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The Effect of Transit-Oriented Development Sites  
on Residential Home Pricing

Bradley S. Randall

A thesis submitted to the faculty of  
Brigham Young University  
in partial fulfillment of the requirements for the degree of  
Master of Science

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## ABSTRACT

### The Effect of Transit-Oriented Development Sites on Residential Home Pricing

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For a number of years residential and commercial development has grown surrounding railway stations in many cities across the United States. One of the trends that has occurred in a number of cities relates to positive property value correlations between real estate values near transit stations and transit-oriented development (TOD) sites as compared to their counterparts not located near a railway station or freeway access. Many cities have noted that homeowners are willing to pay more to be near a TOD site and being near a site can represent a statistically significant factor in determining where to purchase a property. In suburban markets with newer developments, the data was not as readily available. While the suburban area along the main population corridor of Northern Utah called The Wasatch Front has seen a lot of growth in TOD development, there really was not sufficient data on residential pricing to see if the same types of trends that held true in other areas of the United States held true along the Wasatch Front.

This research analyzed multiple cities in multiple counties along the Wasatch Front that all featured development surrounding a TOD site. The purpose of the research was to determine how the price per square foot during a period of study in 2016 was higher for properties located near TOD sites compared to properties nearby freeway entrances or isolated from both. Three types of properties were analyzed in the study: Single-family homes, townhouses and condominiums. Another purpose of this study was to determine which factors were the most statistically significant in the purchases made by homebuyers during the period of study.

Multiple statistical models were tested in order to determine the most significant variables in the study and just over eight hundred properties were tested. The research indicated in developing rapid transit cities like Salt Lake City and suburban areas, the value of car-free living and resident-dense cities is still emerging. Statistical results indicated certain factors and trends that can be helpful not only for local planners and developers but also to further the body of research on the development of these transit-oriented development sites in suburban areas around the United States.

Keywords: transit-oriented development, real estate, valuation

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# **1 INTRODUCTION**

## **1.1 Background of the Problem**

The growth of Transit-Oriented Development (TOD) and Mixed-Use development sites across the United States has been exponential over the past two decades. Transit-oriented development is often defined as higher-density mixed-use development within walking distance – or a half-mile – of transit stations (Kay, 2014). Mixed-Use development is a development that combines two or more different type of land-uses, such as residential, commercial, retail and entertainment uses (Erskine, 2008; MacDonald, 2004).

The growth of Mixed-Use and TOD sites created increased uses for what was generally undesirable or economically unviable land in many cities. Originally much of the development was driven by the desire to help increase walkability and decrease vehicular congestion in cities while preserving real estate values and local businesses in struggling areas (Grant, 2009). However, as numerous cities incorporated this type of development into municipal planning, leasing rates and home value sales also began to increase in many locations. In research based in New York and New Jersey, home values alone were estimated to have increased as much as 40% from their previous values upon completion of TOD sites (Kay, 2014). In the same research study, home values soared near transit stations and TOD sites (Kay, 2014).

As the amount of development grew, consumers, developers, investors and business owners saw increased potential along for increased rail construction and TOD construction

design. Not only did the increase in property values hoped for increase in multiple large cities researched, but property values also increased based upon the announcement of new Transit-Related Mixed Use, Rail Transit Stations and TOD Development locations in Texas, Oregon and other smaller populated state and cities (Holmes, 2008; Dorsey, 2013). While the goal for these transit-related development sites is to increase property tax values for cities and provide additional alternatives for residential and commercial development, it is still not known if this type of development will be ultimately accepted in the suburban residential real estate marketplace. Equally unknown is whether or not in suburban areas in smaller market cities residents are more apt to pay higher prices to live near transit stations and TOD development sites.

Opponents and critics of TOD development contend the perceived value is highly inflated by developers and the high tax and construction costs do not merit the development of such sites and transportation lines in the long run of the community. Some previous research indicated that while commercial and residential values increased near train stations TOD sites, property values immediately surrounding their bus-station counterparts along the same line conversely decreased and crime rates actually increased after the development (Chatman, 2011). Some critics argue that these types of developments along public transit lines, while laudable in their efforts to increase walkability and vibrancy in city areas, do very little to actually increase property values, business profits and overall traffic to those areas (Chatman, 2011; Grant, J., 2010). While many cities in suburban areas have been promoting TOD development, opponents argue that the majority of consumers still prefer living in single-family homes away from public transit stops or busy freeway entrances (Kay, 2014; McMillen, 2004).

The amount of commercial and residential real estate development surrounding public transportation stations and hubs has grown rapidly across the Wasatch Front over the last two decades. The Northern Wasatch Front has expanded from one transit-oriented-development (TOD) site to fifteen (Utah Transit Authority, 2016). Proponents of these projects argued this type of development would provide a more sustainable living opportunity for a more diverse population than ever before. For nearly twenty years, the decision to grow and expand public transportation was debated throughout the State of Utah (UTA Hearing, 1988) from local municipalities and State Legislative Sessions all the way to Hearings in front of representatives of the United States Congress. Utah's model of growth was adapted from previous cities that completed similar expansions, including Portland, Denver and Chicago (Ratner, 2012). For local business owners, community leaders and developers, much of the perceived benefits with regard to this project revolved around three essential anticipated outputs: increased traffic for central business districts in local municipalities, increased opportunities for development through mixed-use TOD community planning, and higher business profits, property tax revenues for local municipalities deeply in need of additional revenue sources.

For the purpose of this study however, the economic effect of these TOD railway stations and subsequent developments to individual homeowners remains relatively unknown. Many of the benefits of developments like this in larger cities promotes increased sales prices and property values for properties near these sites as compared to similar properties in other areas of local municipalities. Critical concern has grown along the Wasatch Front as cities, developers and planners determine whether or not this type of development has actually increased the property values for homeowners and if homeowners are willing to pay more per square foot to be near these sites compared to similar properties away from TOD sites.

On a growth by percentage basis, the state of Utah has remained in the top five growth states in United States for the past five years (Forbes, 2013). While the state represents a large land area, the vast majority of the population is focused along an eighty-mile north to south corridor known as the Wasatch Front, with over 75% of the State's population being concentrated in that particular sector (Census, 2012). As continued population growth, urban sprawl and availability of public transportation and mixed-use communities continues to expand and grow, it becomes necessary for local municipalities, business owners and consumers to better understand the economic effect to home values the construction of these developments provides. In order for local municipalities in areas like the Wasatch Front to decide on whether or not to proceed with the economic outlay to develop such sites it is imperative they understand what some of the tangible benefits from sites already constructed.

## **1.2 Statement of the Problem**

Developers, city planners and investors in suburban areas such as the Wasatch Front still lack sufficient information to determine if the perceived economic benefits to resident home values from developing TOD and Mixed-Use sites merit the time, effort and financial costs for such developments. While many communities are growing in population and increasing density-rich development, it is not certain whether or not real estate values near these sites are indicating the type of growth necessary to continue development or comparable to larger cities across the United States. It is still unknown whether or not residents in smaller markets like Salt lake City and the Wasatch Front region are willing to pay more or less for properties near public transit stations or TOD development sites. It is also unknown whether residents view these types as a reason to purchase a property and alter lifestyle or whether development of these sites and the accompanied economic benefits are more slow-moving than in larger cities. While the purported

economic benefits that have been found in larger cities like Washington D.C., New York City, Chicago and Houston have been more highly documented, the perceived vs. actual benefits of this type of modern development have not been explored as fully and adequately in smaller suburban and mid-size cities like Salt Lake City.

### **1.2.1 Question**

Does the sales price per square foot of residential condos, townhomes and single-family residences near such Mixed-Use and Transit-Related developments yield a higher sales price than similar properties that are located near such sites?

### **1.2.2 Rationale**

Transit-Oriented Development sites continue to grow and expand along the Wasatch Front and other areas in the United States. This type of development is of particular interest to state and city planners, developers, real estate brokers, appraisers, tax assessors, public transportation planners and others because it is re-shaping the way land is being developed and reshaping the landscape of design across the State. Millions of taxpayer dollars are being poured into TOD sites each year. However, the need for focused research in an area like the Wasatch Front is paramount now more than ever because many of the design assumptions and forecasts used to begin development in the area were based upon demographic and economic research performed in larger cities and areas that are not particularly comparable to the Salt Lake City region (UTA Hearing Minutes, 1988).

It is difficult to compare the costs and benefits of such projects in larger cities like New York City and Chicago to suburban markets like the Wasatch Front. Pricing in real estate can be

volatile and unpredictable, and many of the developments depend upon a consistent cash flow in order to make the venture profitable for the future. Because of the desire among developers and planners to continue this type of development it has become increasingly necessary to measure the actual economic benefits of the sites that have been developed thus far providing valuable data and insight to help guide future projects. Beyond this, local municipal and state government enact laws and raise public taxes to support projects of this scope and magnitude. It is vital for public leaders and developers of similarly sized markets as the Wasatch Front to ascertain the benefits of these projects and whether or not they make fiscal sense for their communities.

### **1.3 Purpose of the Research**

The purpose of the research was to evaluate the actual sales prices of single family homes, townhouses and condos in a radius surrounding transit stops, mixed-use communities and TOD sites across eight different cities compared to similarly sized residential properties that are not within immediate proximity of such stations or developments across the Wasatch Front. The Wasatch Front is comprised primarily of four counties: Weber, Davis, Salt Lake and Utah. Two location sites from each county that featured TOD stations and sites were selected to represent a sampling of each county for research purposes. While these eight sites are not the only TOD sites along the Wasatch Front, each of these sites contains a mixture of train and bus transit features as well as residential, multi-family and commercial development activity within a 1.0-mile radius of the site itself.

While the research data focuses on the values of residential properties it is important to note that developers build TOD and Mixed-Use sites to create additional housing but also to provide adequate commercial development to support residential growth, such as grocery stores,

retail centers and office buildings. Real Estate sales for both residential and commercial properties are volatile and ever-changing. The research performed for this study included actual sales values during the year 2016 for over eight hundred properties located in the eight cities of study. While there are many factors that affect property values economically that are outside the control of the building of a TOD site or railway line, this research evaluated the actual sales values of hundreds of properties and the comparable sales price per square foot of these properties as compared to non TOD-site counterparts.

#### **1.4 Research Objectives**

The objectives of this research were the following:

- Analyze development of railways stations and TOD sites along the Wasatch Front in four counties and eight cities to determine the most appropriate mix for the research study.
- Analyze statistical data for residential properties in two cities within four counties along the Wasatch Front including factors such as sales price per square foot, days on market, monetary concessions offered by sellers, type of financing and other factors. Beyond evaluation of the statistical data, it was important to determine which of the factors were statistically significant to the price values of the properties.
- Analyze the statistical data of real estate values in the eight cities by different property types: condos, townhouses and single-family homes.
- Analyze and compare the summary of the statistical data of real estate values near the TOD sites compared to similarly styled residential properties near freeway access and isolated from both. Each city studied needed to have sufficient sales data to provide



adequate statistical data to encompass a truly comparable data result to contrast the values within a 1.0 mile radius of the TOD site.

- Analyze opportunities and reception of residential properties into the Wasatch Front sales by evaluating trends and significant data results from the study of the Wasatch Front market to help city planners, developers and home buyers ascertain whether or not this type of development is yielding higher sales rates for homeowners and higher tax rates for cities as previously desired prior to development.

## **1.5 Assumptions**

The following assumptions were utilized for the research question:

- The data that was compiled from statistical analysis of sales through the Multiple Listing Service of the Wasatch Front, servicing Weber, Davis, Salt Lake and Utah counties.
- Additional external factors will either accelerate real estate appreciation or depreciation, such as the local economy, job growth and availability of housing.
- The eight sites used for the basis of this research are still actively being used as public transportation hubs and development areas. The eight locations chosen were not all built at the same time. Some sites have been developing longer than other sites.
- The eight sites chosen are not significantly different than the others in the state.

## **1.6 Limitations**

The following limitations were also factors in the research process:

- This research only surveys and evaluates residential property values. While the value of commercial leasing rates and sales prices would be equally beneficial when

determining the validity of TOD development, the ability to access concrete data for these properties is very difficult. Much of the information is kept by local commercial brokers and is the prices are kept secret.

- This research only addresses the impact of TOD sites in the state of Utah.

## 1.7 Definition of Terms

Though the definitions of some of the common terms used in this study are currently being debated, discussed and evolved, the most practical and current definitions were used for the purpose of this research.

- *Transit-Oriented Development*: Transit-oriented development is often defined as higher-density mixed-use development within walking distance – or a half mile – of transit stations (DeVos, 2014; Holmes, 2008).
- *Mixed-Use Community*: In general, mixed- use development is a development that combines two or more different types of land uses, such as residential, commercial, employment, and entertainment uses, in close proximity. In some communities, mixed use may be defined as different uses contained within the same physical structure. Defined more broadly, mixed-use development may encompass two or more uses on the same lot, whether housed in a single building or in separate buildings. Some jurisdictions have designated mixed use zoning districts where mixed use is permitted on sites throughout the district. In all cases, the land uses should be close enough to allow convenient access between the different land uses (Ratner, 2012).

- *Public Transportation*: (also called transit, public transit, or mass transit) is transportation by a conveyance that provides regular and continuing general or special transportation to the public, but not including school buses, charter or sightseeing service. (Weinberger, 2001)
- *Transit agency*: (also called transit system) is an entity (public or private) responsible for administering and managing transit activities and services. Transit agencies can directly operate transit service or contract out for all or part of the total transit service provided. When responsibility is with a public entity, it is a public transit agency. When more than one mode of service is operated, it is a multimodal transit agency. (Mohring, 1961; UTA Hearing Minutes, 1988)
- *Appreciation*: An increase in value of a property or other asset. Most property depreciates, and it is fairly rare to discuss a property's appreciation. Real estate and securities are major exceptions, since real estate tends to appreciate over time and securities may increase or decrease in value depending on market conditions. Appreciation may be used to calculate capital gains or property taxes. (Arsenault, 2012)
- *Depreciation*: The monetary value of an asset decreases over time due to use, wear and tear or obsolescence. This decrease is measured as depreciation. Accounting estimates the decrease in value using the information regarding the useful life of the asset. This is useful for estimation of property value for taxation purposes like property tax etc. For such assets like real estate, market and economic conditions are likely to be crucial such as in cases of economic downturn. (Arsenault, 2012).

- *Real Estate*: Land and anything fixed, immovable, or permanently attached to it such as appurtenances, buildings, fences, fixtures, improvements, roads, shrubs and trees (but not growing crops), sewers, structures, utility systems, and walls. Title to real estate normally includes title to air rights, mineral rights, and surface rights that can be bought, leased, sold, or transferred together or separately. Also called real property or realty (Arsenault, 2012).
- *Single-Family Home*: Residence housing one family or household or one that is designed for one family only (Dorsey, 2013)
- *Townhouse*: A single family dwelling that features taller structures of one to three stories in height that may be larger than a condominium but still share walls with other neighbors.
- *Condominium*: A larger property complex divided into individual units and sold. Ownership usually includes a nonexclusive interest in certain “common areas”.

## **2 REVIEW OF LITERATURE**

The study of the key influencing factors to real estate values near transit-oriented development sites (TOD), both economic and demographic are essential to understand the current trends affecting real estate values near these sites as well and how well those trends hold in suburban markets. To best understand the nature of the problem it is imperative to recognize the factors that helped contribute to the rise TOD development sites nationwide.

Additionally, understanding the successful trademarks of TOD development sites around the nation provides a common backdrop for other cities to incorporate TOD development into their own city planning. While geographical location remains closely associated to estimated and perceived real estate values, additional factors influence how, where and to what extent TOD sites can be introduced successfully into the real estate marketplace. The history of TOD and multi-use communities and sites has been altered and shaped through the scopes of both private and public sectors.

### **2.1 Transit-Oriented Development and Mixed-Use Communities**

Transit-oriented development has gained traction not only in densely populated metropolitan cities but also suburban metros across the United States. While the practice is quite common in much of Western Europe and Asia, the United States adopted transit-oriented site development relatively slowly. Traditionally, U.S. developers have focused on construction of either retail or residential design (Cervero, 2001). In 2000, the U.S. Census stated approximately

6 million households live near public transit (US Census, 2000). However, if current growth continues it is estimated over 16 million households will live near public transit by the year 2030 (Holmes, 2008).

While TOD development used to be prominent only in larger cities such as New York City, Chicago and Boston, now many cities including St. Louis, San Diego, Portland, Salt Lake City, and Pittsburgh feature commercial, residential and industrial development surrounding public transportation lines, whether those be light-rail, commuter rail, subway, or bus systems. In its most complete form, TOD can be described as:

A compact, mixed-use community, centered around a transit station that, by design, invites residents, workers, and shoppers to drive their cars less and ride mass transit more. The transit village extends roughly a quarter mile from a transit station, a distance that can be covered in about five minutes by foot. The centerpiece of the transit village is the transit station itself and the civic and public spaces that surround it. The transit station is what connects village residents to the rest of the region (Cervero, 2005).

One key goal of TOD development is the desire to integrate land use and transportation functions aimed at preventing urban sprawl (Cervero, 2001). The new form of development focuses on reshaping and rethinking urban centers and rejuvenating them through high-density development located within half of a mile or approximately 800 meters of a public rail hub (Filion, 2008). The addition of high-density housing often times is developed in the form of rental units and smaller residential properties such as condos and townhomes.

Beyond their placement near rail transportation centers, common physical design characteristics exist for TOD sites. Most TOD sites include an inter-mixing and layering of public amenities such as landscaping, civic spaces and open garden areas as well thoughtfully designed transportation patterns. Each TOD site is designed to maximize bicycle and pedestrian traffic (Holmes, 2008). This design concept influences the mix of spaces made available to the

public and strengthens the over-arching connection between the communities, its inhabitants and the public transit systems that service such developments.

### **2.1.1 Socio-Demographic Factors Affecting TOD Development**

While the majority of generations preceding the current millennial generation desired the traditional family, home, vehicle and single job as a genuine source for happiness and contentment, current factors have changed and the newer generation seeks different outcomes (Holmes, 2008). Individuals are getting married later in life, if at all. More desire to use public transportation, support environmentally conscious initiatives and carpool to work. Currently nearly one third of the U.S. population renting are non-familial households (Holmes, 2008). These trends among others are causing more individuals to seek housing in a variety of forms, not solely the traditional single-family home model that was the staple of the previous homebuyer's generation.

Coupled with this, a large number of baby boomers are choosing to downsize living arrangements, travel less via vehicle and live near public centers that feature restaurants, entertainment and all the necessary conveniences for daily living. Many baby boomers are working longer than ever before, extending the time they need housing near employment centers (U.S. Census, 2012). Many of these trends have been well documented in larger cities (Holmes, 2008; Cervero, 2005). However, it is still relatively unknown whether the same level of trending holds true in smaller markets of population one million and less.

### **2.1.2 Economic Factors Affecting Urban TOD Growth**

The real estate market in general has been a paramount driving force in the global economy since 2000 (Arsenault, 2012). At the beginning of the new millennium, real estate values, especially residential soared. Many individuals and businesses were purchasing properties with no money down or as little as 5% down payments (CCIM Review, 2014). This boom in real estate construction triggered a dangerous implosion of the market (CCIM Review, 2014).

In 2008, the United States experienced the largest downturn in commercial real estate since the Great Depression (CCIM Institute Review, 2014). Between 2008 and 2011, the amount of commercial real estate sales decreased nearly 35-40% (CCIM Institute Review 2004). Residential real estate values across the nation also tumbled due to increased amount of foreclosures, short sales and distressed property sales. Many households downsized and began sharing space again with each other. While the effects of these changes were felt quickly in larger cities, the far-reaching outcomes of this economic downturn were felt across suburban neighborhoods around the nation.

For multiple decades, middle-class job growth had been growing and booming in suburban markets. With the onset of the economic crisis in 2008, many of the jobs previously available in suburban markets began moving back to larger cities. Larger companies closed smaller offices and consolidated staff and resources to accommodate the changing market. For years, urban centers and business developments surrounding public transportation sites sat unused, perhaps foreclosed or vacant (Roshanak, 2013).

As the economy began to improve in 2011, developers began using spaces for mixed-use. Rather than risk building an entire office building that may sit vacant, designers organized a mix



of residential, retail and office use into multiple building sites. Adding residential dwellings in urban areas and near public transit sites also provided walkability for many of the local residents. Increasing numbers of adults began living near their places of employment, and traveling less and less to reach entertainment and other needs.

Traditionally rental rates in urban centers tend to be lower than non-transit areas. Many of those areas are full of low-income, ethnically mixed developments. Demographic shifts such as increased immigration have allowed additional developments to incorporate more ethnically diverse renters. According to the U.S. Census, the median cost of owning or renting a home in suburb locations in Chicago, Illinois was \$1,917.00 per month, representing a staggering 56% of the area's median gross income (U.S. Census, 2012). The high cost of owning or renting single family homes is one of the major drivers behind TOD development growth nationwide, as newer more affordable options have become available in denser communities near public transit hubs.

Research in Australia suggests that many individuals move to a TOD site based on dissatisfaction with the household income (Renne, 2005). Although income is increasingly a factor, additional survey results show that beyond income, if a household does decide to move, they are more likely to choose a location that provided a healthier neighborhood surrounding and active lifestyle. This research held true even among active adults and seniors (Mehdipanah, 2013).

Additionally a research study performed in the San Diego area indicated that compact development of condominiums and townhomes generated a premium ranging from 40% - 100% compared to houses in nearby single-use subdivisions. Property values of single-family homes and the price per square foot of those homes that sold increased because of the introduction of mixed-use communities and transit railways into the marketplace (Ratner, 2012). Conversely, a

separate study performed in the Atlanta region indicated single-family homes within ¼ mile of the railways stations and TOD sites of the local area were selling for a staggering 19% less than properties located three miles away minimum (Bows and Ihlandfeldt, 2001) The negative characteristics that made these properties less desirable in Atlanta included noise, crime concern, aesthetics and pollution (Bows and Ihlandfeldt, 2001).

One of the major challenges posed to city planners and developers when considering these types of developments is the fact that while one type of development may provide positive real estate valuation effects in one suburban area, the trend may not hold true.

## **2.2 Perceived Universal Benefits of TOD Sites**

Much of the research previously performed indicates the same type of benefits provided by successful TOD design in larger cities will also occur in smaller suburban areas. The previous urban design model promoted larger urban environments and a more sedentary lifestyle (). Many individuals heavy dependency upon vehicles and perceived lack of adequate time for physical activity resulted in troubling mental health and physical health issues, as documented by multiple studies globally (Ratner, 2005; Topalovic, 2012; Wasfi, 2013).

The vast majority of public and private sector proponents for TOD site development site public health as a primary objective behind site design. The World Health Organization (WHO) linked transportation as one of the top ten social determinants of health (Wilkinson and Marmot, 2003). Additional studies found that at least 60% of the global population failed to achieve the recommended 30 minutes of daily moderate exercise (Wilkinson and Marmot, 2003). TOD sites combine public transportation to needed public services like grocery stores and incorporate a higher level of physical activity for people of all ages, income levels and demographic

backgrounds (Ekelund, 2012). Simulated research in Canada indicated a strong positive correlation between positive mental health, daily activity and an increase in steps walked per day amongst all participants (Wasfi, 2013). Over forty-five percent of workers currently living near transit-zones walk, bike or take transit to work, compared to a paltry 16% in non-transit zones (Ekelund, 2012). Additionally, the Healthy Cities Commission performed calculated studies surrounding urban renewal TOD sites and highlighted the need for public transit investment to benefit accessibility, green space for activity, and better water and sanitation regulation to alleviate additional health risks (Wasfi, 2013).

While eating habits, lifestyle choices, and family health history can resolutely alter health benefits regardless of whether or not one lives near a TOD site, increasing amounts of research indicates much of the desired health outcomes for TOD sites have emerged, thus fueling city planners and officials in the public sector and private developers to continue this style of design. Regardless of the size of the city studied, the health benefits of a more pedestrian-friendly, active-lifestyle community are collective and widespread.

An additional benefit of the TOD development design is the decrease in carbon-emitting vehicles along the road due to the introduction of mass transit. Mass transit provides means for thousands of commuters to arrive at work relatively easily without the extra expenditure of a vehicle. A research study based in California indicated a decrease of vehicular travel rates between 20% - 40% for those living near a TOD site. Although research indicates the majority of suburban mass transit users still own a vehicle, the majority use mass transit because of the ease of use and overall convenience (Ekelund, 2012).

### **2.2.1 Perceived Universal Benefits to the Public Sector**

Thoughtfully designed communities, working in a collaborative fashion can provide communities of all sizes with incredible benefits and also provide financial benefits to the public sector. In research based on a nationwide study of TOD developments, researchers found four key and far-reaching benefits to the public sector achieved through TOD development: increased public transportation ridership, increased revenues, increased property tax proceeds and strengthened institution relationship among all parties (Ratner; Goetz, 2012)

TOD also promotes multiple uses for property sites. Compatible uses are now available surrounding many sites featuring retail shopping, restaurants, high-end retailers, office space and even industrial development sites. Sites are intended for mixed-use properties and this type of development brings a wider range of guests into the area. Denver reported numerous benefits from the mixed-use TOD sites they developed as they saw urbanites, young adults, working professionals and active older adults all shopping, traveling and living in the same area surrounding public transportation sites (Ratner; Goetz, 2012; Rania, 2013).

TOD development opens up additional types of residential development options, including condominiums, townhomes, rental apartments and single-family homes. With a wider variety of options to choose from, many individuals of varied cultures and ages can now gather at the same site to live, work and play. While much of the design is innovative in its intentions, it also harkens back to a more historic approach to design, one where a traditional “main street” and a town square was intricately linked to the local community. A planner wrote:

It is near-impossible to imagine community independent of the town square or the local pub. While it is only a start, a small corner store does wonders to limit automobile trips out of the development, and does more than a social club to build the bonds of community (Duany et al., 2000).

As early as 1961 authors began predicting the dangerous effects of losing the diversity and vibrancy that comes from strong urban centers (Jacobs, 1961). When the focus of development is centered in monotonous land uses with big-box retailers many cities lose the sense of individuality that their founders contended so strongly to obtain. Mixed-Use sites and TOD sites help restore the strongest facets of that individuality while still allowing the economic growth needed for long-term sustainability to thrive.

In 2009 a study performed in the San Francisco and San Jose Bay area examined single-family home prices near four TOD locations testing attitudes about TOD sites and whether or not it had a positive or negative effect on property values. In that study the perceived benefits of increased access to public amenities translated to increased property values in three of the four sites, including additional tax revenue from the compact development style employed by the city (Matthew, 2009).

## **2.3 Obstacles to TOD Project Growth in Suburban Sector**

Although many TOD sites were developed near urban centers because of the lack of space available for development, suburban sites face a variety of different obstacles to potential growth.

### **2.3.1 Location Issues and Liability**

Location has long been considered the major factor in whether a real estate development will be financially successful or not. Because TOD sites generally need both public and private support, both parties are seeking a financial yield from the investment. Many large urban centers already feature a well-defined public transportation system of rail and bus options. In 2012 a

research study identified 643 potential new projects in metropolitan regions, yielding an astounding 1464 miles of new public transit lines (Ratner, 2012). The cost to initiate such projects is staggering.

Many of the new projects are within 30-40 miles of larger metropolitan areas, which create new challenges for the smaller populated city planning departments and local developers (MacDonald, 2004). Many smaller suburban markets simply do not have the initial resources to fund such a large project. However, newer suburban markets seeking to develop such systems have to begin with much fewer resources and far fewer previously developed transportation routes. Sometimes public transportation rail lines do not follow the desired path of development. This issue causes many projects to be exceedingly expensive or to be curtailed because of the lack of a definably effective location (Ratner, 2012).

Some developers believe that through proper design, any location can be made economically viable through property TOD site design. A project in a suburban San Diego California neighborhood called the Barrio Logan Neighborhood incorporated both residential and retail uses into a struggling community. Although real estate values increased for the residential property, retail values floundered (Ratner, 2012).

Much of the research surrounding TOD sites has been focused on major metropolitan cities. Results in suburban areas are skewed and varied at best. This lack of suburban research presents a unique obstacle for the public and private sector in considering TOD mixed-use development. (Rania, 2013).

### **2.3.2 Differences in Local Government Support**

The need for collaboration between the private and public sector is paramount to success in a mixed-use TOD site. Not surprisingly, a clashing of interests in both transformational planning and design ideas for development of public spaces mixed within private development can create massive delays to projects (Rania, 2013). Often the desires of private developers can be seen as only financially driven to public lawmakers who answer to voting citizens. Conversely, private developers who have invested in the most technologically advanced and contemporary urban style approach to design can view the public forum process as archaic, ineffective and unnecessary. Without a meeting of the minds, project success is highly unlikely.

For many cities, zoning ordinances have dictated and governed development for decades prior to the birth of TOD development. The addition of multi-use sites creates unique challenges for the public sector as variances and zoning additions are requested to create mixed-use sites. A survey based around 11 U.S. and Canadian Transit systems indicated that often times local municipalities as well as state organizations lacked a full understanding of TOD benefits (Dorsey, 2013). A project in Atlanta that would provide over 500 additional housing units was blocked because local residents and municipalities believed the traffic delays from the construction would never be worth the perceived benefits of vitalizing the local community (Dorsey, 2013). Lack of understanding amongst the public can stagnate projects and negatively affect real estate values in the local area. While the concept of TOD design is much more familiar to municipal leaders in larger cities, gaining political support in smaller towns where city councils change leadership hands quite often can be very challenging.

### **2.3.3 Local Real Estate Cycles and Trends Vary**

Numerous industry practitioners believe the real estate market is inherently cyclical (Arsenault, 2012). Some academics and professionals argue that although TOD development's goal is to increase value in subprime markets, any type of development cannot reverse the natural trends of the micro and market itself (CCIM Report, 2014).

Often times, development of any sort cannot stave the cycles and trends occurring in a given area. A Canadian developer lamented over a failed TOD project:

A lot of the commercial sites flipped out to residential from commercial because there's just no demand for the commercial...The market will tell you what it needs to be...after twelve years or so, it hasn't quite hit its stride. (Grant, 2010).

Some developers argue that TOD development is not as sustainable in the long-term as some initially thought. Although real estate values initially soared in some areas of California, eventually they topped out and followed a more traditional real estate cycle. Even the newest development was not able to outwit the predicted real estate cycle and trends in the area in the long run. One planner additionally noted:

Vertical separation is somewhat of a nostalgic concept...where the person runs a store and lives above it...We have the odd development that has been successful, but it's not widespread. I'm not sure the market embraces vertical separation to the extent new urbanists though it would. (Grant, 2010)

### **2.3.4 Timing of Arrival to the Various Markets**

Because mixed-use developments are still relatively new to the U.S. Real Estate market, planning for the completion of these projects can be tricky. Without a retail portion to promote business, residential sales typically flounder. However, without residential property available, there are no consumers for retail or office spaces to occupy (Grant, 2010). Because the initial



investment for both public entities and private developers is so high, if one project fails, it could impact the community negatively for years to come.

One such project located in Orem, Utah combined two residential towers with a multi-faceted retail section of shops on the lower floors of the development. Construction began on the towers before full funding had been reached. Developers hoped the design concept, novel at the time in the area, would attract enough residential buyers to gain the necessary funds to complete the retail development. Unfortunately, the project was delayed, and then later bankrupted. Over a decade later, the project still sat unused and mostly vacant until a second public and community vote allowed the completion of the development.

### **2.3.5 Attitudes Towards TOD Developments and Transportation Methods**

Since the 1990's, Urban Planners have tried to reduce car use (and accompanying air pollution and congestion) by creating communities that offer alternative means to reach community amenities through high-density development and utilizing other forms of transportation including trains, buses, walking and cycling (Cervero, 1996)). One study concluded that the attitudes and previous habits of individuals towards transportation had a bigger effect on travel behavior than the built and environment itself (Rania, 2013). For many suburban dwellers, they have grown up utilizing vehicles as the main source of transportation. A change of mode of transportation would signify a need to change lifestyle and travel habits. High-density and TOD development promotes more frequent trips to grocery stores while many suburban families are more interested in the convenience of one larger visit to a grocery store weekly.

For many decades suburban design has been built around single-family homes with larger lot sizes and big-box retailer options like Wal-Mart, Target and other super stores that are not geared toward non-vehicle using consumers. Car-oriented individuals have many set patterns that can take a long time to break, and this can create a major problem in the development process of TOD sites in suburban areas. It was noted:

Additionally, many of the developments surrounding railway stations feature lower cost alternatives that may not be desired by other owners nearby who own single-family homes. Research studied in 2013 indicated there was a certain level of dissonance between the individuals looking to purchase single-family residents nearby townhomes, condominiums and rental units as compared to purchasing in a development of similarly sized homes and income levels (Kamruzaman et al, 2013). In the same study it was found that over a two-year period in Australia the majority of people who moved during the time period moved away from railway stations.

### **3 METHODOLOGY**

#### **3.1 The Method**

The purpose of the research is to evaluate the economic effect of the addition of residential real estate properties to the market surrounding transit-oriented development sites as compared to similar properties not surrounding such sites. For the research to validate the problem studied it was determined comparison of the sales price per square foot of various properties along the Wasatch Front corridor near newly constructed commuter railway stations and TOD sites to their non-railway counterparts. Initially, the research method desired was a mixed-method approach of both interview-style discussion qualitative response collection combined with a quantitative model to test the economic results of adding these types of properties in the market.

As the research continued it was determined the best way to ascertain the overall effect of the research was to cluster all of the properties studied into three main categories and determine a set of variables to test across multiple sites along the Wasatch Front. Determining the statistical significance of variables tested would require a quantitative approach blocking certain variables to determine which variables were the most statistically significant as compared to the primary dependent variable: sold price per square foot. The independent variables initially considered were used as moderators in the study to determine statistical relevance and then eventually help compare sold sales pricing for multiple types of properties in the cities tested.

### 3.1.1 Quantitative Mixed-Model Research

This type of blocking quantitative mixed-model statistical model became increasingly popular in the 1950's when researchers began introducing random effects into study of traditional linear models (Fisher, 1918). Because it was not initially known which variables would be statistically significant, multiple test models would need to be tested and grouped together. Multiple models can be applied in numerous disciplines when multiple correlated measurements are made on each individual unit of measurement.

The research study utilized for this problem needed repeated measurements and testing of the main categories with the covariate comparable data to determine what types of effects were statistically significant for the data. Another reason why this approach needed to be utilized in this study was the fact that these results needed to be tested not only in one location, but eight total. Tests needed to be performed multiple times, on multiple sites, using similar criteria. For a mixed method to be effective, the data typically needs to be normally distributed as Gaussian data.

The two models include a fixed-effect parameter and a co-variance parameter. The fixed-effects parameters are typically associated with known variables similar to a standard linear model study using qualitative or quantitative variables. Conversely, it is the addition of the covariance parameters that makes a mixed-method procedure effective because it allows for clustered examination and repeated measurement of the same experimental units to test for statistical significance.

While there may be many differing opinions among homeowners, developers, government leaders and others involved in the development of transit-oriented-development sites along the Wasatch Front, the use of quantitative data tested across multiple locations was

imperative to the validity of this research. Quantitative data provided factual data regarding whether or not purchasers during a certain time period statistically valued similar style properties nearby these sites through paying a higher price per square foot compared to other locations in the same area.

### **3.2 Selection of Primary Variables, Sites and Locations**

The primary variable for the quantitative mixed-model for this study was related to the location of the property in cities analyzed. The primary variable was tested in eight cities across four counties along the Wasatch Front. For statistical reliability, it was determined that multiple properties would need to be tested in three major categories or variables: properties within one-mile radii near TOD developments and railway stations, properties within one-mile radii near freeways or isolated properties not within one mile of either a station or a freeway entrance.

One of the goals of the research was to see how the sales price per square foot of condominiums, townhouses and single-family homes compared when analyzed against similar style properties in difference areas of suburban cities. When testing the effect of residential values in a suburban market the need to evaluate whether or not individuals placed a higher value towards properties near TOD sites was critical to answering the problem statement. In order to determine whether or not individuals placed a higher value towards these types of properties it would be necessary to determine what factors buyers placed a statistical value towards purchasing a home. By narrowing down statistically significant variables those variables could then be tested across the twenty-four sites along the Wasatch Front.

### **3.2.1 Selection of Property Types and Site Locations**

Along the Wasatch Front the bulk of residential buyers in 2016 purchased one of the following styles of residential properties: single-family homes, townhouses and condominiums. Statistically, a significant portion of development surrounding TOD sites is developed for rental purposes (Filion, 2008). The utilization of public transit sites provides a means for lower-income housing opportunities through rentals that developers often utilize. Many rental tenants do not have the same access to vehicles as homeowners so development of apartment buildings occurs typically surrounding most TOD sites (Cervero, 2005; Black, 2001; Chatman, 2011), including those researched along the Wasatch Front. However, the main purpose of this research was to test the statistical significance of real estate sales values for individuals who chose to purchase a property near a TOD site as compared to those who did not. For the research to be validated, examples of each type of property would need to be found in each site city analyzed.

### **3.2.2 Selection of Sites for Study**

The selection of sites to study was determined by geographical location within the Wasatch Front. The Wasatch Front consists of four main counties: Weber, Davis, Salt Lake and Utah. Site location needed to provide a high enough amount of researchable properties that met the criteria needed for study. From each county, two cities with sufficient property types in each category were selected for testing. Critical components in the selection of cities included:

- Each city needed to have a commuter railway station developed within the last ten years and preferably development surrounding the railway station to make it comparable to the TOD development sites tested in other cities across the United States.

- Each city needed sufficient selection of single-family homes, townhomes and condominiums to be able to analyze each property type for each category. While the number of properties tested was not equal in every city and location, there needed to be a sufficient sample of properties to be able to provide equitable and usable data.
- Each city needed to be located along a major highway or freeway in order to compare property values near vehicular entrance points. Along the Wasatch Front this was a relatively easy request as Interstate-15 is the major freeway that runs north and south through the area. The railway line follows a similar north to south pattern mimicking the path of Interstate-15.

A selection of approximately one hundred properties was analyzed in each city, totaling 804 properties in its entirety for the research. Location of sites selected to study are provided in the appendix of this research study. The cities determined for study were as follows in Table 3-1. Additionally a breakdown of the number of sites and property types is found in Table 3-2.

Table 3-1 Cities Analyzed for Data Entry

<b>County</b>	<b>Cities Analyzed</b>
Weber	Ogden Clearfield
Davis	Layton Farmington
Salt Lake	Salt Lake City Draper
Utah	Lehi Provo

Table 3-2 Analysis Summary Data

<b>City</b>	<b>Total # of Properties Evaluated</b>	<b>Total # of Properties of Each Type Analyzed</b>
Ogden	116	Single-Family Homes: 39 Townhomes: 36 Condominiums: 41
Clearfield	112	Single-Family Homes: 40 Townhomes: 43 Condominiums: 29
Layton	64	Single-Family Homes: 32 Townhomes: 23 Condominiums: 9
Farmington	83	Single-Family Homes: 32 Townhomes: 48 Condominiums: 3
Salt Lake City	77	Single-Family Home: 29 Townhomes: 19 Condominiums: 29
Draper	128	Single-Family Homes: 58 Townhomes: 32 Condominiums: 38
Lehi	100	Single-Family Homes: 57 Townhomes: 40 Condominiums: 3
Provo	124	Single-Family Homes: 45 Townhomes: 46 Condominiums: 33



### **3.2.3 Selection of Covariate Factors**

In order to compare the independent variable through repeated and clustered group analysis it was necessary to determine factors that could be statistically significant in all of the cities and sites issued. There are numerous factors that could be significant to a potential buyer in a real estate transaction. The covariate factors chosen for the study were as follows:

- List Price
- Sales Price per Square Foot
- Concessions or discounts provided by sellers towards buyers
- Number of Days on Market
- Square Footage of property
- Bedrooms
- Bathrooms
- Year Built
- Acres
- Type of Financing

The data from the independent and covariate factors was obtained from the Utah Multiple Listing Service website. This information is proprietary information available to Utah Real Estate Agents and Brokers. If a property was sold without the use of a Realtor or through a real estate auction data was not obtained for the study. Statistically over 88% of purchasers utilized a Real Estate Agent in 2015 (National Association of Realtors, 2015). Because of this fact, the data compiled from the clustered and repeated studies of the properties can be utilized for conclusions. In order to perform a fully conclusive analysis of a study of this type it would be recommended to find records for every property type. For the purpose of this study however,

inferences and trends could be found through the Multiple Listing Service by studying multiple locations in each county and three different types of locations in each city.

### **3.3 Need for Multiple Clusters of Testing**

The type of testing performed for this analysis required multiple iterations in order to accurately show statistically significant data and evaluate potential trends for homebuyers when related to purchasing property near TOD sites. For this research study four different levels of testing were completed. Each level included a different grouping or cluster of variables to be tested.

*First Round of Testing:* The purpose of the first round of testing was to determine statistically significant covariates without including the testing of location of the properties in each city.

*Second Round of Testing:* The second iteration of testing eliminated the least significant variables and ran a similar test to the first round but with only significant variables. The purpose of this second round of testing was to evaluate differences or trends between the first two tests.

*Third Round of Testing:* With the data from the first two testing models, a third round of testing was provided including all significant covariate factors and the addition of analyzing property values with the categorical factor of sites near freeways, TOD sites and isolated from both included in the data. This third model would include over eight hundred properties across eight cities.

*Fourth Round of Testing:* One of the purposes of the research was to evaluate the addition of real estate properties near TOD sites to the suburban market and its overall reception

into the market through assessment of estimated sales prices per square foot. The largest city tested was Salt Lake City. Home values historically have been higher in Salt Lake City as compared to other cities along the Wasatch Front. Because of this fact a fourth model, similar to the third model but excluding data from Salt Lake City, was also tested.

#### **4 FINDINGS**

The following is a compilation of the results of the quantitative Mixed-model method procedural analysis of 804 properties sold between January 2016 and November 2016 in eight different cities across the Wasatch Front. Within the eight cities researched, three different locations in each city were utilized, totaling 24 different locations tested. For the purpose of the research multiple models were tested to determine statistical significance and make conclusions regarding the data. A breakdown of these models will be provided in the findings of this research to help determine final statistical significance.

While initially multiple covariate data was utilized to test the primary variable, some factors ultimately were eliminated due to lack of relevance in the findings. While multiple factors affect the overall sales price per square foot of a residential property, the purpose of this research was to compare the sales price per square foot of properties near railway and TOD sites compared to properties near freeway entrances or isolated from both. By testing the 804 properties across multiple iterations determination of statistical viability for the assertions were determined. Through this methodology a determination of what types of factors were most significant to affecting the price per square foot of sold properties along the Wasatch Front and how those affecting factors influenced the ultimate price per square foot of sold properties for areas near TOD sites was established.

#### 4.1 The First Model: Testing all Covariate Factors

Initially, the following covariate factors were tested across the eight cities:

- List Price
- Sold Price
- Price Per Square Foot
- Concessions
- Days on Market
- Square Footage
- Bedrooms
- Baths
- Year Built (Age of Property)
- Acres (Size of Lot)
- Type of Financing Utilized by Buyer

The dependent variable for each model of the study through all of the various iterations was the sold price per square foot. Through each model of testing the final sold price per square foot was ultimately the most important result. Multiple variables contributed positively or negatively to the final sales price. Ultimately it was the sales price per square foot that was the major dependent variable through the iterations tested. A breakdown of the class level information from the first model of 804 properties tested is included in Table 4-1.

Table 4-1 Variables Tested from First Model

Variable Tested	Number Tested	Values
Category	3	Isolated, Near Freeway, Nearest Station
City	8	Clearfield, Draper, Farmington, Layton, Lehi, Ogden, Provo, Salt Lake City
Type of Property	3	Condo, Home, Townhouse
Type of Financing	5	Cash, Conventional, FHA, VA, Other

#### 4.1.1 Testing Type of Financing

The type of financing initially was determined to be important to the research because the type of financing utilized in a transaction could help signify the type of buyer who might be purchasing a property. The following is a list of the five types of financing utilized in this study.

*Cash* – A buyer who utilized all cash to purchase the property. In a cash purchase, no financing or third-party lender is needed. Many times in a cash-only purchase the owner is an investor who will in turn rent out the unit as an investment property. Because national data suggests a higher percentage of properties near TOD sites is utilized as rental or investment real estate, determining whether or not a purchaser was a cash-buyer was initially deemed significant.

*Conventional* – The most common type of buyer utilizes financing from a bank, insurance company or other third party source to finance the purchase of a property by placing a percentage of the purchase price down as an initial down payment. Most conventional loans are structured with the buyer placing 10% - 30% of the total purchase price down at the time of

purchase while financing the remaining amount over 15, 20 or 30 years and paying interest on the loan. This the standard type of loan that is offered on the marketplace for buyers and in the case of this study was the most standard type of loan seen.

*FHA* – An FHA loan is a government-backed loan where the buyer needs only 3.5% of the total purchase price to purchase a property. This ‘First-Time-Homebuyer’ loan requires additional mortgage insurance in order for a buyer to qualify and is not available for larger investments.

*VA* – Similar to an FHA loan, the VA loan is a Veteran’s Administration fund loan that is a government-backed loan requiring a low percentage of the value down and allowing those who have served in the United States Military additional options for the purchase of a property.

*Other* – If a property purchase does not fall into one of the four main types of financing, it can be deemed as ‘other’. If a buyer purchases a property through seller-induced financing, auction, or trade it is indicated on the Multiple Listing Service as ‘other’ financing. While the number of properties purchased outside of the four main financing types in the state of Utah is minimal, it still needed to be tested.

Initially it was predicted that the type of financing utilized in the transaction would be a significant factor in measuring the residential sales prices of the properties. If it were statistically significant, it may also correlate with the locations of the properties purchased. In order to determine this a statistical test of these variables was performed. This first set of testing was used to help eliminate non-statistically significant data from more significant data that could be used in the remaining portions of the study.

For data to be utilized as statistically significant the goal was to find a P value that was .05 or less. In the first model, type of financing was determined not to be of statistical importance due to the low F value and high P value. The P Value of the statistical analysis represents the probability of obtaining an F value or statistic. The values from the first model are found below in Table 4-2. The F value or statistic is used when comparing statistical models and generally provides data related to the type of value that can be placed to the variable being tested given similar standard deviations and normally distributed population data. Conversely, factors like the number of bedrooms, baths, year built, and size of the property were determined to have a higher statistical relevance for the research. Although the type of financing may be important to buyers in the purchase, for the purpose of this research it was deemed statistically insignificant and was consequently eliminated from future testing. The first test of all covariate factors in all cities across all locations yielded the following information indicated in Table 4-2.

Table 4-2 Testing of Covariates for Statistical Relevance

<b>Variable Tested</b>	<b>Degrees of Freedom</b>	<b>F Value</b>	<b>P &gt; F</b>
Bedrooms	7	4.98	.0608
Baths	721	16.39	<.0001
Year Built	721	55.88	<.0001
Acres	7	7.74	.0272
Type of Financing	27	1.17	.3447

Data from the first variable testing showed relative significance of all variables outside of number of bedrooms and type of financing. Although the number of bedrooms was not deemed statistically significant, it was conversely not an outlying piece of data that could negatively skew the data. Because of this, the number of bedrooms was not removed from future testing.



#### **4.1.2 Testing Days on Market**

The number of days on a market can sometimes affect the ultimate sales price of a residential property because often if a property has been on the market a longer time it may be sold at a discounted price in order to remove the property from the market. Perhaps a seller is more willing to negotiate higher concessions to buyers in the form of a lower sales price because the home has been on the market so long.

During the testing period of 2016 in the Utah market there was a higher number of buyers in the market than there was inventory on the market. Because of this, a seller for the most part were able to sell properties faster than if the inventory is higher than the buyer demand. During 2016 the average property was on the market less than 30 days before going under contract in preparation for sale. While there were outlier properties in each of the twenty-four locations researched, there were also outlying properties that were under contract in less than one day.

In essence, properties during the testing period were being sold at a faster rate than many years prior. This fact highlights a key economic trend for the area and not an isolated incident: in a seller's market, the number of days a property remains on the market before going under contract will decrease. Because of lower inventory, certain factors may become less important to buyers, including the amount of time a property has been on the market. Because of this fact, it was not known until completing the first model test whether or not the days on the market would be statistically significant as compared to other factors. Below Table 4-3 highlights comparison of days on market to other variables tested.

Table 4-3 Testing of Remaining Covariate Variables

Variable Tested	Degree of Freedom	F Value	P > F
Type of Property	14	4.34	.0341
Concessions	721	5.88	.0155
Days on Market	7	0.28	.6124
Square Footage	721	94.63	<.0001

Comparing all of the factors tested above, days on the market was the least statistically significant with an F value of only .28 and a P score of .6124. This resulted in the conclusion that testing the days on the market would not alter the effects of the research significantly and in future tests this factor should be eliminated. Similar to the results found with type of financing, the number of days on the market was not statistically significant to the research enough to continue utilizing it for future iterations.

#### 4.1.3 Removing Location Within City from First Test

While ultimately the research was meant to test multiple variables compared to a single dependent variable (price-per-square-foot), the first test of the data did not include testing the location of the properties relative to each city. Eventually the testing of location near TOD sites, freeway entrances or isolated from both would be added to the testing structure, the first test was meant to ascertain statistically significant covariant factors. By determining which of the tested factors were more significant, the final model would provide a more accurate understanding of the effect of significant variables. A summary of the initial nine variables tested is found below in Table 4-4.

Table 4-4 Complete First Model Test

Variable Tested	Degrees of Freedom	F Value	P > F
Type of Property	14	4.34	.0341
Concessions	721	5.88	.0155
Days on Market	7	0.28	.6124
Square Footage	721	94.63	<.0001
Bedrooms	7	4.98	.0608
Baths	721	16.39	<.0001
Year Built	721	55.88	<.0001
Acres	7	7.74	0.0272
Type of Financing	27	1.17	.3447

Based upon the data researched the following factors were the most statistically significant were: Type of Property, Concessions, Square Footage, Number of Bedrooms, Number of Baths, Year Built and Acreage of Property. These factors were then re-tested in the second model of testing. The ultimate purpose of the first round of testing was to successfully determine the most statistically significant variables based upon the relative significance of each of the variables tested compared with each other. By eliminating certain variables the possibility of skewed data in future models when price per square foot of various properties in various locations near TOD sites, freeways or isolated from all three were added to the analysis.

#### 4.1.4 Measuring Estimated Price per Square Foot in First Model

The first data model yielded the most significant covariate factors as well as an initial price per square foot sold value of the three types of properties across all twenty-four tested locations. By testing the initial data an estimated sales price per square foot can be determined

for each type of property being tested, including condominiums, single-family homes and townhouses. In the table below additional statistical data, including standard errors, degrees of freedom and an estimated T-value were also utilized. The data below indicates three types of property tested. A summary of the distribution of the estimated sales prices is found below in Table 4-5.

Table 4-5 Estimated Sales Price per Square Foot from First Model Tested

Type of Property	Estimate Sales Price per Square Foot	Standard Error	DF (Degree of Freedom)	T Value
Condo	\$113.96	11.7975	14	9.66
Single Family Home	\$123.69	11.6955	14	10.58
Townhouse	\$111.45	11.6831	14	9.54

Graphically, the price per square foot for each property type is indicated in Figure 4-1:

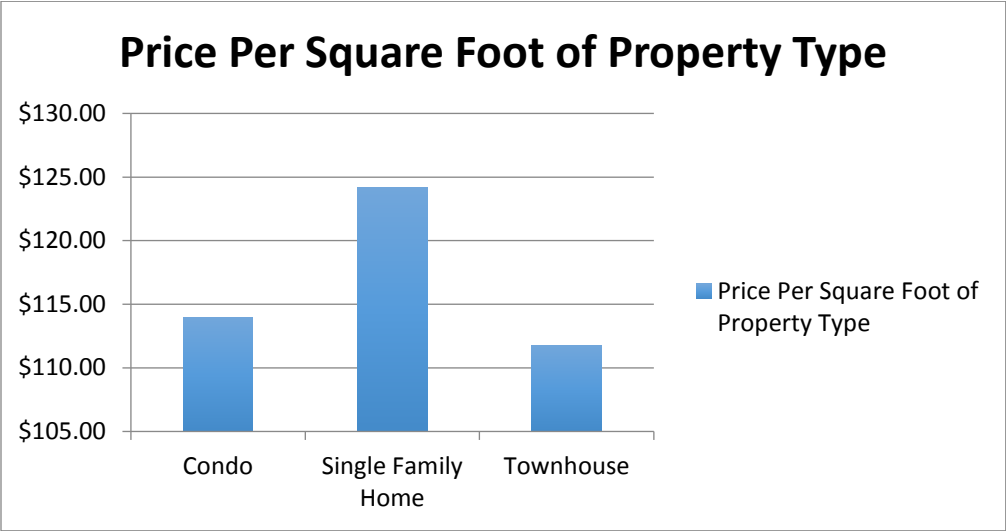


Figure 4-1 Estimated Sales Price in Graphic Form from First Model Test

With this data the second model of data was then tested to further determine the effect of multiple variables upon the price per square foot and then begin to fuse the data together with the eventual categorical test desired.

#### **4.2 Testing All Significant Covariate Factors**

The second round of testing included testing covariate factors deemed most significant from the first round of testing. The second model included testing of the most significant variables without including the covariates of category distinguishing between properties isolated from stations, near freeway entrances and near TOD sites and stations.

The primary purpose of the second model of testing was to evaluate what effect the elimination of non-statistically significant variables would have on sales price per square foot of sold properties. The variables tested in the second model included:

- Type of Property
- Concessions
- Square Footage
- Number of Bedrooms
- Number of Bathrooms
- Year Built (Age of Property)
- Acreage of Property

A secondary purpose of the second model of research was to begin to identify which variables were the most significant when it came to sales price per square foot.

#### 4.2.1 Second Model Effect on Price per Square Foot

The effect of the second model of testing can be found on Table 4-6. Similar to the previous testing, a P value of less than .05 indicated a relative significance when testing with all of the variables utilized for this grouping of tests as indicated in Table 4-6.

Table 4-6 Testing of All Significant Variables

Variable Tested	Degrees of Freedom	F Value	P > F
Type of Property	14	4.13	.0389
Concessions	729	5.26	.0221
Square Footage	729	95.72	<.0001
Bedrooms	7	4.31	.0766
Baths	729	16.12	<.0001
Year Built	729	58.91	<.0001
Acres	7	7.00	.0332

According to the data, the most statistically insignificant variable was the number of bedrooms in a property with a value of .0766. This information was not surprising considering the data from the first round of testing. Nevertheless, certain factors also were indicative of being the most significant, including: Square Footage, number of Bathrooms and the age of the property. Each of these variables indicated a stronger significance than the other variables tested.

The following Table 4-7 indicates the effect of these significant variables tested on the overall sales price per square foot.

Table 4-7 Breakdown of Effect on Sales Price per Square Foot

Type of Property	Estimate	Standard Error	DF	T Value
Condo	\$113.97	12.5833	14	9.06
Home	\$124.17	12.4969	14	9.94
Townhouse	\$111.79	12.4739	14	8.96

The effect of the price estimates from the second model is found in Figure 4-2.

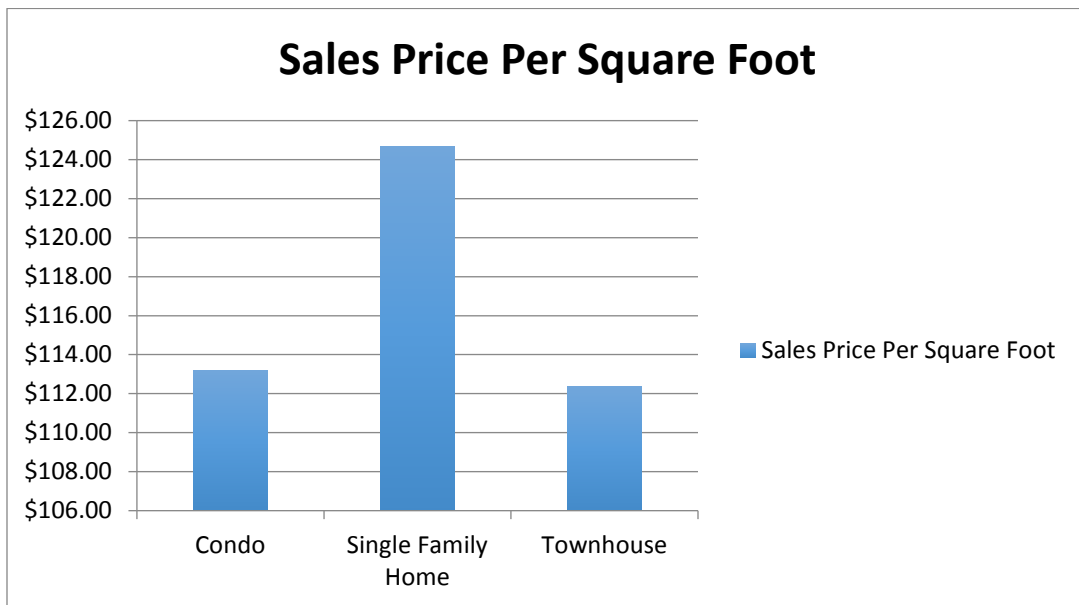


Figure 4-2 Effect on Sales Price per Square Foot

The data indicated a slight difference in sales price per square foot as compared to the original data. During each round of testing it was important to compare the overall sales price per square foot found in the newest round of testing to the previous testing results. These comparisons helped determine how the variables tested were affecting the sales price per square foot throughout the entire process of testing and evaluation. Without these comparisons the ultimate sales price data found in the final round of testing would not be as significant as it is

with the comparisons included. The comparison of price is important to analyze final results. A comparison of these prices can be found on the subsequent Figure 4-3.

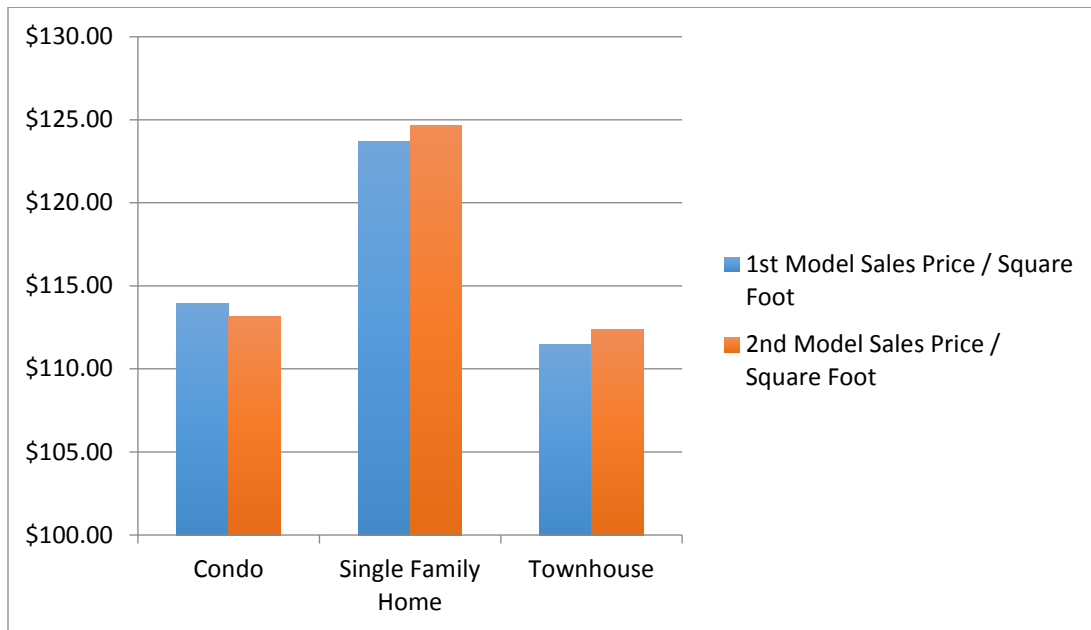


Figure 4-3 Comparison of Sales Price per Square Foot Between Two Models

The second round of testing did not create a large difference in overall sales price per square foot. Based upon the sale of a single-family home of 2,500 square feet, the difference between the sales price of model one and two would be a sales price difference of approximately \$1,200 total in a sales price estimate of \$310,425 vs. \$309,225.

#### 4.2.2 Preparation for Introduction of Primary Variable: Location Within City

As previously noted, a primary benefit of the mixed procedural testing methods is the ability to test multiple variables multiple times. By providing two different test methods, the testing of data to see the effect of pricing and significant variables and covariate factors had upon properties based in the three overall categories of study. By introducing variable of location



within each city tested into the testing models research conclusions for the purpose of this study could be finalized and documented. One of the main purposes of the research was to determine the different price per square foot of sold properties in properties near railway stations, freeway entrances and isolated from both.

### 4.3 The Third Model

The third testing model included all significant covariates found from the first model coupled with the testing results of the second model to obtain a final estimate on sales value per square foot of three types of properties in three different categories of interest. The data results can be found below in Table 4-8 and are similar to the previous two models tested.

Table 4-8 Statistical Conclusions with All Significant Variables

Effect	Degrees of Freedom Minimum	Degrees of Freedom Maximum	F Value	P > F
Type of Property	2	14	4.23	.0365
Concessions	1	713	3.96	.0469
Square Footage	1	713	111.60	<.0001
Bedrooms	1	7	4.85	.0636
Baths	1	713	8.78	.0032
Year Built	1	713	74.54	<.0001
Acres	1	7	12.90	.0088
Location within City	2	14	1.69	.2192

By adding location within city to statistical data researched, a few factors became more statistically significant as compared to other models. The testing results indicate a higher importance and effect to overall sales price per square foot in the third model of the size of the

lot (acreage), square footage of the home, and age of the home, as previously indicated. From the second round of testing it was determined that all of the above factors indicated significance, but, not all of them to the same level.

Of all of the variables tested in the third model, the location of the property was the least significant factor measured. Whether or not a property was located near a freeway, TOD site or railway station or isolated from both did not determine a higher significance than the traditional factors of size of the property, size of the lot and the number of bedrooms and bathrooms of the property. Although buyers placed relative significance to the location of the property, they were more interested and paid higher subsequently for other features related to the home.

#### 4.3.1 Effect of Covariates on Sales Price

While there may be statistical significance to the covariates tested in the third model, measurement also needed to be tested to determine whether or not the variables affected price in a positive or negative fashion. The measurement of the effects of these variables can be found below in Table 4-9.

Table 4-9 Effect of Pricing on Property Type from Third Model

Type of Property	Estimate	Standard Error	DF
Condo	\$113.17	11.7862	14
Single Family Home	\$124.66	11.6928	14
Townhouse	\$112.37	11.6664	14

The overall order of the pricing for the three types of properties did not change between the first models to the third testing model. As was previously noted, buyers were more likely to

pay a higher amount per square foot for a single-family home as compared to townhouses and condominiums. In spite of this being the case, the differences between the pricing for the third model is indicated below in Figure 4-4 and comparison of the three tests in Figure 4-5.

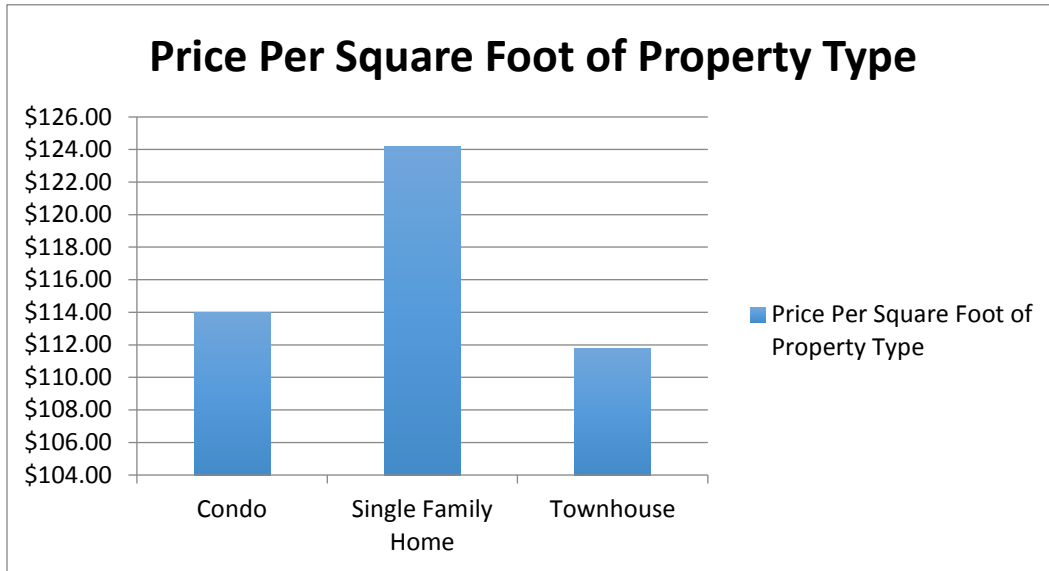


Figure 4-4 Third Model Pricing per Square Foot of Property Type

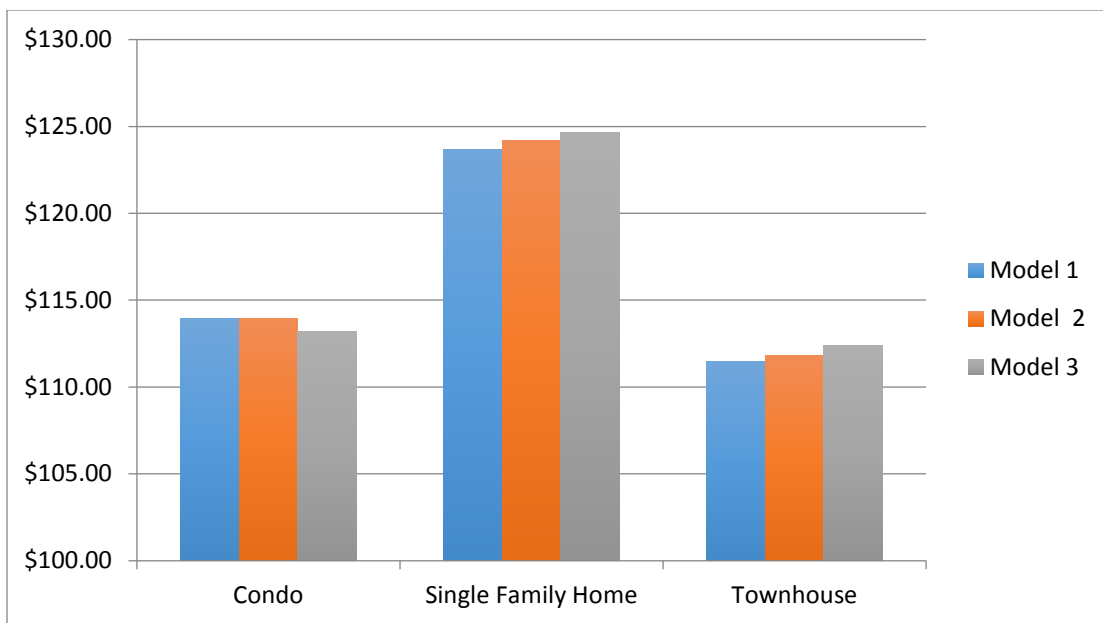


Figure 4-5 Comparison of Pricing from All Three Models

Overall there was not a disparaging difference in pricing between the three models tested. In all three models, the single-family homes overall were able to fetch the highest pricing per square foot.

The other significant covariates also had an effect on pricing, as indicated in the table below. If a number estimate as indicated in the second column as well as the T value on the far right column below was positive, the variable tested had a positive effect on sales price per square foot. Conversely, a negative score indicated that as the value of the tested variable increased, the price per square foot actually decreased. Results can be found in Table 4-10 below.

Table 4-10 Effect of Covariates on Pricing

<b>Effect</b>	<b>Estimate</b>	<b>Standard Error</b>	<b>DF</b>	<b>T Value</b>
Concessions	-.00078	.000393	713	-1.99
Square Footage	-.02167	.002051	713	-10.56
Bedrooms	-3.4869	1.5838	7	-2.20
Bathrooms	6.0772	2.0512	713	2.96
Year Built	58.1217	16.1842	7	3.59

Of the five variables tested above, three variables provided a negative price effect by increasing the variable while two provided a positive. When a seller paid concessions towards a buyers purchase price the overall value of the property per square foot decreased. Similarly, the higher the square footage was added to the property the lower sales price per square foot the home was able to be sold for.

While some sellers may mistakenly believe a large home will automatically sell for more, research indicated in the above table that it is only true to a certain point. Of particular interest from Table 4-10 is the fact that while the addition of a bathroom increased value on tested

properties in 2016, the addition of the bedroom actually decreased the overall sales price per square foot. The addition of a bedroom can help a property sell faster in many cases, but its effect on the overall pricing of the test properties was not a positive effect overall. Lastly, the age of the home was statistically significant, indicated newer properties will sell for a higher premium than older properties.

**4.3.2 Pricing Based Upon Location Within City**

With the addition of the locations within cities into the third model we can now see the effect of the location of the property has on the overall pricing. The previous tests were all run to be able to acquire a final sales price estimate for each category of property tested. The results of this testing is found in the table below in Table 4-11.

Table 4-11 Pricing Effect with Category Included

<b>Location within City</b>	<b>Estimate</b>	<b>Standard Error</b>	<b>DF</b>	<b>T Value</b>
Isolated	\$121.97	11.8615	14	9.60
Near Freeway	\$112.10	11.8443	14	9.46
Near Station	\$116.12	11.8443	14	9.81

Of the three categories tested in the third model, properties, which were isolated from both a freeway entrance and a TOD site or railway station, were able to achieve a higher overall sales price per square foot. Coupled with the data tested on property type, single-family homes in an isolated location were the top producers for the Wasatch Front marketplace. Graphic distribution of this data is found in Figure 4-6:

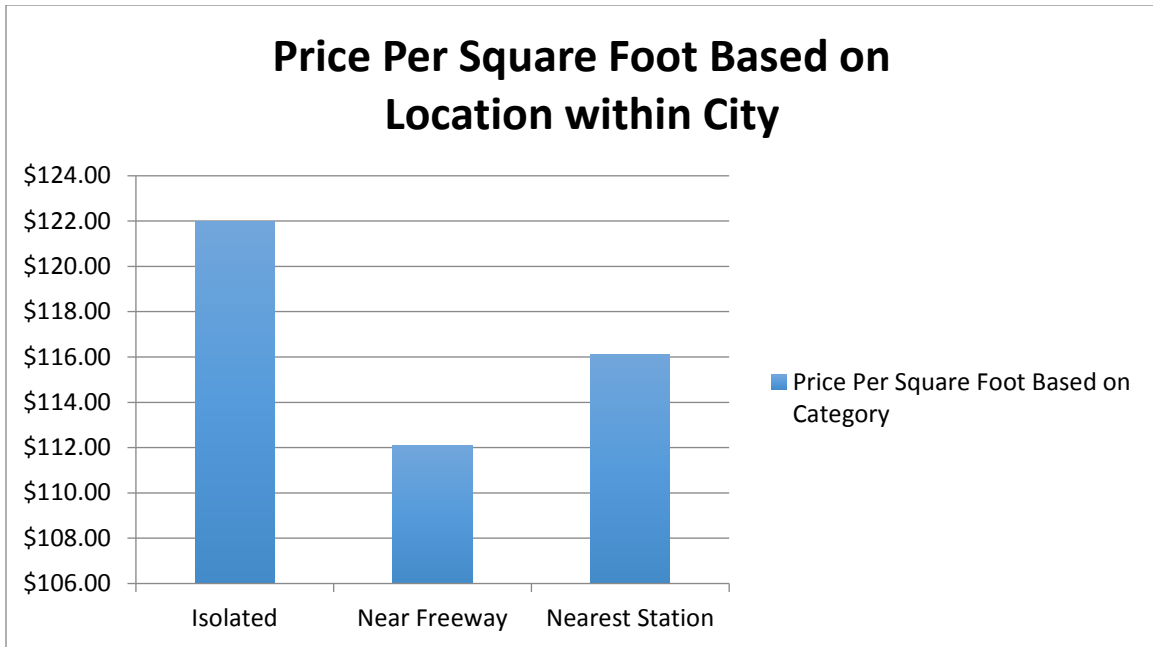


Figure 4-6 Pricing Distribution by Location Within City

The numerical distribution of this data may not seem overly significant unless applied to a real-life example. Much of the reason for the testing was to determine if buyers were willing to pay more money to purchase a property near a TOD site as compared to other locations. If a 2,500 square foot home were constructed along the Wasatch Front based upon the data results, the pricing would be distributed as follows:

Pricing for property near freeway:           \$280,250

Pricing for property near station:           \$290,300

Pricing for property isolated from both:   \$304,925

While the size of the property is the same, these results indicate buyers in 2016 during the time period tested were willing to pay nearly \$25,000 more to be away from a freeway entrance. Qualitative data was not researched to indicate if actual buyers felt a significant desire to purchase a property a certain distance from the freeway entrance, but, statistical results

indicate a negative correlation between pricing and location of the property near a freeway entrance. Of the three categories tested, only properties within one square mile of a freeway entrance showed a negative price correlation. This breakdown is indicated below in Table 4-12.

Table 4-12 Price Effect on Properties Near Freeway Entrances

Location within City	Estimate	Standard Error	DF	T Value
Near Freeway Entrance	-4.0211	5.2894	14	-.76

During the time period tested, properties closest to a freeway entrance exhibited a negatively related effect on the overall sales price per square foot. Conversely, properties located within one square mile of TOD sites indicated a higher sales price per square foot of over \$4.00 per square foot as compared to the freeway located properties.

**4.4 The Fourth Model: Eliminating Salt Lake City from Testing**

Of all of the cities researched, Salt Lake City resembles the closest to many of the types of cities studied along the West Coast and East Coast. Property values for a number of years have been the highest in Salt Lake City, as compared to other areas. The amount of public transportation options also is the highest in Salt Lake City as compared to the other cities researched. Beyond this, transit-oriented development has been better established in the capitol city of Utah than in many other cities, with the first transit railway opening before the 2002 Winter Olympic Games in the year 2000.

A good portion of the desire from the research was to see how cities all along the Wasatch Front fared when it came to pricing for residential properties. After running analyses

and three different models it was determined a fourth model would need to be run without the data from Salt Lake City to see if the trends held true or if Salt Lake City was skewing the data in any way because of the higher pricing available in the city. The fourth model consisted of similar testing to the third model, with the exclusion of seventy-seven properties researched in Salt Lake City.

For the final model 727 properties were analyzed and tested. The types of financing was also re-entered into the testing data to determine the difference in pricing estimates for various types of financing along the suburban areas of the Wasatch Front. While the overall results of the previous models of testing were important, it was determined that a final model needed to be run to make sure Salt Lake City was not skewing data inappropriately. When Salt Lake City was removed from the data testing the comparative pricing can be found below in Table 4-13.

Table 4-13 Comparative Pricing of 4th Model of Testing

Type of Property	Estimate	Standard Error	DF
Condo	\$108.02	9.9013	12
Single Family Home	\$118.35	9.7869	12
Townhouse	\$107.26	9.7783	12

By eliminating Salt Lake City from the testing the overall price per square foot of each property type tested dropped. Suburban prices outside of major metropolitan areas, including along the Wasatch Front have historically been lower than urban centers. The cost of living in larger cities is higher and the results of this fourth round of testing indicated similar trends after



exclusion of Salt Lake City. A breakdown of the pricing estimates dependent upon the location of the property is found below in Table 4-14.

Table 4-14 Breakdown of Pricing from 4th Model of Testing

Category of Property	Estimate	Standard Error	DF
Isolated	\$113.35	7.4042	12
Near Freeway	\$107.26	7.3982	12
Nearest Station	\$110.74	7.3686	12

The results were similar to the third round of testing, excluding the fact that the disparity between the pricing on the three categories of properties was the smallest for the fourth round of testing. This data indicated that when excluding Salt Lake City from the data the pricing was slightly more evenly distributed. While the same trends of isolated properties being the most highly valued did not change, the difference between the property pricing was significantly lower. For a 2,500 square foot home the pricing breakdown in the fourth model of testing would be estimated as follows:

Pricing for property near freeway: \$268,150

Pricing for property near station: \$276,850

Pricing for property isolated from both: \$283,375

After the third model of testing a difference of nearly \$25,000 was indicated between the value of isolated properties compared to properties located near freeways. In the fourth the sales price difference between isolated properties and others near stations decreases from approximately \$15,000 to only \$6,525. The difference in this is noteworthy considering previous thought indicated perhaps the gap for the suburban neighborhood pricing might be more

pronounced in the fourth model as compared to the previous three. This ended up to be conversely what actually occurred. The price difference in graphic form is found on Figure 4-7.

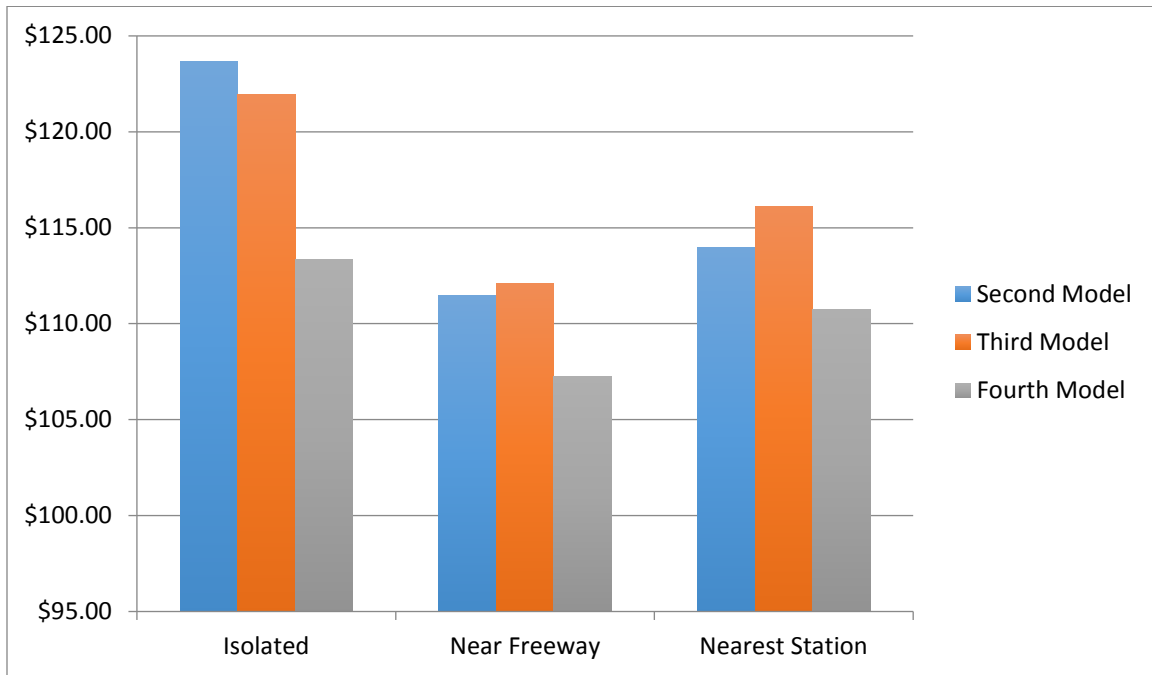


Figure 4-7 Price Distribution Excluding Salt Lake City

The third model indicated a higher premium price difference buyers were willing to pay for properties located in an isolated location away from both TOD sites and freeway entrances. The fourth model conversely indicated a more even disbursement of pricing amongst the three categories of properties tested. While there are many additional factors that contribute to a reason why buyers may select a certain property outside of location, it can be noted from the testing models that buyers paid the highest premium for properties located at isolated locations as compared to locations near freeway entrances or railway stations.

## **5 CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Access to TOD Sites is Valued by Buyers**

The data collected during the study provided valid representation on a number of facts regarding residential development surrounding TOD sites. First, the data indicated during the period of study residential purchasers valued being near a TOD site more than being near a freeway entrance. Whether the property was a townhouse, condominium or single-family home, homeowners placed a monetary value higher near the TOD sites than freeway locations, despite the fact that most homeowners own vehicles in Utah and most likely need access to the freeway each day. While the location of the twenty-four sites researched are not located long distances away from the freeway, homeowners valued being near a transit site with its additional community-building, reduced vehicle-traffic and condensed style of development over locations near a freeway.

Many critics of TOD development have argued that the cultural shift needed for TOD development to be truly successful is a barrier too large to break in most locations of the United States, especially the Western United States (DeVos, 2014). Much of the design of TOD focused development has been trying to reduce car use and travel distances to work by creating high-density neighborhoods enriched with a variety of public services (Cervero, 1996; Cao et Al., 2009).

## **5.2 Residential Values in Emerging TOD Locations**

Much of the original research highlighted the successful emergence of TOD sites across a multiple cities in the United States and abroad (Black, 2016; Kay, 2014). While numerous larger cities reported higher real estate values near TOD sites than other locations, the trend did not necessarily hold constant in all areas. Much of the culture of transit-oriented-development is not inherited, but instead adapts over time. For decades cities were designed utilizing the concept of one main street with all of the shopping in one location. Over time this type of development altered, especially in suburban locations to larger stores that were accessible by vehicles. Instead of owning one family car, people began purchasing multiple vehicles.

For TOD design to be successfully implemented in emerging development markets like the Wasatch Front, there will need to be additional shifts in not only the culture of the area, but also in the demographics of the area. Demographic shifts take time and many times are based around external factors such as unemployment rates and the growth and stability of the development.

Additionally, a number of the TOD locations were built wherever the railways could obtain land. Sometimes these included sites on lower-value real estate properties. While the initial value of the real estate may have been lower than surrounding neighborhoods, the fact that pricing per square foot is comparable to other market areas and higher than neighborhoods near freeway entrances indicates a strong growth and resilience in the market place for residential properties near TOD sites. Favorable market conditions for real estate along the Wasatch Front have also helped these sites grow in value.

Research from this study indicated the highest values for real estate during the period of study overwhelmingly were placed for properties isolated from freeway entrances and exits as

well as rail stations and TOD sites. Even when including the largest city in Utah (Salt Lake City) in the data, residents were more likely to pay the highest premium to purchase a property isolated from trains and freeways, but still accessible to community amenities.

One encouraging trend for developers and urban planners based upon the growth of TOD and transit in suburban areas is the fact that since its inception into the marketplace, railway growth and subsequent development has grown at a rapid pace in the state of Utah. The Wasatch Front began with one light-rail line connecting portions of Salt Lake County via public rail transit, and now features multiple light-rail lines and a commuter rail extending into four counties. Additionally, residential development has occurred within one mile of each of the eight locations researched.

The growth of this type of development as a whole has helped residential real estate values along the Wasatch Front to continue to grow. Many new businesses have grown near TOD sites, thus increasing the need for both rental and purchased residential real estate. In spite of the data indicating the highest values for isolated properties, property values as a whole along the Wasatch Front increased between 7% - 9% during the period of study alone (Utah Association of Realtors, 2015). The data also showed that there was not a negative correlation to price statistically in properties purchased near TOD sites. In other words, homeowners or builders who sold properties did not have to discount their sales prices as a whole because they were constructed near TOD sites.

Based upon the properties researched, determining whether or not residential development near TOD sites will be a success for developers for all suburban locations may be premature. In many larger cities across the United States much of the population of those cities has grown up with public transportation as a viable means of transportation and the way of life in

density-thick developments near TOD sites is commonplace (Chtatman, 2011; DeVos, 2014). Conversely, many of the homebuyers from the study may not have grown up with the same mindset. The growth of TOD development grew partially out of a necessity due to population growth, lack of land for developing and changing demographic and cultural shifts in those cities (McMillen, 2004). This type of cultural shift is happening in suburban areas, but not as quickly as other areas.

### **5.2.1 Residential Pricing in Suburban Locations**

Development of TOD sites and the cultural shifts needed for this type of development to be truly successful in suburban locations cannot fully be verified from this study or other studies of suburban locations. Some developers or city planners may mistakenly assume a development in a suburban city along the Wasatch Front would be just as successful as a development along an east-coast location. This type of comparison is inherently false. While developers, urban planners, city planners and other related parties can learn lessons from other locations, suburban locations like the Wasatch Front may not be the most viable location for all types of TOD development. Deeply engrained cultural norms, such as vehicular travel, being willing to travel 20-40 minutes to work each day, owning a yard and land as well as other stigmatic “homeowner rights” may take longer to break down than in other locations. The research definitely provided an indication that if research is to be tested it needs to be tested across similarly sized and demographically similar areas before implementation into the marketplace.

### **5.2.2 Suburban Statistics Indicate Change**

This research indicated the sales price per square foot of properties tested in only the suburban markets indicated a much smaller price differential between isolated properties as compared to properties near TOD sites. While the full intent of the design may not be fully realized along the suburban Wasatch Front market as of yet, data indicates the suburban population is embracing the concept of residential development near TOD sites at an increasing rate. The data indicated the highest premium for pricing on properties was related to isolated properties away from both freeway entrances and railway stations. However, the highest price overall included the data from Salt Lake City.

The overall price per square foot for homes isolated from both train stations and freeway entrances was higher as compared to the properties near stations and freeway entrances that were studied. The fact that the disparity between the three location types in each city in suburban locations favors the idea that traction is being achieved for real estate values near railway stations and TOD sites. Many of the freeway entrances have been around the Wasatch Front market for many years, while the railway stations are relatively new. Access to stations in suburban markets is not quite as readily available as in larger cities that could affect data results. In spite of these factors, this type of development is being acclimated into the marketplace throughout the Wasatch Front.

### **5.3 Additional Factors to Consider when Developing TOD Sites**

While the focus of this research surrounded residential real estate values near TOD sites, the overall purpose of TOD development is not to solely increase residential property values. Well-planned TOD development includes a multi-faceted goal of increasing community

amenities available to residents nearby, decreasing vehicular travel, providing a variety of housing options for individuals of all ages and demographics and providing commercial development to limit travel time to work. There are other factors that need to be substantially weighed in order for community leaders and developers to make the most informed decision regarding approval or denial of TOD development sites.

### **5.3.1 Multi-family Development Growth**

Multi-family rentals were not analyzed in this study. However, new rental properties ranging from apartments and studio units to larger townhouse style rentals were introduced into the marketplace surrounding many of the study sites from this research study. Of the eight cities tested, seven included new rental development within 1.0 mile of the station or development site. Had the introduction of the high-speed rail line not been planned for that area, it is unknown whether or not developers would have seen value to adding these rental units into the market.

Additionally, many renters have lower income levels as compared to home owning individuals. Because of this fact, the need for finding employment closer to home or accessible through other means besides vehicles is also apparent.

Because many of the sites along the Wasatch Front have included a mix of both purchased residential properties and rental opportunities it can be inferred that a combination of both types of development would be necessary for long-term success of the site economically. The ratio of what percentage of development should be rental vs. individually owned is one that is still relatively unknown. Lease rates and vacancy rates are not publically available to be able to test. Data would need to be gathered internally from multi-family management companies and brokers in order to see how well each new rental development is being received into the rental



market. For both types of developments to succeed additional study would need to be tested to verify the validity of the results. Each type of property is very unique and would need to be tested individually.

### **5.3.2 Changing Demographics in Suburban Areas**

There were multiple demographic trends researched for the purpose of this study. Some of the factors changing the breakdown of demographics along the Wasatch Front specifically include:

*Growing Population:* Utah continues to be one of the fastest growing states in the country. Because of this there are limited areas for development. Over 70% of the land available in Utah is federally owned and cannot be developed at this time (Utah Business, 2016). Additionally the highest percentage of population in the state lives in the four counties researched in this study. A growing population will increase the necessity for density-rich development in these suburban areas. Thus a growth in this type of development will continue to increase not only due to demand only but also the necessity for density rich urban environments that utilize smaller parcels of land and are located in favorable economic areas.

*Changing Population Breakdown:* Previous research indicated a growing number of “baby boomers” in the marketplace (Holmes and Hemert, 2008; Bernick and Cevero; 1998). The addition of baby boomers in the marketplace indicated an increased need for smaller properties nearby more public amenities like shopping, retail and work environments. Many baby boomers who are aging are desiring to live near these amenities and use their vehicles less. The ability of developers, city and urban planners to capitalize on this growing market could yield high benefits currently and in the future.

*Change in Younger Demographic Preferences:* While many older real estate purchasers who have grown up along the Wasatch Front may have spent the vast majority of their lives without TOD development and public transit, younger purchasers including “Millennials” aged 18-34 as of the year 2017 are more accustomed to this type of development and see it as a more viable option. This age demographic not only is renting properties longer (Utah Apartment Association, 2016), but they are also purchasing differently than their predecessors. With high birth rates in the state of Utah more individuals will be comfortable with this type of property purchase than ever before.

### **5.3.3 Commercial Growth near TOD Sites**

An additional avenue of research that could be employed is the introduction of commercial office, retail and industrial space to the market near TOD sites. Some of the highlights of commercial development near TOD tested sites from this study included the following:

*Provo:* The addition of multiple office buildings, storage facilities and retail shops within one square mile of the property.

*Lehi:* Within one mile of the test site, over a dozen five to seven story buildings of high-quality Class-A office space have been introduced the market. In addition to this a retail outlet mall, dozens of restaurants and eateries and small retail spaces. The commercial development surrounding the Lehi property is one of the fastest growing commercial development locations in the United States (Forbes, 2015).

*Draper:* Multiple office buildings, retail and an aquarium have been added within reach of the station. Nationally known company Ebay developed a property in the area in part because of the accessibility of the TOD site.

*Salt Lake City:* The development of numerous skyscrapers and a large retail mall has all occurred near the transit site. Multiple styles of mixed-use communities of varying sizes have all been developed near the site as well.

*Farmington:* The introduction of a shopping mall, dozens of restaurants, a grocery store and approximately a half-dozen multi-family developments have helped make the Farmington TOD site one of the most heavily used in Utah. Most of the newly added amenities are within a five to ten minute walk of the station decreasing the need for vehicular travel.

Commercial development is an additional facet needed in order for the long-term success of the TOD development sites along the Wasatch Front. If needed amenities and employment opportunities are not made available in these suburban communities, residents will need to travel to where they are available. Thoughtful consideration should be applied to the introduction of commercial space surrounding TOD sites to make sure an appropriate mix of community amenities, entertainment options and office space is provided.

#### **5.4 Recommendations for Developers, City and Urban Planners**

When deciding whether or not to introduce TOD sites into city designs and planning it is necessary to compare similarly sized locations in order to determine whether or not the sites will be effective. Much of the research is based around larger cities like New York City, Washington, D.C., Houston, Los Angeles and Seattle. Comparison of data results from these cities would not be a true comparison model to a location like Salt Lake City and The Wasatch Front.

While the introduction of new development into suburban markets can create additional opportunities for purchasers in these areas, the level to which homebuyers place additional monetary value on the purchase of properties near TOD sites in suburban markets is not as high as it would be in more metropolitan areas. For developers, return on investment and yield may take longer by introducing this type of development in a suburban market than it would in a metropolitan area. Development returns should be evaluated conservatively based upon the fact that introduction of residential development near TOD sites requires attitude, cultural and demographic shifts which may take time to complete.

It is also recommended that developers recognize purchasers in suburban areas still place a higher dollar significance on purchasing a property based upon its age, square footage, number of bedrooms and some other factors than perhaps they do on whether it is located near a TOD site, freeway or isolated from both. Residential buyers see value in many factors, but don't see statistically significant value as of yet in the location of the property as compared to some of the other factors tested in the research model. Because of this developers should make sure the products being provided to the marketplace meet the demands of the consumers or full reception will most likely not take place.

## **5.5 Recommendations for Additional Study**

The intent of this research was to analyze pricing for residential properties of multiple types of properties along multiple cities along the Wasatch Front. While there were statistical trends and data that was poignant gained from this study, this study provided a quantitative approach alone. Over eight hundred properties were analyzed and statistical importance was provided to multiple factors tested. However, a qualitative study analyzing buyers reasoning for

purchasing where they did during 2016 would yield more concrete evidence to the effectiveness of residential development near TOD sites. A qualitative study analyzing why buyers decided to buy the particular properties they purchased and whether or not the location of TOD site, freeway entrance or neither played a positive or negative impact on that decision would be recommended.

While this research can provide valuable data for residential developers and planners, a more robust study of multi-family and commercial property would provide additional insight helpful to all city and urban planners. The data available to complete this study is mostly internal and not publically available. Because of this, a quantitative and qualitative study of this type of data could be very beneficial provided one could obtain access to the appropriate data. The study of residential trends is more accessible due to the high amount of information available publically and through the Multiple Listing Service. This type of transparency is not available for multi-family and commercial development currently.

In total twenty-four locations in eight cities were tested. However, there are numerous additional cities along the Wasatch Front that could be tested similarly to what was completed in this data model. For a more complete viewpoint of the Wasatch Front, testing could take place along all train stops from North Ogden to Provo. Beyond this testing could also be completed for locations near light-rail stops. Although light rail is only available in Salt Lake County inferences could be made and additional trends noted through study of TOD sites near light rail locations.

One of the main problems discovered when the research began was the fact that most of the research highlighted focused on larger cities in the United States or globally. If one were to continue this research outside of the Wasatch Front, the same type of methodology could be

utilized to study markets of similar size and breakdown to that of the Wasatch Front. By obtaining more data for similarly sized locations, better decisions could be made by developers, city planners and urban planners to evaluate the effect of real estate values surrounding TOD sites and whether or not buyers value living near a TOD site over other locations.

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