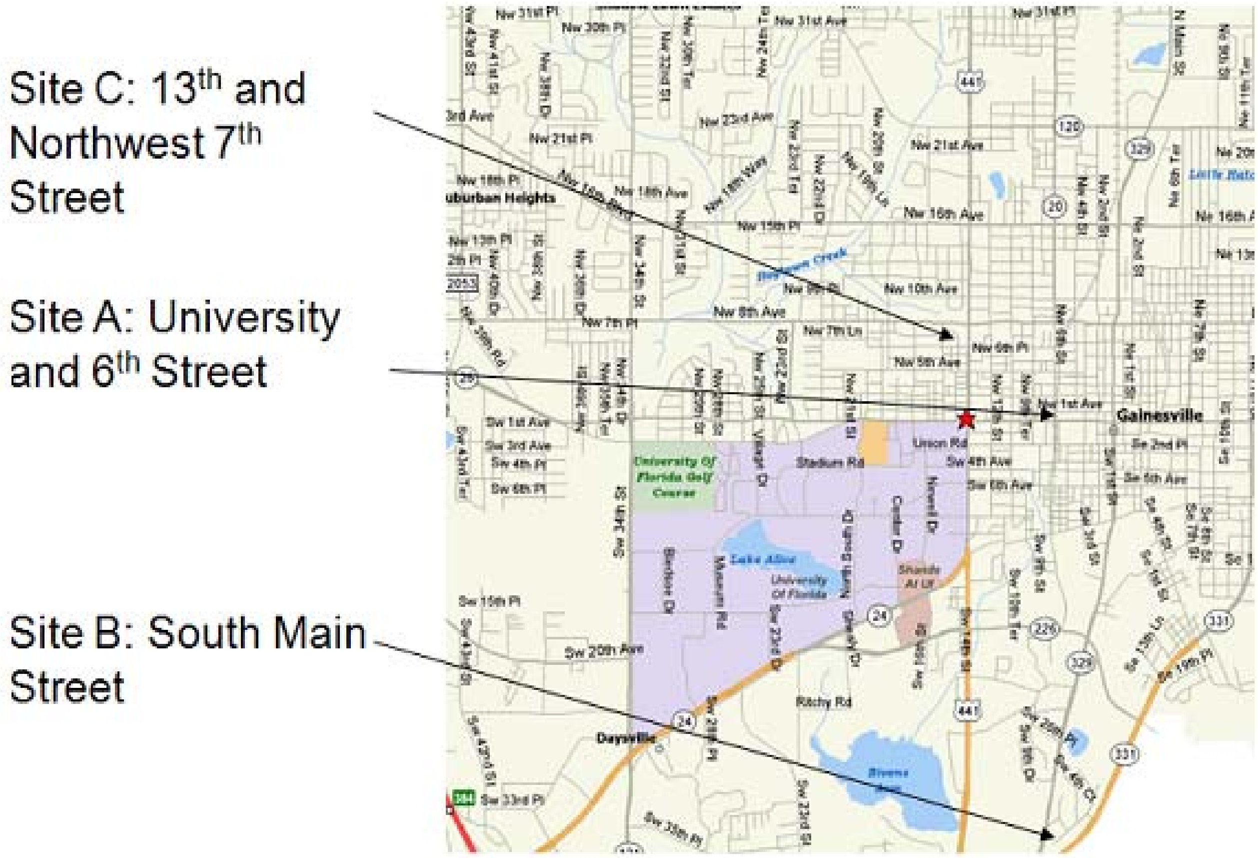

Figure 4-1. Three prospective apartment development locations. Selection completed September 14, 2005.

Initially, site selection was based on the availability of land, the size of the parcel and the location of the parcel. This type of strategy is commonly applied in real estate market analysis.

Site A is currently occupied by Central Florida Office Supply. This two acre parcel lies within UF's 3.65 mile trade area, and within a mile of the downtown district. Zoned as a redevelopment district by the City of Gainesville, this site has the potential to hold up to 300 units.

Figure 4-2. Site A -University Avenue and 6th Street. Photograph taken February 3, 2008.

This site was chosen for two reasons. First is its proximity to campus and the downtown area. Though not within the established L1 student trade area, L1 students are expected to find the location attractive because of its access to both UF and downtown. It is on a public transportation route, which UF students can ride at no additional charge beyond their required student fees. Second is to avoid the saturated submarkets of new apartment complexes.

Figure 4-3. Site B - Main Street and Williston Road. Photograph taken February 3, 2008.

Site B is a two acre assembled lot that provides great access to major roads, such as: SR 20, SR 24, US 441, and SR 301. Site B also lies within the 3.65 mile trade area of UF, and is 1.5 miles from downtown. This location was chosen because a new mixed use development (Thrall, 2002) combining housing and retail on this site could provide both the site and situation needs required by the target renters.

Figure 4-4. Site C - 13th Street and 7th Avenue

The site C location is within the University's trade area. It is located near the future mixed use development of University Corners (www.universitycorners.com) which is under construction and will contain over 150 square foot of retail within the one-million square foot development. This site is located relatively close to housing in the pipeline, which can provide agglomeration benefits as well as competitive supply. Therefore, the developer must include site amenities within the apartment complex to insure its competitive position. Site C is presently occupied by a scuba dive shop. The area has potential to be developed into a complex that would be suitable for L1's.

Table 4-1. Score card: comparison and ranking of three prospective sites

	Site A	Site B	Site C	Best
Proximity to UF	1	3	2	Site A
Proximity to L1s	2	3	1	Site C
Land parcel size	1	1	2	Site A & B
Proximity to downtown	1	2	3	Site A
Proximity to Mid-Town	2	3	1	Site C
Proximity to shopping	2	3	1	Site C

The three sites are compared and ranked from 1 to 3 according to which was qualitatively judged to be the best for the specific criterion. There are six criterion listed in Table 3 which were also discussed above.

Site A and C tied for the best development sites. Both sites A and C are located within one mile of UF. Site B greatest disadvantage is that it is outside the desired one mile distance from UF, and not close to existing shopping or transportation to compensate. A fourth site was then chosen to substitute for site B, and to confirm more closely to the desired criteria. The site chosen was the present location of College Manor Apartments, which is directly across the street from UF, on SW 13th Street. The apartment complex is older and suffering from lack of recent renovation. The site is suitable for demolition and rebuilding to a higher then current density.

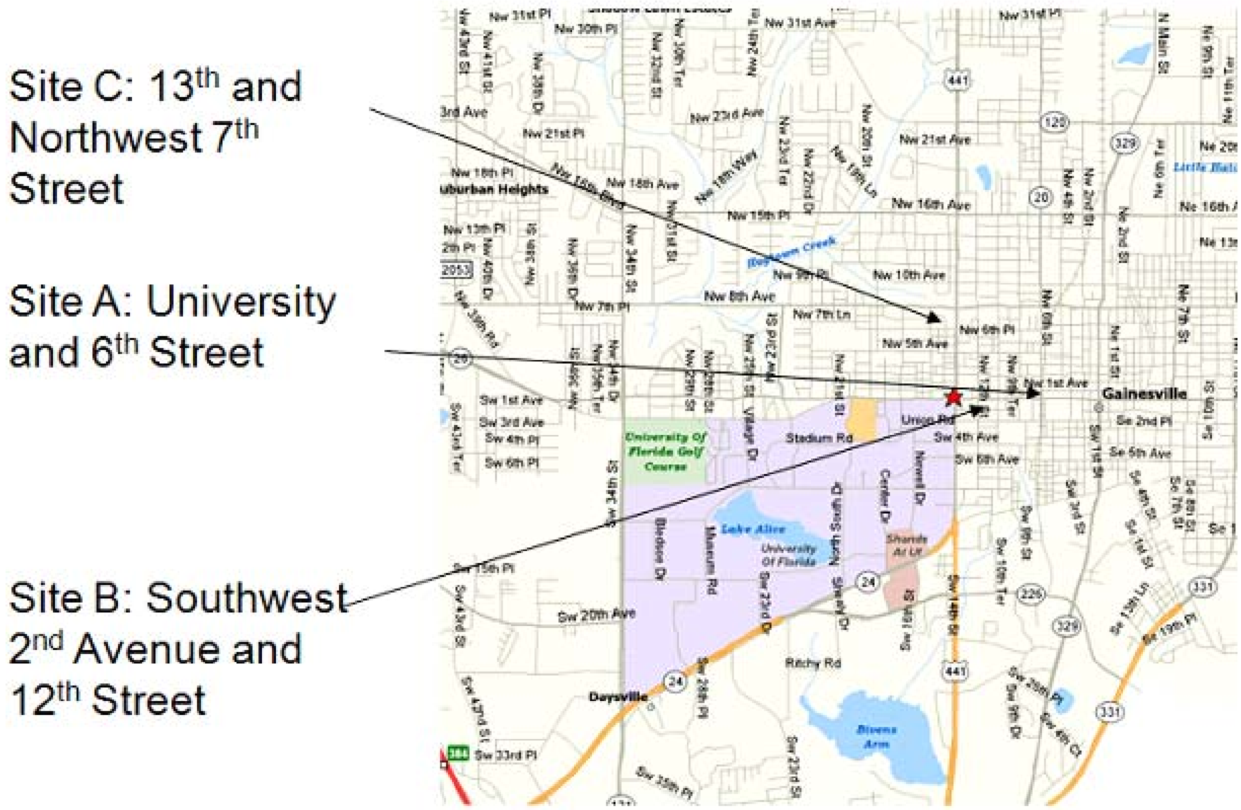

Figure 4-5. Site B – Replacement of Site B with 1216 SW 2nd Avenue

The new site to replace site B is located at the corner of Southwest Second Avenue, and Southwest 12th Street. This site was selected because of its relative proximity to the university, its relative proximity to other L1 students, as well as its relative proximity to Downtown, as well as good proximity to everyday shopping needs with the development completion of University Corners. The site is the second oldest apartment complex in Gainesville; the *Age* of a building has a negative affect on rent. The age of the current apartment building is 37 years old. Because there is already an apartment complex at this location, the predictive model from the regression can be used to evaluate whether the property is being utilized properly. The predicted monthly rent interval for this apartment complex is between \$378 and \$1352 dollars a month at the 95% confidence level, the actual price per month for this apartment complex is \$580 dollars a month. The actual monthly rent falls on the smaller side of the prediction interval. Plugging the variables for this location into the regression equation gives you a monthly rent of $739 dollars a month for a one bedroom, one bath apartment. Plugging in variables for a new apartment

Figure 4-6. Photo of replacement site B at 1216 SW 2nd Avenue. Photograph taken February 3, 2008.

complex at this location gives a predicted monthly rent of $1165 dollars, this results from changing the age of 37 to one, signifying a new development, also a clubhouse was included, and pets not allowed, as the regression results showed that the age of a building as well as the allowance of pets are variables that affect rent negatively. A new apartment complex at this location can command rent much greater than it currently receives. A financial analysis would need to be performed, working backwards from the target (the predicted monthly rent interval) $378 and $1352 dollars a month, cost of acquisition, demolition and construction.

Table 4-2. Score card: comparison and ranking of three prospective “finalist” sites

	Site A	Replacement Site B’	Site C	Best
Proximity to UF	3	1	2	Site B’
Proximity to L1s	3	2	1	Site C
Land Parcel Size	2	1	3	Site B’
Proximity to Downtown	1	2	3	Site A
Proximity to Mid-Town	3	2	1	Site C
Proximity to shopping	2	3	1	Site C

After substituting the new Site B’ for the previous Site B, the results of Table 4 indicate that Site C should be considered by developers as a prospective location for a new apartment complex.

Site C is located at 13th Street and Northwest 7th Avenue. It is within the L1 student trade area, and offers L1 type amenities nearby. It is within the premium one mile zone distant from UF. The site is large enough to support the development of an apartment complex and to provide adequate onsite parking. The property would need to be rezoned from retail to either mixed use or high density housing. The disadvantage of Site C is that it is least proximate to downtown than the two other competitive locations. The pipeline analysis shows that other new apartments or condos are planned to be constructed in the area. The competitive supply might be an agglomerative benefit since the site is at the periphery of the L1 trade area. It can be stated, that this is the best location for a new apartment building. (A discussion of developments in the market that took place after this study was concluded can be found in Appendix C).

CHAPTER 5
CONCLUSION

This analysis introduces a seven step procedure for identifying prospective sites for development. The seven steps are:

1. Demand Generator identification
2. Population Identification
3. Hedonic Pricing Model
4. Pipeline Analysis
5. Locational Amenities
6. Locational Necessities
7. Site Availability

The seven steps were applied to select a location for a new apartment complex development. The analysis of the seven steps is used to justify the selection of the finalist site. Step 3 was a hedonic model is used to calculate potential rents for a site. This is valuable because the geospatial analyst is responsible for data creation that is input to the financial analysis. The difference between potential and realized rents is the opportunity cost of not developing or redeveloping a site. Psychographic lifestyle segmentation profiles (LSP) were used to obtain the characteristics of current and future demand; among the characteristics are the type of amenities that need to be included in the new development, and establishing constraints on location. Pipeline analysis reveals potential overdevelopment, or possible locations that might benefit from agglomeration. These seven steps will assist real estate professionals in their ranking properties for construction or acquisition. The analysis supports qualitative judgment with geospatial procedures. The seven steps will reduce the risk of making a bad judgment, and to increase the likelihood making a successful business investment.

APPENDIX A
PSYCHOGRAPHIC SUBMARKETS

Mapping the location of students in Gainesville by Life Mode Group allows for the visualization of submarkets demarcated by their psychographic profile.

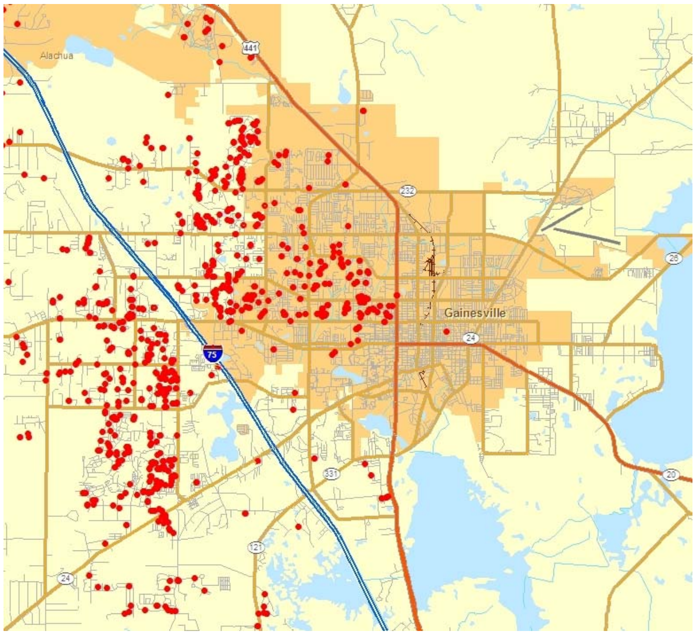

Figure A-1. Map of L1 students.

The L1 population groups predominately to the North and West of the University.

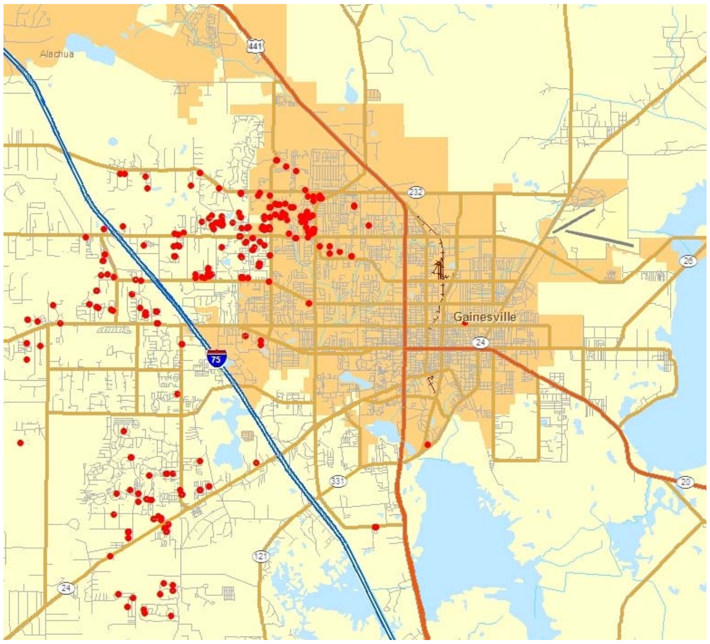

Figure A-2. Map of L2 students.

L2 students do not have the same numbers as the L1 students but one can see a pattern emerge as to where the L2 students live.

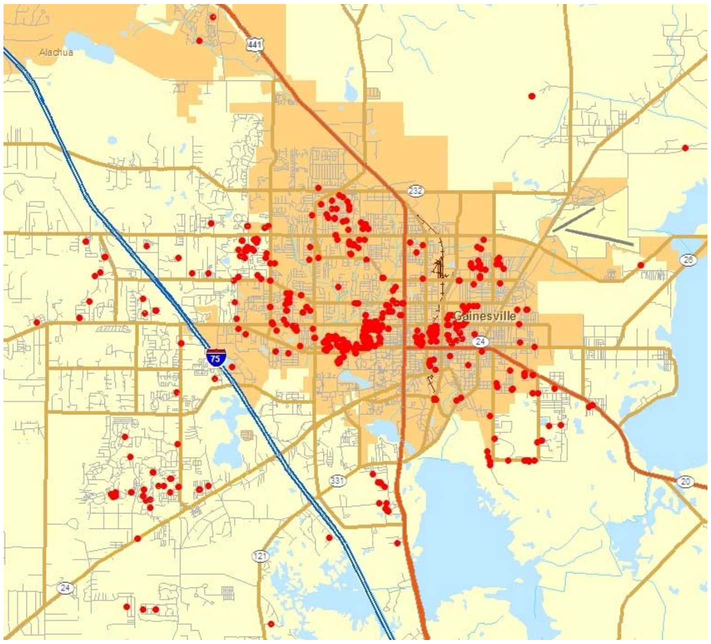

Figure A-3. Map of L3 students

L3 Students group to the North and North East of the University.

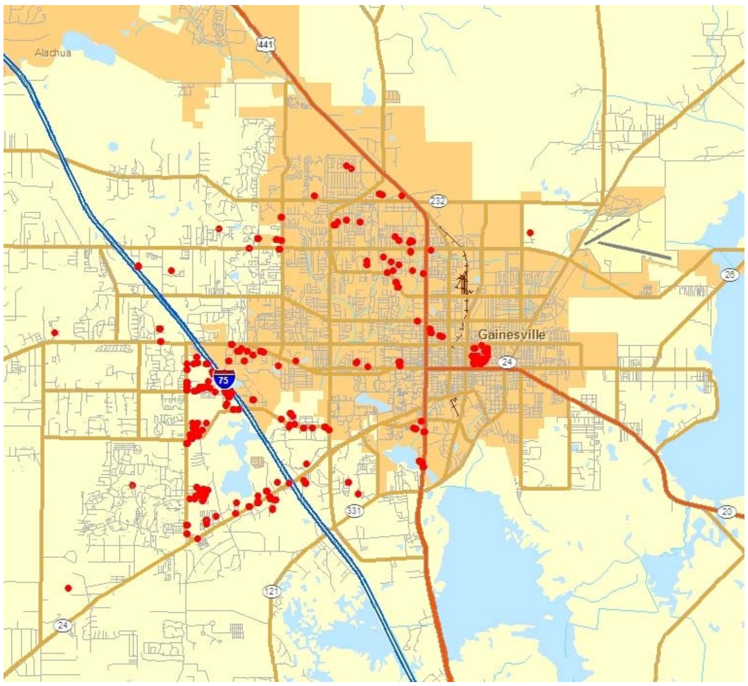

Figure A-4. Map of L4 students.

L4 Students seem to cluster around Main Street and around the I-75 interchange.

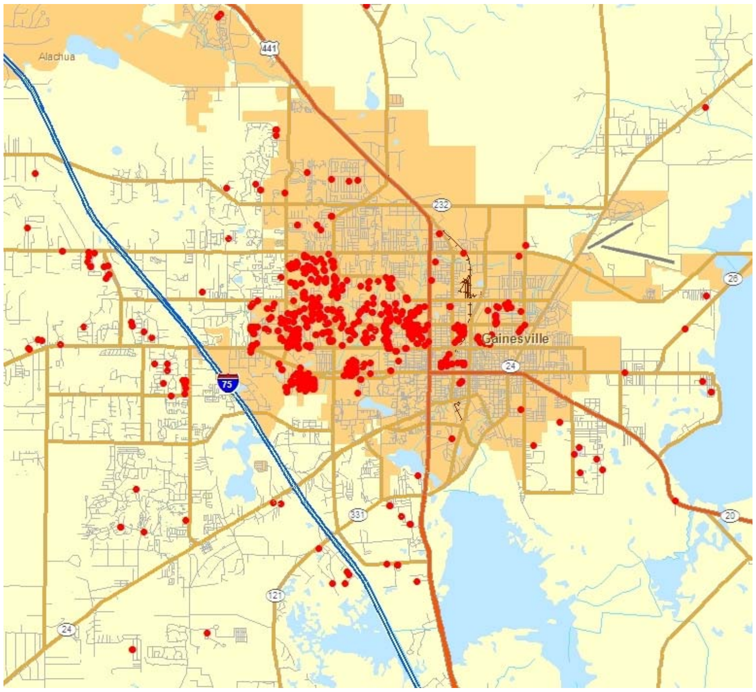

Figure A-5. Map of L5 students.

L5 Students are concentrated to the North of the University like the L1 students', however, L5 students have a greater concentration while having less of a concentration in the Northwest.

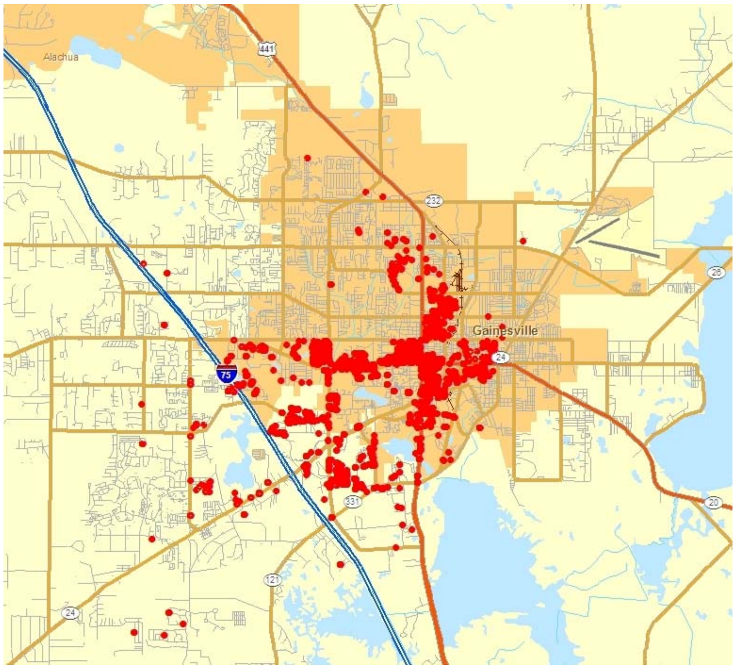

Figure A-6. Map of L6 students.

L6 Students are concentrated along 13th Avenue as well as scattered across the University itself. Looking at these maps allows one to see the different psychographic groups and where they live in Gainesville. These maps reinforce the belief that similar people will group together, there is overlap in every psychographic market, however, each psychographic group has its own unique pattern of residential behavior. Some groups are willing to live in areas other groups are not, reinforcing the idea that individuals that are similar in psychographic make-up make decisions that are indistinguishable from one another.

APPENDIX B
REGRESSION TABLES

Table B-1. Notes

Output Created		27-Jan-2008 19:07:57
Comments		
Input	Data	C:\Documents and Settings\Gabriel Bolden\Desktop\aptList.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	350
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /DESCRIPTIVES MEAN STDDEV CORR SIG N /MISSING LISTWISE /STATISTICS COEFF OUTS CI BCOV R ANOVA COLLIN TOL ZPP /CRITERIA=PIN(.05) POUT(.10) CIN(95) /NOORIGIN /DEPENDENT Price /METHOD=STEPWISE Studio Bed Bath TownHouse PatioBalcony Pet Furnished Dishwasher LaundryRoom WasherDryer Fireplace Pool Tennis Clubhouse Age OneMile TwoMile ThreeMile FourMile FourPlusMiles /SCATTERPLOT=(*SDRESID ,*ZPRED) /RESIDUALS HIST(ZRESID) NORM(ZRESID) /SAVE ZPRED COOK LEVER MCIN ICIN ZRESID.

Table B-1 Continued.

Resources	Processor Time	00:00:02.016
	Elapsed Time	00:00:01.579
	Memory Required	14076 bytes
	Additional Memory Required for Residual Plots	760 bytes
Variables Created or Modified	ZPR_4	Standardized Predicted Value
	ZRE_4	Standardized Residual
	COO_4	Cook's Distance
	LEV_4	Centered Leverage Value
	LMCI_4	95% Mean Confidence Interval Lower Bound for Price
	UMCI_4	95% Mean Confidence Interval Upper Bound for Price
	LICI_4	95% Individual Confidence Interval Lower Bound for Price
	UICI_4	95% Individual Confidence Interval Upper Bound for Price

Table B-2. Descriptive statistics.

	Mean	Std. Deviation	N
Price	$950.89	$379.355	350
Studio	.03	.182	350
Bed	2.04	.975	350
Bath	1.80	.800	350
TownHouse	.18	.382	350
PatioBalcony	.89	.315	350
Pet	.86	.344	350
Furnished	.31	.465	350
Dishwasher	.91	.289	350
LaundryRoom	.80	.401	350
WasherDryer	.45	.498	350
Fireplace	.18	.385	350
Pool	.89	.308	350
Tennis	.34	.473	350
Clubhouse	.53	.500	350
Age	14.73	10.395	350
OneMile	.08	.272	350
TwoMile	.16	.364	350
ThreeMile	.17	.380	350
FourMile	.19	.396	350
FourPlusMiles	.39	.489	350

Table B-3. Correlations.

		Price	Studio	Bed	Bath	TownHouse	PatioBalcony	Pet	Furnished	Dishwasher	LaundryRoom	WasherDryer	Fireplace	Pool	Tennis	Clubhouse	Age	One Mile	Two Mile	Three Mile	Four Mile	FourPlus Miles
Pearson Correlation	Price	1.000	-.201	.715	.759	.054	.160	-.398	.364	.283	-.176	.291	.049	.151	.275	.379	-.338	.133	-.126	-.067	.078	.013
	Studio	-.201	1.000	-.395	-.189	-.005	-.083	-.016	-.060	-.267	.094	-.107	.075	-.191	-.134	-.200	.156	.234	-.038	-.045	-.013	-.088
	Bed	.715	-.395	1.000	.832	.112	.061	-.214	.213	.268	-.163	.234	-.073	.215	.213	.204	-.156	-.077	-.050	.059	-.035	.069
	Bath	.759	-.189	.832	1.000	.163	.071	-.281	.265	.262	-.187	.329	.000	.176	.238	.266	-.232	-.025	-.074	-.013	-.015	.091
	TownHouse	.054	-.005	.112	.163	1.000	-.050	.120	.105	.147	.045	.168	.036	.111	.033	.063	.110	.139	.129	.162	-.228	-.114
	PatioBalcony	.160	-.083	.061	.071	-.050	1.000	-.062	.025	.329	.073	.027	.166	-.063	.195	.284	-.090	-.096	.153	-.077	.082	-.067
	Pet	-.398	-.016	-.214	-.281	.120	-.062	1.000	-.267	.018	.091	-.158	.057	.133	-.032	-.110	.210	-.097	.126	.052	-.098	-.001
	Furnished	.364	-.060	.213	.265	.105	.025	-.267	1.000	.129	.062	.120	-.077	.133	.194	.257	-.195	-.064	-.106	.030	.025	.096
	Dishwasher	.283	-.267	.268	.262	.147	.329	.018	.129	1.000	-.159	.167	.097	.149	.226	.296	-.339	-.089	-.135	.067	.030	.073
	LaundryRoom	-.176	.094	-.163	-.187	.045	.073	.091	.062	-.159	1.000	-.511	.030	.037	.054	-.100	.310	-.037	.020	.154	.011	-.152
	WasherDryer	.291	-.107	.234	.329	.168	.027	-.158	.120	.167	-.511	1.000	-.109	-.064	.171	.288	-.368	-.054	-.105	-.111	-.007	.213
	Fireplace	.049	.075	-.073	.000	.036	.166	.057	-.077	.097	.030	-.109	1.000	.064	.106	.025	.076	.136	-.080	-.039	-.042	.033
	Pool	.151	-.191	.215	.176	.111	-.063	.133	.133	.149	.037	-.064	.064	1.000	.245	.364	-.030	-.207	.123	.060	-.160	.106
	Tennis	.275	-.134	.213	.238	.033	.195	-.032	.194	.226	.054	.171	.106	.245	1.000	.504	-.131	-.210	-.175	.166	-.014	.154
	Clubhouse	.379	-.200	.204	.266	.063	.284	-.110	.257	.296	-.100	.288	.025	.364	.504	1.000	-.475	-.249	-.095	-.019	.117	.153
	Age	-.338	.156	-.156	-.232	.110	-.090	.210	-.195	-.339	.310	-.368	.076	-.030	-.131	-.475	1.000	.221	.073	.181	-.149	-.213
	OneMile	.133	.234	-.077	-.025	.139	-.096	-.097	-.064	-.089	-.037	-.054	.136	-.207	-.210	-.249	.221	1.000	-.127	-.135	-.145	-.238
	TwoMile	-.126	-.038	-.050	-.074	.129	.153	.126	-.106	-.135	.020	-.105	-.080	.123	-.175	-.095	.073	-.127	1.000	-.198	-.212	-.348
	ThreeMile	-.067	-.045	.059	-.013	.162	-.077	.052	.030	.067	.154	-.111	-.039	.060	.166	-.019	.181	-.135	-.198	1.000	-.226	-.371
	FourMile	.078	-.013	-.035	-.015	-.228	.082	-.098	.025	.030	.011	-.007	-.042	-.160	-.014	.117	-.149	-.145	-.212	-.226	1.000	-.367
	FourPlusMiles	.013	-.088	.069	.091	-.114	-.067	-.001	.096	.073	-.152	.213	.033	.106	.154	.153	-.213	-.238	-.348	-.371	-.367	1.000

Table B-3. Continued

		Price	Studio	Bed	Bath	TownHouse	PatioBalcony	Pet	Furnished	Dishwasher	LaundryRoom	WasherDryer	Fireplace	Pool	Tennis	Clubhouse	Age	One Mile	Two Mile	Three Mile	Four Mile	FourPlus Miles
Sig. (1-tailed)	Price	.	.000	.000	.000	.159	.001	.000	.000	.000	.000	.000	.182	.002	.000	.000	.000	.006	.009	.105	.072	.402
	Studio	.000	.	.000	.000	.462	.061	.382	.132	.000	.039	.023	.080	.000	.006	.000	.002	.000	.238	.200	.403	.051
	Bed	.000	.000	.	.000	.018	.127	.000	.000	.000	.001	.000	.087	.000	.000	.000	.002	.075	.175	.137	.257	.099
	Bath	.000	.000	.000	.	.001	.093	.000	.000	.000	.000	.000	.497	.000	.000	.000	.000	.318	.083	.406	.390	.044
	TownHouse	.159	.462	.018	.001	.	.177	.013	.025	.003	.201	.001	.252	.019	.268	.118	.020	.005	.008	.001	.000	.016
	PatioBalcony	.001	.061	.127	.093	.177	.	.124	.323	.000	.088	.305	.001	.121	.000	.000	.047	.036	.002	.076	.063	.105
	Pet	.000	.382	.000	.000	.013	.124	.	.000	.371	.044	.002	.143	.006	.276	.020	.000	.035	.009	.167	.033	.491
	Furnished	.000	.132	.000	.000	.025	.323	.000	.	.008	.125	.013	.076	.006	.000	.000	.000	.118	.023	.290	.318	.036
	Dishwasher	.000	.000	.000	.000	.003	.000	.371	.008	.	.001	.001	.035	.003	.000	.000	.000	.048	.006	.104	.285	.085
	LaundryRoom	.000	.039	.001	.000	.201	.088	.044	.125	.001	.	.000	.290	.244	.155	.031	.000	.246	.357	.002	.420	.002
	WasherDryer	.000	.023	.000	.000	.001	.305	.002	.013	.001	.000	.	.021	.118	.001	.000	.000	.156	.025	.019	.446	.000
	Fireplace	.182	.080	.087	.497	.252	.001	.143	.076	.035	.290	.021	.	.115	.023	.318	.078	.005	.068	.235	.216	.270
	Pool	.002	.000	.000	.000	.019	.121	.006	.006	.003	.244	.118	.115	.	.000	.000	.291	.000	.011	.132	.001	.023
	Tennis	.000	.006	.000	.000	.268	.000	.276	.000	.000	.155	.001	.023	.000	.	.000	.007	.000	.001	.001	.396	.002
	Clubhouse	.000	.000	.000	.000	.118	.000	.020	.000	.000	.031	.000	.318	.000	.000	.	.000	.000	.037	.363	.015	.002
	Age	.000	.002	.002	.000	.020	.047	.000	.000	.000	.000	.000	.078	.291	.007	.000	.	.000	.086	.000	.003	.000
	OneMile	.006	.000	.075	.318	.005	.036	.035	.118	.048	.246	.156	.005	.000	.000	.000	.000	.	.009	.006	.003	.000
	TwoMile	.009	.238	.175	.083	.008	.002	.009	.023	.006	.357	.025	.068	.011	.001	.037	.086	.009	.	.000	.000	.000
	ThreeMile	.105	.200	.137	.406	.001	.076	.167	.290	.104	.002	.019	.235	.132	.001	.363	.000	.006	.000	.	.000	.000
	FourMile	.072	.403	.257	.390	.000	.063	.033	.318	.285	.420	.446	.216	.001	.396	.015	.003	.003	.000	.000	.	.000
	FourPlusMiles	.402	.051	.099	.044	.016	.105	.491	.036	.085	.002	.000	.270	.023	.002	.002	.000	.000	.000	.000	.000	.

Table B-3. Continued

		Price	Studio	Bed	Bath	TownHouse	PatioBalcony	Pet	Furnished	Dishwasher	LaundryRoom	WasherDryer	Fireplace	Pool	Tennis	Clubhouse	Age	One Mile	Two Mile	Three Mile	Four Mile	FourPlus Miles
N	Price	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Studio	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Bed	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Bath	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	TownHouse	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	PatioBalcony	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Pet	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Furnished	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Dishwasher	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	LaundryRoom	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	WasherDryer	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Fireplace	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Pool	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Tennis	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Clubhouse	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	Age	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	OneMile	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	TwoMile	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	ThreeMile	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	FourMile	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
	FourPlusMiles	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350

Table B-4. Variable entered and removed.

Model	Variables Entered	Variables Removed	Method
1	Bath	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Pet	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	Clubhouse	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
4	OneMile	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
5	Bed	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

Table B-4 Continued.

6	Age	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
7	Furnished	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
8	FourMile	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
9	Fireplace	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
10	TownHouse	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: Price

Table B-5. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.759[a]	.576	.575	$247.287
2	.783[b]	.613	.611	$236.634
3	.803[c]	.644	.641	$227.217
4	.824[d]	.678	.675	$216.411
5	.844[e]	.713	.709	$204.815
6	.851[f]	.725	.720	$200.755
7	.858[g]	.736	.730	$197.067
8	.861[h]	.741	.735	$195.156
9	.864[i]	.746	.739	$193.742
10	.865[j]	.749	.741	$192.878

a. Predictors: (Constant), Bath

b. Predictors: (Constant), Bath, Pet

c. Predictors: (Constant), Bath, Pet, Clubhouse

d. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile

e. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed

f. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age

g. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished

h. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished, FourMile

i. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished, FourMile, Fireplace

j. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished, FourMile, Fireplace, TownHouse

k. Dependent Variable: Price

Table B-6. ANOVA table.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.894E7	1	2.894E7	473.328	.000[a]
	Residual	2.128E7	348	61150.620		
	Total	5.022E7	349			
2	Regression	3.079E7	2	1.540E7	274.968	.000[b]
	Residual	1.943E7	347	55995.868		
	Total	5.022E7	349			
3	Regression	3.236E7	3	1.079E7	208.942	.000[c]
	Residual	1.786E7	346	51627.625		
	Total	5.022E7	349			
4	Regression	3.407E7	4	8516782.277	181.852	.000[d]
	Residual	1.616E7	345	46833.527		
	Total	5.022E7	349			
5	Regression	3.579E7	5	7158823.445	170.654	.000[e]
	Residual	1.443E7	344	41949.357		
	Total	5.022E7	349			
6	Regression	3.640E7	6	6066829.415	150.533	.000[f]
	Residual	1.382E7	343	40302.389		
	Total	5.022E7	349			
7	Regression	3.694E7	7	5277560.853	135.895	.000[g]
	Residual	1.328E7	342	38835.585		
	Total	5.022E7	349			
8	Regression	3.724E7	8	4654678.070	122.215	.000[h]
	Residual	1.299E7	341	38085.840		
	Total	5.022E7	349			
9	Regression	3.746E7	9	4162498.765	110.894	.000[i]
	Residual	1.276E7	340	37535.903		
	Total	5.022E7	349			

Table B-6 Continued.

10	Regression	3.761E7	10	3761320.932	101.105	.000[j]
	Residual	1.261E7	339	37202.025		
	Total	5.022E7	349			

a. Predictors: (Constant), Bath

b. Predictors: (Constant), Bath, Pet

c. Predictors: (Constant), Bath, Pet, Clubhouse

d. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile

e. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed

f. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age

g. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished

h. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished, FourMile

i. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished, FourMile, Fireplace

j. Predictors: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished, FourMile, Fireplace, TownHouse

k. Dependent Variable: Price

Table B-7. Coefficient table.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	302.255	32.613		9.268	.000	238.112	366.398					
	Bath	360.182	16.555	.759	21.756	.000	327.621	392.743	.759	.759	.759	1.000	1.000
2	(Constant)	540.397	51.871		10.418	.000	438.376	642.419					
	Bath	333.471	16.510	.703	20.198	.000	300.999	365.943	.759	.735	.674	.921	1.086
	Pet	-220.244	38.319	-.200	-5.748	.000	-295.611	-144.877	-.398	-.295	-.192	.921	1.086
3	(Constant)	500.173	50.339		9.936	.000	401.164	599.182					
	Bath	311.241	16.358	.656	19.027	.000	279.067	343.415	.759	.715	.610	.865	1.156
	Pet	-212.492	36.821	-.193	-5.771	.000	-284.913	-140.071	-.398	-.296	-.185	.919	1.088
	Clubhouse	139.182	25.260	.183	5.510	.000	89.499	188.864	.379	.284	.177	.928	1.078
4	(Constant)	437.632	49.052		8.922	.000	341.153	534.111					
	Bath	310.272	15.581	.654	19.913	.000	279.626	340.918	.759	.731	.608	.865	1.157
	Pet	-186.499	35.333	-.169	-5.278	.000	-255.994	-117.003	-.398	-.273	-.161	.906	1.104
	Clubhouse	177.821	24.896	.234	7.143	.000	128.854	226.788	.379	.359	.218	.866	1.154
	OneMile	267.933	44.398	.192	6.035	.000	180.607	355.259	.133	.309	.184	.922	1.084
5	(Constant)	410.120	46.622		8.797	.000	318.421	501.820					
	Bath	175.434	25.673	.370	6.834	.000	124.939	225.929	.759	.346	.197	.285	3.505
	Pet	-191.481	33.449	-.174	-5.725	.000	-257.271	-125.691	-.398	-.295	-.165	.905	1.105
	Clubhouse	186.867	23.604	.246	7.917	.000	140.440	233.293	.379	.393	.229	.863	1.158
	OneMile	297.635	42.274	.213	7.041	.000	214.487	380.782	.133	.355	.203	.911	1.097
	Bed	131.116	20.435	.337	6.416	.000	90.923	171.310	.715	.327	.185	.303	3.299

Table B-7 Continued.

6	(Constant)	486.623	49.769		9.778	.000	388.733	584.513					
	Bath	164.851	25.311	.347	6.513	.000	115.067	214.636	.759	.332	.184	.282	3.547
	Pet	-169.347	33.278	-.154	-5.089	.000	-234.802	-103.891	-.398	-.265	-.144	.879	1.138
	Clubhouse	147.628	25.249	.195	5.847	.000	97.965	197.292	.379	.301	.166	.725	1.380
	OneMile	322.996	41.948	.231	7.700	.000	240.488	405.503	.133	.384	.218	.889	1.125
	Bed	136.815	20.084	.351	6.812	.000	97.312	176.317	.715	.345	.193	.301	3.317
	Age	-4.716	1.215	-.129	-3.880	.000	-7.106	-2.325	-.338	-.205	-.110	.724	1.382
7	(Constant)	456.979	49.495		9.233	.000	359.626	554.332					
	Bath	156.311	24.951	.329	6.265	.000	107.235	205.388	.759	.321	.174	.280	3.577
	Pet	-144.442	33.340	-.131	-4.332	.000	-210.021	-78.864	-.398	-.228	-.120	.844	1.185
	Clubhouse	132.856	25.099	.175	5.293	.000	83.488	182.224	.379	.275	.147	.707	1.415
	OneMile	327.751	41.197	.235	7.956	.000	246.719	408.783	.133	.395	.221	.888	1.126
	Bed	137.056	19.715	.352	6.952	.000	98.279	175.834	.715	.352	.193	.301	3.317
	Age	-4.605	1.193	-.126	-3.859	.000	-6.952	-2.258	-.338	-.204	-.107	.723	1.383
	Furnished	91.758	24.563	.112	3.736	.000	43.445	140.072	.364	.198	.104	.853	1.172

Table B-7 Continued.

8	(Constant)	424.370	50.398		8.420	.000	325.240	523.500					
	Bath	156.907	24.710	.331	6.350	.000	108.304	205.510	.759	.325	.175	.280	3.577
	Pet	-134.666	33.204	-.122	-4.056	.000	-199.976	-69.356	-.398	-.215	-.112	.834	1.199
	Clubhouse	129.587	24.884	.171	5.208	.000	80.642	178.531	.379	.271	.143	.705	1.418
	OneMile	342.021	41.119	.245	8.318	.000	261.142	422.899	.133	.411	.229	.874	1.144
	Bed	139.383	19.542	.358	7.133	.000	100.946	177.820	.715	.360	.196	.301	3.323
	Age	-4.346	1.185	-.119	-3.666	.000	-6.677	-2.014	-.338	-.195	-.101	.719	1.391
	Furnished	93.320	24.331	.114	3.835	.000	45.462	141.178	.364	.203	.106	.853	1.172
	FourMile	75.299	27.079	.079	2.781	.006	22.037	128.562	.078	.149	.077	.948	1.055
9	(Constant)	421.945	50.043		8.432	.000	323.513	520.377					
	Bath	149.872	24.699	.316	6.068	.000	101.291	198.453	.759	.313	.166	.276	3.626
	Pet	-138.781	33.006	-.126	-4.205	.000	-203.702	-73.859	-.398	-.222	-.115	.832	1.202
	Clubhouse	123.529	24.827	.163	4.976	.000	74.695	172.362	.379	.261	.136	.698	1.432
	OneMile	329.435	41.143	.236	8.007	.000	248.508	410.363	.133	.398	.219	.861	1.162
	Bed	145.407	19.555	.374	7.436	.000	106.942	183.872	.715	.374	.203	.296	3.377
	Age	-4.566	1.180	-.125	-3.869	.000	-6.888	-2.245	-.338	-.205	-.106	.715	1.400
	Furnished	97.566	24.217	.120	4.029	.000	49.932	145.200	.364	.213	.110	.849	1.179
	FourMile	76.682	26.889	.080	2.852	.005	23.794	129.571	.078	.153	.078	.948	1.055
	Fireplace	67.851	27.709	.069	2.449	.015	13.348	122.355	.049	.132	.067	.946	1.057

Table B-7 Continued.

10	(Constant)	405.039	50.523		8.017	.000	305.662	504.417					
	Bath	157.118	24.851	.331	6.323	.000	108.237	205.999	.759	.325	.172	.270	3.704
	Pet	-126.794	33.394	-.115	-3.797	.000	-192.480	-61.109	-.398	-.202	-.103	.805	1.242
	Clubhouse	129.351	24.885	.170	5.198	.000	80.403	178.299	.379	.272	.141	.689	1.452
	OneMile	340.970	41.359	.244	8.244	.000	259.617	422.322	.133	.409	.224	.844	1.184
	Bed	143.387	19.494	.368	7.355	.000	105.042	181.731	.715	.371	.200	.295	3.386
	Age	-4.255	1.185	-.117	-3.591	.000	-6.587	-1.924	-.338	-.191	-.098	.702	1.424
	Furnished	102.976	24.258	.126	4.245	.000	55.260	150.692	.364	.225	.116	.838	1.193
	FourMile	66.091	27.281	.069	2.423	.016	12.430	119.752	.078	.130	.066	.912	1.096
	Fireplace	67.066	27.589	.068	2.431	.016	12.800	121.333	.049	.131	.066	.946	1.057
	TownHouse	-58.985	29.305	-.059	-2.013	.045	-116.627	-1.343	.054	-.109	-.055	.849	1.178

Dependent Variable: Price

Table B-8 Excluded variables.

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	Studio	-.060[a]	-1.679	.094	-.090	.964	1.037	.964
	Bed	.272[a]	4.441	.000	.232	.308	3.252	.308
	TownHouse	-.072[a]	-2.037	.042	-.109	.974	1.027	.974
	PatioBalcony	.107[a]	3.091	.002	.164	.995	1.005	.995
	Pet	-.200[a]	-5.748	.000	-.295	.921	1.086	.921
	Furnished	.175[a]	5.009	.000	.260	.930	1.076	.930
	Dishwasher	.090[a]	2.508	.013	.133	.931	1.074	.931
	LaundryRoom	-.035[a]	-.987	.324	-.053	.965	1.036	.965
	WasherDryer	.046[a]	1.257	.210	.067	.892	1.122	.892
	Fireplace	.048[a]	1.388	.166	.074	1.000	1.000	1.000
	Pool	.017[a]	.489	.625	.026	.969	1.032	.969
	Tennis	.099[a]	2.795	.005	.148	.943	1.060	.943
	Clubhouse	.191[a]	5.485	.000	.282	.929	1.076	.929
	Age	-.171[a]	-4.935	.000	-.256	.946	1.057	.946
	OneMile	.153[a]	4.494	.000	.235	.999	1.001	.999
	TwoMile	-.070[a]	-2.022	.044	-.108	.994	1.006	.994
	ThreeMile	-.057[a]	-1.649	.100	-.088	1.000	1.000	1.000
	FourMile	.090[a]	2.588	.010	.138	1.000	1.000	1.000
	FourPlusMiles	-.057[a]	-1.617	.107	-.086	.992	1.008	.992

Table B-8 Continued.

2	Studio	-.074[b]	-2.191	.029	-.117	.959	1.043	.883
	Bed	.286[b]	4.896	.000	.255	.307	3.256	.296
	TownHouse	-.039[b]	-1.133	.258	-.061	.944	1.060	.882
	PatioBalcony	.099[b]	2.975	.003	.158	.993	1.007	.918
	Furnished	.140[b]	4.041	.000	.212	.890	1.124	.881
	Dishwasher	.111[b]	3.227	.001	.171	.922	1.084	.849
	LaundryRoom	-.027[b]	-.796	.426	-.043	.963	1.038	.894
	WasherDryer	.032[b]	.900	.369	.048	.887	1.128	.838
	Fireplace	.060[b]	1.800	.073	.096	.996	1.004	.917
	Pool	.057[b]	1.659	.098	.089	.933	1.072	.874
	Tennis	.107[b]	3.152	.002	.167	.942	1.062	.868
	Clubhouse	.183[b]	5.510	.000	.284	.928	1.078	.865
	Age	-.144[b]	-4.250	.000	-.223	.923	1.083	.889
	OneMile	.133[b]	4.060	.000	.213	.988	1.013	.910
	TwoMile	-.050[b]	-1.481	.139	-.079	.982	1.018	.910
	ThreeMile	-.048[b]	-1.434	.152	-.077	.997	1.003	.918
	FourMile	.070[b]	2.091	.037	.112	.988	1.012	.910
	FourPlusMiles	-.052[b]	-1.542	.124	-.083	.991	1.009	.912

Table B-8 Continued.

3	Studio	-.046[c]	-1.402	.162	-.075	.934	1.070	.843
	Bed	.296[c]	5.317	.000	.275	.307	3.260	.288
	TownHouse	-.044[c]	-1.337	.182	-.072	.943	1.060	.832
	PatioBalcony	.054[c]	1.617	.107	.087	.918	1.089	.858
	Furnished	.107[c]	3.131	.002	.166	.855	1.170	.844
	Dishwasher	.069[c]	2.019	.044	.108	.865	1.156	.822
	LaundryRoom	-.018[c]	-.545	.586	-.029	.961	1.041	.845
	WasherDryer	-.009[c]	-.270	.788	-.015	.845	1.184	.811
	Fireplace	.055[c]	1.717	.087	.092	.996	1.004	.865
	Pool	-.007[c]	-.210	.834	-.011	.819	1.220	.815
	Tennis	.027[c]	.722	.471	.039	.731	1.367	.720
	Age	-.078[c]	-2.120	.035	-.113	.744	1.344	.744
	OneMile	.192[c]	6.035	.000	.309	.922	1.084	.865
	TwoMile	-.037[c]	-1.130	.259	-.061	.977	1.024	.864
	ThreeMile	-.045[c]	-1.416	.158	-.076	.997	1.003	.865
	FourMile	.049[c]	1.510	.132	.081	.974	1.027	.860
	FourPlusMiles	-.077[c]	-2.385	.018	-.127	.973	1.028	.862

Table B-8 Continued.

4	Studio	-.087[d]	-2.723	.007	-.145	.899	1.113	.841
	Bed	.337[d]	6.416	.000	.327	.303	3.299	.285
	TownHouse	-.081[d]	-2.557	.011	-.137	.912	1.096	.832
	PatioBalcony	.060[d]	1.894	.059	.102	.917	1.090	.808
	Furnished	.114[d]	3.516	.000	.186	.854	1.171	.838
	Dishwasher	.072[d]	2.199	.029	.118	.865	1.156	.817
	LaundryRoom	-.008[d]	-.251	.802	-.014	.958	1.044	.845
	WasherDryer	-.009[d]	-.278	.781	-.015	.845	1.184	.811
	Fireplace	.027[d]	.866	.387	.047	.971	1.030	.862
	Pool	.015[d]	.446	.656	.024	.810	1.235	.780
	Tennis	.049[d]	1.377	.169	.074	.724	1.381	.696
	Age	-.113[d]	-3.188	.002	-.169	.728	1.374	.725
	TwoMile	-.010[d]	-.322	.747	-.017	.957	1.045	.856
	ThreeMile	-.020[d]	-.647	.518	-.035	.978	1.023	.864
	FourMile	.075[d]	2.422	.016	.129	.957	1.045	.860
	FourPlusMiles	-.040[d]	-1.252	.212	-.067	.930	1.075	.861

Table B-8 Continued.

5	Studio	-.002[e]	-.059	.953	-.003	.728	1.374	.245
	TownHouse	-.075[e]	-2.504	.013	-.134	.911	1.097	.280
	PatioBalcony	.058[e]	1.927	.055	.103	.917	1.090	.285
	Furnished	.115[e]	3.757	.000	.199	.854	1.171	.283
	Dishwasher	.052[e]	1.684	.093	.091	.856	1.168	.285
	LaundryRoom	-.004[e]	-.123	.902	-.007	.958	1.044	.284
	WasherDryer	.005[e]	.143	.886	.008	.841	1.189	.274
	Fireplace	.050[e]	1.693	.091	.091	.958	1.044	.282
	Pool	-.012[e]	-.361	.718	-.019	.796	1.256	.285
	Tennis	.042[e]	1.226	.221	.066	.723	1.383	.285
	Age	-.129[e]	-3.880	.000	-.205	.724	1.382	.282
	TwoMile	-.010[e]	-.334	.738	-.018	.957	1.045	.285
	ThreeMile	-.041[e]	-1.395	.164	-.075	.966	1.035	.283
	FourMile	.084[e]	2.885	.004	.154	.954	1.048	.285
	FourPlusMiles	-.033[e]	-1.108	.269	-.060	.929	1.076	.284

Table B-8 Continued.

6	Studio	.008[f]	.251	.802	.014	.723	1.383	.243
	TownHouse	-.060[f]	-2.024	.044	-.109	.894	1.119	.275
	PatioBalcony	.066[f]	2.225	.027	.119	.913	1.095	.282
	Furnished	.112[f]	3.736	.000	.198	.853	1.172	.280
	Dishwasher	.024[f]	.774	.440	.042	.804	1.244	.282
	LaundryRoom	.033[f]	1.073	.284	.058	.873	1.145	.282
	WasherDryer	-.026[f]	-.826	.409	-.045	.791	1.265	.273
	Fireplace	.059[f]	2.049	.041	.110	.952	1.051	.279
	Pool	.010[f]	.303	.762	.016	.772	1.295	.282
	Tennis	.065[f]	1.941	.053	.104	.702	1.424	.281
	TwoMile	-.006[f]	-.219	.827	-.012	.956	1.046	.282
	ThreeMile	-.018[f]	-.619	.537	-.033	.923	1.083	.281
	FourMile	.076[f]	2.641	.009	.141	.949	1.054	.282
	FourPlusMiles	-.049[f]	-1.669	.096	-.090	.912	1.096	.281

Table B-8 Continued.

7	Studio	.007[g]	.205	.838	.011	.723	1.383	.243
	TownHouse	-.074[g]	-2.516	.012	-.135	.882	1.134	.274
	PatioBalcony	.072[g]	2.503	.013	.134	.910	1.099	.280
	Dishwasher	.020[g]	.657	.512	.036	.803	1.246	.279
	LaundryRoom	.016[g]	.520	.603	.028	.853	1.173	.279
	WasherDryer	-.023[g]	-.728	.467	-.039	.790	1.266	.270
	Fireplace	.067[g]	2.365	.019	.127	.947	1.056	.276
	Pool	.001[g]	.022	.982	.001	.768	1.302	.280
	Tennis	.057[g]	1.720	.086	.093	.699	1.431	.278
	TwoMile	.000[g]	.002	.998	.000	.952	1.050	.280
	ThreeMile	-.024[g]	-.827	.409	-.045	.921	1.086	.278
	FourMile	.079[g]	2.781	.006	.149	.948	1.055	.280
	FourPlusMiles	-.055[g]	-1.884	.060	-.101	.910	1.098	.279
8	Studio	.006[h]	.187	.852	.010	.723	1.383	.243
	TownHouse	-.060[h]	-2.033	.043	-.110	.849	1.177	.274
	PatioBalcony	.069[h]	2.392	.017	.129	.908	1.102	.280
	Dishwasher	.020[h]	.658	.511	.036	.803	1.246	.279
	LaundryRoom	.012[h]	.414	.679	.022	.851	1.175	.279
	WasherDryer	-.017[h]	-.558	.577	-.030	.787	1.271	.270
	Fireplace	.069[h]	2.449	.015	.132	.946	1.057	.276
	Pool	.019[h]	.595	.552	.032	.737	1.358	.280
	Tennis	.064[h]	1.950	.052	.105	.695	1.439	.278
	TwoMile	.018[h]	.632	.528	.034	.906	1.104	.280
	ThreeMile	-.006[h]	-.201	.841	-.011	.872	1.147	.278
	FourPlusMiles	-.023[h]	-.726	.469	-.039	.728	1.374	.279

Table B-8 Continued.

9	Studio	.006[i]	.183	.855	.010	.723	1.383	.240
	TownHouse	-.059[i]	-2.013	.045	-.109	.849	1.178	.270
	PatioBalcony	.058[i]	2.012	.045	.109	.881	1.135	.276
	Dishwasher	.010[i]	.336	.737	.018	.788	1.269	.276
	LaundryRoom	.011[i]	.356	.722	.019	.851	1.176	.275
	WasherDryer	-.008[i]	-.272	.786	-.015	.775	1.290	.265
	Pool	.013[i]	.420	.675	.023	.733	1.365	.276
	Tennis	.055[i]	1.672	.095	.090	.685	1.461	.275
	TwoMile	.024[i]	.832	.406	.045	.900	1.111	.276
	ThreeMile	-.004[i]	-.137	.891	-.007	.871	1.148	.274
	FourPlusMiles	-.029[i]	-.912	.362	-.049	.724	1.382	.275
10	Studio	.005[j]	.153	.879	.008	.723	1.384	.239
	PatioBalcony	.055[j]	1.913	.057	.103	.879	1.138	.270
	Dishwasher	.019[j]	.627	.531	.034	.772	1.295	.270
	LaundryRoom	.013[j]	.432	.666	.023	.849	1.177	.269
	WasherDryer	.002[j]	.076	.940	.004	.752	1.329	.262
	Pool	.014[j]	.428	.669	.023	.733	1.365	.270
	Tennis	.051[j]	1.566	.118	.085	.682	1.465	.269
	TwoMile	.032[j]	1.101	.271	.060	.886	1.129	.270
	ThreeMile	.004[j]	.120	.904	.007	.857	1.167	.268
	FourPlusMiles	-.045[j]	-1.375	.170	-.075	.691	1.446	.269

a. Predictors in the Model: (Constant), Bath

b. Predictors in the Model: (Constant), Bath, Pet

c. Predictors in the Model: (Constant), Bath, Pet, Clubhouse

d. Predictors in the Model: (Constant), Bath, Pet, Clubhouse, OneMile

e. Predictors in the Model: (Constant), Bath, Pet, Clubhouse, OneMile, Bed

Table B-8 Continued.

f. Predictors in the Model: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age

g. Predictors in the Model: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished

h. Predictors in the Model: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished, FourMile

i. Predictors in the Model: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished, FourMile, Fireplace

j. Predictors in the Model: (Constant), Bath, Pet, Clubhouse, OneMile, Bed, Age, Furnished, FourMile, Fireplace, TownHouse

k. Dependent Variable: Price

Table B-9. Coefficient correlations

Model			Bath	Pet	Clubhouse	OneMile	Bed	Age	Furnished	FourMile	Fireplace	TownHouse
1	Correlations	Bath	1.000									
	Covariances	Bath	274.083									
2	Correlations	Bath	1.000	.281								
		Pet	.281	1.000								
	Covariances	Bath	272.577	178.081								
		Pet	178.081	1468.342								
3	Correlations	Bath	1.000	.263	-.247							
		Pet	.263	1.000	.038							
		Clubhouse	-.247	.038	1.000							
	Covariances	Bath	267.590	158.513	-101.909							
		Pet	158.513	1355.776	35.538							
		Clubhouse	-101.909	35.538	638.063							
4	Correlations	Bath	1.000	.260	-.241	-.010						
		Pet	.260	1.000	.068	.122						
		Clubhouse	-.241	.068	1.000	.257						
		OneMile	-.010	.122	.257	1.000						
	Covariances	Bath	242.767	143.102	-93.475	-7.132						
		Pet	143.102	1248.432	59.817	191.235						
		Clubhouse	-93.475	59.817	619.810	284.275						
		OneMile	-7.132	191.235	284.275	1971.217						

Table B-9. Continued

5	Correlations	Bath	1.000	.168	-.187	-.096	-.819					
		Pet	.168	1.000	.066	.119	-.023					
		Clubhouse	-.187	.066	1.000	.262	.060					
		OneMile	-.096	.119	.262	1.000	.110					
		Bed	-.819	-.023	.060	.110	1.000					
	Covariances	Bath	659.082	144.496	-113.353	-103.669	-429.443					
		Pet	144.496	1118.839	52.484	167.697	-15.868					
		Clubhouse	-113.353	52.484	557.159	261.155	28.809					
		OneMile	-103.669	167.697	261.155	1787.072	94.596					
		Bed	-429.443	-15.868	28.809	94.596	417.590					
6	Correlations	Bath	1.000	.146	-.127	-.111	-.820	.108				
		Pet	.146	1.000	-.009	.142	-.010	-.171				
		Clubhouse	-.127	-.009	1.000	.174	.025	.400				
		OneMile	-.111	.142	.174	1.000	.119	-.156				
		Bed	-.820	-.010	.025	.119	1.000	-.073				
		Age	.108	-.171	.400	-.156	-.073	1.000				
	Covariances	Bath	640.643	123.268	-81.327	-117.422	-416.587	3.314				
		Pet	123.268	1107.449	-7.255	198.393	-6.869	-6.932				
		Clubhouse	-81.327	-7.255	637.534	184.814	12.829	12.289				
		OneMile	-117.422	198.393	184.814	1759.624	100.480	-7.943				
		Bed	-416.587	-6.869	12.829	100.480	403.351	-1.785				
		Age	3.314	-6.932	12.289	-7.943	-1.785	1.477				

Table B-9. Continued

7	Correlations	Bath	1.000	.124	-.111	-.113	-.816	.105	-.092			
		Pet	.124	1.000	-.040	.145	-.009	-.163	.200			
		Clubhouse	-.111	-.040	1.000	.167	.024	.391	-.158			
		OneMile	-.113	.145	.167	1.000	.119	-.155	.031			
		Bed	-.816	-.009	.024	.119	1.000	-.073	.003			
		Age	.105	-.163	.391	-.155	-.073	1.000	.025			
		Furnished	-.092	.200	-.158	.031	.003	.025	1.000			
	Covariances	Bath	622.553	103.540	-69.327	-116.059	-401.573	3.126	-56.154			
		Pet	103.540	1111.588	-33.354	199.659	-6.187	-6.482	163.754			
		Clubhouse	-69.327	-33.354	629.968	173.054	12.106	11.724	-97.132			
		OneMile	-116.059	199.659	173.054	1697.203	96.905	-7.616	31.269			
		Bed	-401.573	-6.187	12.106	96.905	388.675	-1.718	1.588			
		Age	3.126	-6.482	11.724	-7.616	-1.718	1.424	.728			
		Furnished	-56.154	163.754	-97.132	31.269	1.588	.728	603.337			
8	Correlations	Bath	1.000	.125	-.111	-.111	-.815	.105	-.091	.009		
		Pet	.125	1.000	-.045	.157	-.005	-.153	.201	.106		
		Clubhouse	-.111	-.045	1.000	.160	.022	.386	-.158	-.047		
		OneMile	-.111	.157	.160	1.000	.124	-.143	.034	.125		
		Bed	-.815	-.005	.022	.124	1.000	-.069	.004	.043		
		Age	.105	-.153	.386	-.143	-.069	1.000	.027	.079		
		Furnished	-.091	.201	-.158	.034	.004	.027	1.000	.023		
		FourMile	.009	.106	-.047	.125	.043	.079	.023	1.000		
	Covariances	Bath	610.580	102.294	-68.240	-112.720	-393.642	3.085	-54.949	5.798		
		Pet	102.294	1102.490	-36.844	213.846	-3.126	-6.029	162.567	95.206		
		Clubhouse	-68.240	-36.844	619.189	163.680	10.889	11.388	-95.917	-31.838		
		OneMile	-112.720	213.846	163.680	1690.770	99.328	-6.990	33.547	138.955		
		Bed	-393.642	-3.126	10.889	99.328	381.872	-1.607	2.028	22.656		
		Age	3.085	-6.029	11.388	-6.990	-1.607	1.405	.766	2.526		
		Furnished	-54.949	162.567	-95.917	33.547	2.028	.766	592.005	15.207		
		FourMile	5.798	95.206	-31.838	138.955	22.656	2.526	15.207	733.264		

Table B-9. Continued

9	Correlations	Bath	1.000	.130	-.098	-.095	-.818	.113	-.099	.006	-.116	
		Pet	.130	1.000	-.039	.162	-.011	-.149	.197	.105	-.051	
		Clubhouse	-.098	-.039	1.000	.170	.010	.391	-.164	-.049	-.100	
		OneMile	-.095	.162	.170	1.000	.106	-.132	.024	.121	-.125	
		Bed	-.818	-.011	.010	.106	1.000	-.078	.013	.045	.126	
		Age	.113	-.149	.391	-.132	-.078	1.000	.021	.077	-.076	
		Furnished	-.099	.197	-.164	.024	.013	.021	1.000	.025	.072	
		FourMile	.006	.105	-.049	.121	.045	.077	.025	1.000	.021	
		Fireplace	-.116	-.051	-.100	-.125	.126	-.076	.072	.021	1.000	
	Covariances	Bath	610.017	105.645	-60.147	-96.327	-395.026	3.300	-59.138	4.091	-79.605	
		Pet	105.645	1089.394	-32.154	219.396	-7.216	-5.790	157.305	92.882	-46.566	
		Clubhouse	-60.147	-32.154	616.369	174.032	4.645	11.447	-98.823	-32.776	-68.553	
		OneMile	-96.327	219.396	174.032	1692.773	85.248	-6.426	24.149	134.045	-142.417	
		Bed	-395.026	-7.216	4.645	85.248	382.410	-1.805	6.265	23.719	68.172	
		Age	3.300	-5.790	11.447	-6.426	-1.805	1.393	.599	2.439	-2.499	
		Furnished	-59.138	157.305	-98.823	24.149	6.265	.599	586.464	15.968	48.055	
		FourMile	4.091	92.882	-32.776	134.045	23.719	2.439	15.968	722.996	15.654	
		Fireplace	-79.605	-46.566	-68.553	-142.417	68.172	-2.499	48.055	15.654	767.815	
10	Correlations	Bath	1.000	.152	-.080	-.073	-.816	.130	-.081	-.022	-.117	-.145
		Pet	.152	1.000	-.018	.182	-.020	-.122	.212	.067	-.053	-.178
		Clubhouse	-.080	-.018	1.000	.184	.004	.400	-.149	-.070	-.101	-.116
		OneMile	-.073	.182	.184	1.000	.098	-.112	.039	.091	-.126	-.139
		Bed	-.816	-.020	.004	.098	1.000	-.084	.007	.054	.126	.051
		Age	.130	-.122	.400	-.112	-.084	1.000	.035	.050	-.078	-.130
		Furnished	-.081	.212	-.149	.039	.007	.035	1.000	.003	.070	-.111
		FourMile	-.022	.067	-.070	.091	.054	.050	.003	1.000	.023	.193
		Fireplace	-.117	-.053	-.101	-.126	.126	-.078	.070	.023	1.000	.014
		TownHouse	-.145	-.178	-.116	-.139	.051	-.130	-.111	.193	.014	1.000

Table B-9. Continued

Covariances	Bath	617.550	126.143	-49.200	-74.841	-395.125	3.827	-48.937	-14.887	-80.301	-105.492
	Pet	126.143	1115.167	-14.644	251.570	-13.129	-4.818	171.911	60.720	-48.475	-174.511
	Clubhouse	-49.200	-14.644	619.253	189.059	1.701	11.792	-90.170	-47.705	-69.071	-84.764
	OneMile	-74.841	251.570	189.059	1710.555	78.738	-5.482	39.336	102.699	-143.386	-167.934
	Bed	-395.125	-13.129	1.701	78.738	380.016	-1.944	3.512	28.789	67.957	29.413
	Age	3.827	-4.818	11.792	-5.482	-1.944	1.405	1.009	1.603	-2.537	-4.530
	Furnished	-48.937	171.911	-90.170	39.336	3.512	1.009	588.471	1.683	46.580	-78.761
	FourMile	-14.887	60.720	-47.705	102.699	28.789	1.603	1.683	744.254	17.567	154.202
	Fireplace	-80.301	-48.475	-69.071	-143.386	67.957	-2.537	46.580	17.567	761.138	11.431
	TownHouse	-105.492	-174.511	-84.764	-167.934	29.413	-4.530	-78.761	154.202	11.431	858.769

a. Dependent Variable: Price

Table B-10 Collinearity diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions										
				(Constant)	Bath	Pet	Clubhouse	One Mile	Bed	Age	Furnished	FourMile	Fireplace	TownHouse
1	1	1.914	1.000	.04	.04									
	2	.086	4.723	.96	.96									
2	1	2.768	1.000	.01	.02	.01								
	2	.194	3.782	.00	.42	.30								
	3	.039	8.453	.99	.57	.68								
3	1	3.391	1.000	.00	.01	.01	.03							
	2	.395	2.929	.01	.00	.07	.80							
	3	.175	4.396	.00	.48	.24	.17							
	4	.039	9.373	.99	.50	.69	.00							
4	1	3.460	1.000	.00	.01	.01	.02	.01						
	2	.975	1.883	.00	.00	.00	.04	.79						
	3	.357	3.114	.01	.00	.09	.71	.14						
	4	.171	4.499	.00	.51	.21	.21	.03						
	5	.037	9.617	.99	.48	.69	.01	.03						
5	1	4.343	1.000	.00	.00	.01	.01	.00	.00					
	2	.977	2.108	.00	.00	.00	.03	.78	.00					
	3	.359	3.477	.01	.00	.07	.78	.14	.00					
	4	.252	4.151	.01	.04	.19	.12	.01	.06					
	5	.041	10.231	.85	.01	.64	.04	.06	.19					
	6	.027	12.654	.14	.95	.10	.01	.00	.75					

Table B-10 Continued

6	1	4.973	1.000	.00	.00	.00	.01	.00	.00	.01				
	2	1.028	2.199	.00	.00	.00	.05	.61	.00	.02				
	3	.527	3.072	.00	.00	.02	.22	.31	.00	.16				
	4	.264	4.338	.00	.04	.06	.37	.02	.06	.03				
	5	.143	5.907	.01	.00	.38	.26	.01	.00	.68				
	6	.039	11.294	.75	.03	.42	.10	.04	.26	.07				
	7	.026	13.762	.23	.93	.11	.00	.00	.67	.04				
7	1	5.346	1.000	.00	.00	.00	.01	.00	.00	.01	.01			
	2	1.074	2.231	.00	.00	.00	.04	.50	.00	.02	.05			
	3	.687	2.789	.00	.00	.02	.01	.29	.00	.04	.42			
	4	.432	3.519	.00	.00	.00	.30	.14	.00	.12	.41			
	5	.257	4.556	.00	.05	.05	.29	.01	.07	.05	.05			
	6	.140	6.187	.01	.00	.38	.28	.01	.00	.65	.03			
	7	.038	11.895	.75	.04	.45	.07	.04	.25	.07	.03			
	8	.026	14.268	.23	.91	.11	.00	.00	.67	.04	.00			
8	1	5.549	1.000	.00	.00	.00	.01	.00	.00	.00	.01	.01		
	2	1.132	2.214	.00	.00	.00	.03	.42	.00	.02	.02	.10		
	3	.764	2.695	.00	.00	.00	.02	.01	.00	.01	.20	.64		
	4	.668	2.882	.00	.00	.02	.00	.38	.00	.04	.25	.19		
	5	.428	3.599	.00	.00	.00	.31	.12	.00	.11	.41	.02		
	6	.257	4.648	.00	.05	.05	.30	.01	.07	.05	.04	.00		
	7	.140	6.306	.01	.00	.38	.27	.01	.00	.65	.03	.00		
	8	.036	12.401	.72	.05	.43	.06	.05	.29	.07	.03	.05		
	9	.026	14.571	.26	.90	.12	.00	.00	.63	.05	.00	.01		

Table B-10 Continued

9	1	5.752	1.000	.00	.00	.00	.01	.00	.00	.00	.01	.01	.01	
	2	1.190	2.198	.00	.00	.00	.03	.33	.00	.02	.03	.08	.08	
	3	.791	2.697	.00	.00	.00	.00	.05	.00	.00	.16	.33	.34	
	4	.733	2.800	.00	.00	.00	.02	.16	.00	.01	.02	.38	.40	
	5	.659	2.955	.00	.00	.02	.01	.26	.00	.05	.24	.12	.10	
	6	.421	3.696	.00	.00	.00	.28	.13	.00	.10	.44	.02	.04	
	7	.253	4.769	.00	.04	.05	.32	.02	.07	.05	.03	.00	.02	
	8	.140	6.421	.01	.00	.37	.27	.01	.00	.65	.03	.00	.00	
	9	.036	12.651	.74	.04	.43	.06	.04	.28	.07	.04	.05	.00	
	10	.026	14.929	.24	.91	.12	.00	.00	.65	.05	.00	.00	.01	
10	1	5.985	1.000	.00	.00	.00	.01	.00	.00	.00	.01	.00	.01	.01
	2	1.245	2.192	.00	.00	.00	.02	.26	.00	.01	.02	.13	.04	.06
	3	.926	2.543	.00	.00	.00	.01	.04	.00	.01	.09	.19	.16	.24
	4	.744	2.836	.00	.00	.00	.02	.25	.00	.01	.01	.09	.61	.01
	5	.663	3.004	.00	.00	.02	.02	.24	.00	.05	.32	.02	.10	.02
	6	.566	3.253	.00	.00	.00	.00	.00	.00	.01	.04	.50	.01	.60
	7	.420	3.775	.00	.00	.00	.27	.13	.00	.10	.41	.03	.04	.01
	8	.252	4.877	.00	.04	.05	.32	.02	.06	.05	.04	.01	.02	.01
	9	.139	6.550	.01	.00	.36	.27	.01	.00	.64	.03	.00	.00	.00
	10	.035	13.003	.68	.07	.40	.06	.05	.33	.07	.04	.03	.00	.01
	11	.025	15.454	.30	.88	.16	.00	.00	.60	.06	.00	.00	.01	.03

a. Dependent Variable: Price

Table B-11 Residuals statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	$420.60	$1,968.29	$950.89	$328.290	350
Std. Predicted Value	-1.615	3.099	.000	1.000	350
Standard Error of Predicted Value	18.617	65.783	33.165	8.335	350
Adjusted Predicted Value	$419.26	$1,964.89	$950.93	$327.244	350
Residual	$-492.065	$1,010.729	$1.754E-13	$190.095	350
Std. Residual	-2.551	5.240	.000	.986	350
Stud. Residual	-2.602	5.325	.000	1.005	350
Deleted Residual	$-511.720	$1,043.648	$-.035	$197.584	350
Stud. Deleted Residual	-2.624	5.554	.002	1.017	350
Mahal. Distance	2.254	39.599	9.971	5.742	350
Cook's Distance	.000	.102	.004	.011	350
Centered Leverage Value	.006	.113	.029	.016	350

a. Dependent Variable: Price

Charts

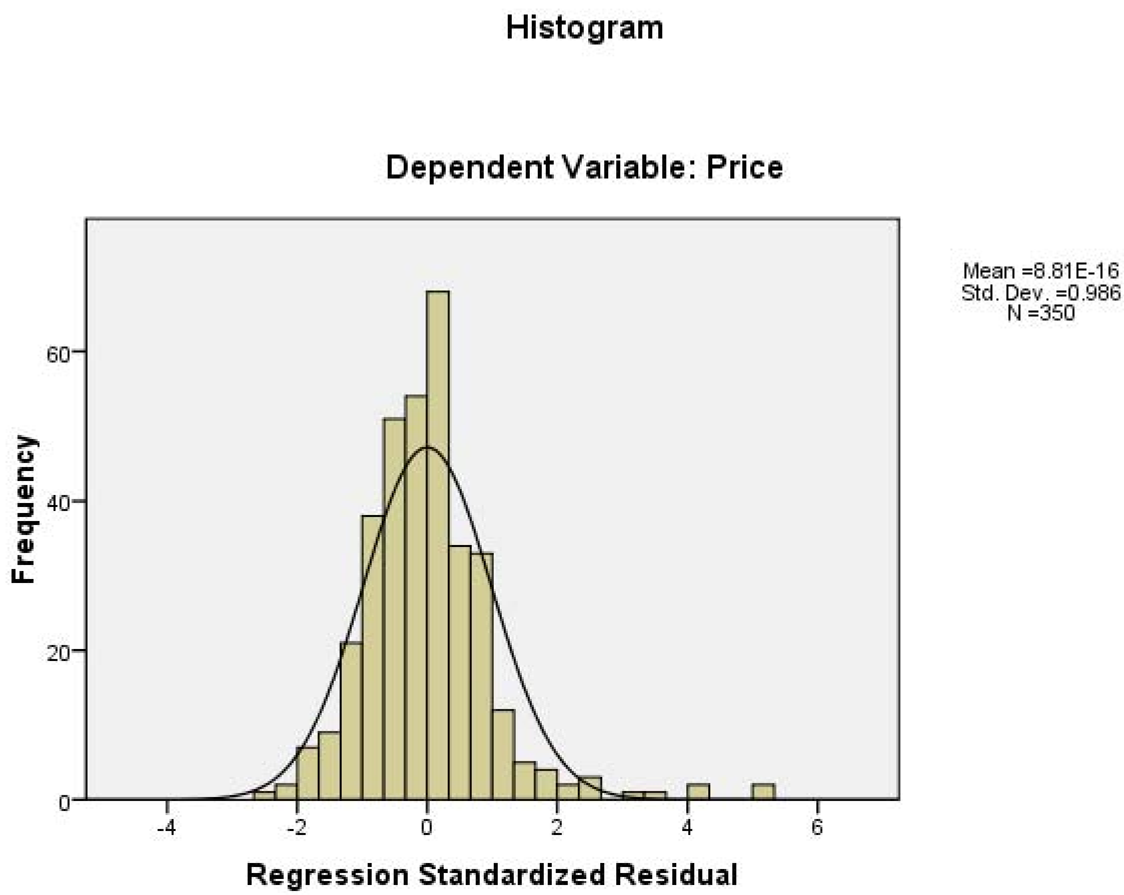

Figure B-1. Histogram

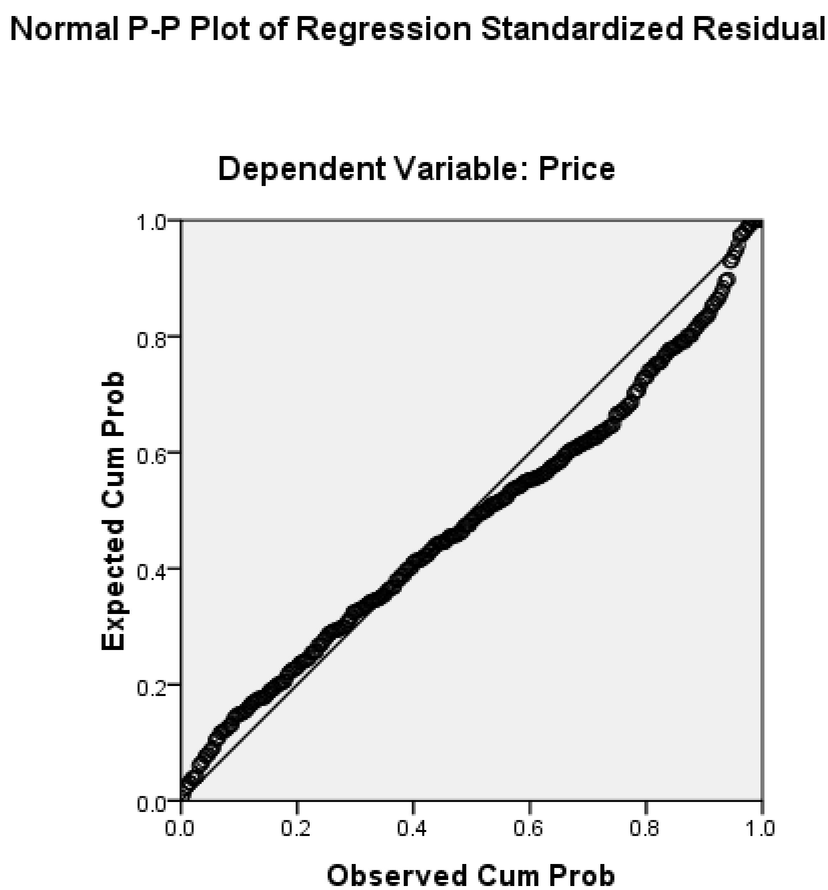

Figure B-2. Normal P-P plot of regression standardized residual.

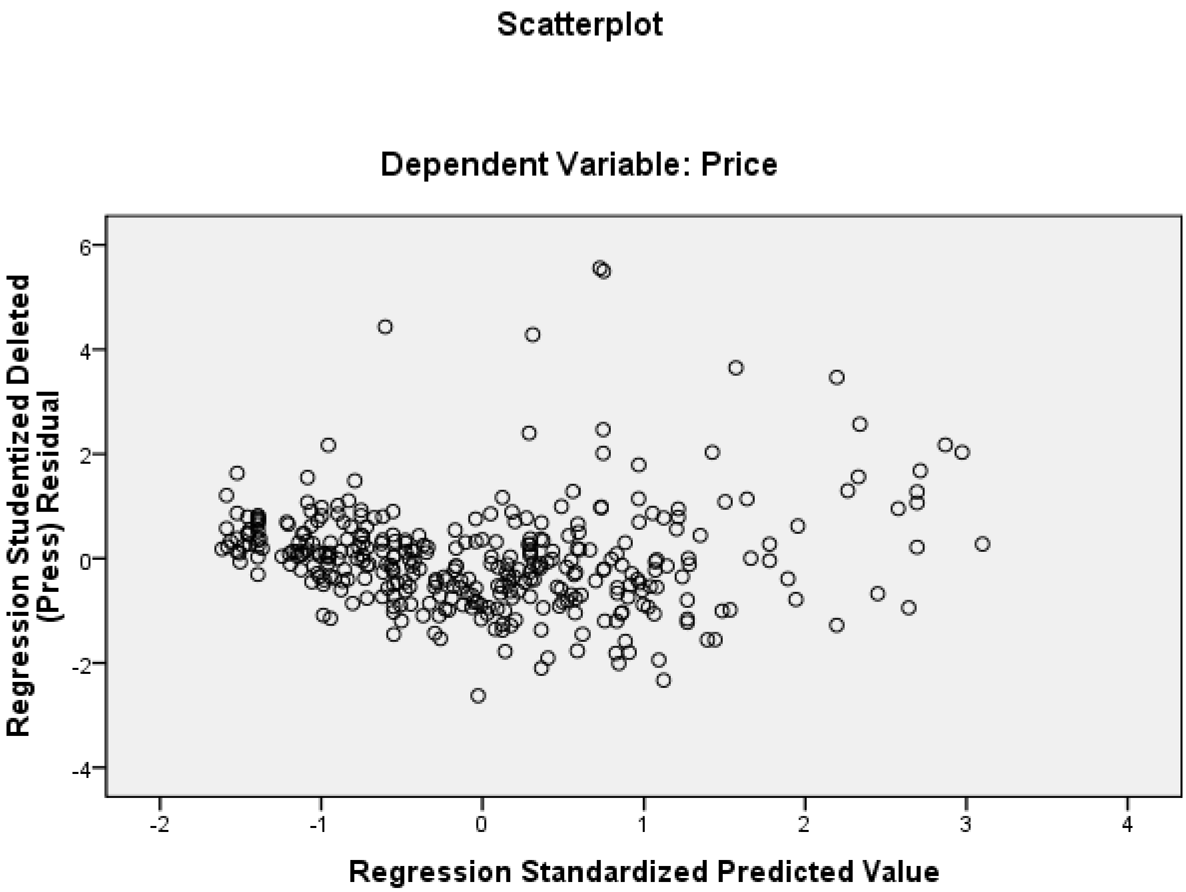

Figure B-3. Scatter plot

APPENDIX C
AFTERWORD

After the completion of this project, many new apartment and condo projects were started within steps of where the recommendations in this paper were maid. The following is photographic evidence of the benefits for following the algorithm for locating a building. The fact that there are new developments going in, that are in close proximity to my recommendations lends credence to the algorithm.

Figure C-1. 13th Street and NW 7th Avenue location.

Figure C-2. 13th Street and NW 7th Avenue. The image above is of the same complex from the back side, this complex is very large, stretching from 7th Street to 8th street, making it almost a full city block. It is assumed that it would be an entire city block, except the trophy shop refused to sale

Figure C-3. Trophy shop surrounded by new complex at NW 7th Avenue. The trophy shop is now completely surrounded by apartments

Figure C-4. SW 2nd Avenue and 6Th Street

Figure C-5. Alternate shot of SW 2nd Avenue and 6th Street. This is a shot of the same complex, both pictures for this complex show the extent of how large these buildings are, depending on its floor plan, this project has a very good chance at being successful based on its location. Both of the sites in the pictures above, fit with the rules set up in the algorithm, which leads me to believe that the algorithm is correct in its assumptions.

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BIOGRAPHICAL SKETCH

Gabriel Bolden was born in San Diego, California, February 19th, 1981. He was raised there by his single Mother and Grandparents. An active child, Gabriel played many sports growing up. In high school, he attended University City High School, where he was the captain of the soccer team and a member of the golf team. In high school, Gabriel was not focused on academics, it was not because he did not have the aptitude, rather it was because he felt the education system he was a part of was developed for some one else.

Although following graduation, he realized that without a good education he would be just another stereotype from Clairemont (his neighborhood in San Diego). With little other options, Gabriel attended the local community college called Mesa. Gabriel made a promise to himself that he would graduate in two years and transfer to a good university. Reinvigorated, Gabriel kept that promise he made to himself, finishing Mesa Community College in exactly two years, he was then accepted to the University of Los Angeles, California.

At UCLA, Gabriel majored in Geography, where he met faculty who would change his life forever. Gabriel worked as the librarian of the geography library, and finished up his course work in two years. So in four years he went from a high school graduate with little prospects to a graduate from one of the best public universities in the United States. Following graduation from UCLA, and on the recommendation of Dr. Tom Gillespie and Dr. Judith Carney, he traveled through central America for three months. It was in Guatemala that he heard of a local plant called “tres puntas,” which was sort of cure all herbal remedy used by the Garifuna people as well as the natives of central America. This peaked his interest in studying the Garifuna people and their plant in graduate school.

Upon returning to the United States, he consulted professors Gillespie and Carney at UCLA about going to grad school outside of California in order to broaden his horizons, he had one stipulation though, where ever he went it had to be warm. Both professors recommended that he apply to the University of Florida because of the faculty and his underlying wish to be warm. Gabriel applied to the University of Florida and was accepted. He had never seen the campus or even ever been to Florida but that was not going to stop him. He got on a train and five days later he was in Florida ready to start studying the Garifuna and central America through cultural geography. Although, not everything goes as planned, his first semester was horrible, he wasn't quite ready to a grad student and it showed in his behavior. Gabriel found out that there was not any faculty members working with the garifuna and central America, which meant there was no one to work with, that compiled with his horrible semester and pathetic GPA made him contemplate quitting graduate school.

Going home over the break and having to explain himself to his family reinforced the belief that quitting was not an option. So instead of pursuing academia for a career, he decided that he would end his education after he attained a master's degree. He decided that economic geography was the way to go after checking the titles of upcoming classes. It is at this point in which he took Dr. Grant Ian Thrall's introductory economic geography course, immediately taking to the material presented in the course, he was satisfied with the choice he made. Being in the economic geography discipline reinvigorated him which in turn reinvigorated his GPA.

While working on his course work and thesis, Gabriel worked for SeaGrant, as well as helped Dr. Thrall with research for his consulting business. Throughout this process Dr. Thrall became his graduate thesis chair, and even though he took his time, he eventually wrote a thesis on apartment location in Gainesville, Florida. The thesis was unique as it was the first to give a specific set of steps to locate an apartment building; he was able to use different techniques, like the use of GIS, psychographics, and statistics to come up with the best location for a new apartment building in Gainesville, Florida. The steps taken in the thesis can be applied to locating an apartment or any other type of building anywhere in the United States, because most of the software used is available to the public, this information can help professionals make better real estate decisions, therefore simplifying the decision making process.