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16. Abstract <p>Through the implementation of a state of the art light rail system, Houston has relinquished its title as the largest city in the US without a fixed guide way transit system. METRORail has been designed with the intent to enhance environmental, social, and economic development. The rail is one of a number of mobility improvements to counter Houston's ranking as among the top ten worst cities in terms of traffic congestion. This is in some measure due to lower density, vast residential and commercial development patterns that force people to drive more frequently and over longer distances. However, in recent times people have rediscovered that building in proximity to "good public transit connections" is an amenity that attracts the interest of renters, homebuyers and many businesses. This realization has been formed out of a 30-year debate about rail transit systems. It has become apparent that a Transit Oriented Development (TOD) in Houston can work.</p> <p>According to the Urban Land Institute (ULI), TOD is considered a major way to create more securely clustered, pedestrian friendly, mixed use projects that can increase rail ridership. The purpose of this study is to investigate, analyze and evaluate the suggested and implemented successful principles of Transit Oriented Development system and relate the patterns to the Houston's Ambassador Way Transit Station. This research will be useful for transit organizations and other stakeholders engaged in Houston's new transit developments, to ensure that nearby growth will produce adequate numbers of riders to nourish transit and initiate a desire to optimize land use around the Ambassador Way Transit Station community. This work also will serve as a guide to communities, designers and developers who may not initially recognize the basic valuable principles that underlie any Transit Oriented Development project.</p>					
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**AN EXAMINATION OF SUCCESSFUL MIXED USE IN TRANSIT ORIENTED
DEVELOPMENT AS CONCEPTUALLY APPLIED TO THE PROPOSED
AMBASSADOR WAY TRANSIT STATION IN HOUSTON, TEXAS**

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Research Report SWUTC/05/473700-00046-1

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ABSTRACT

Through the implementation of a state of the art light rail system, Houston has relinquished its title as the largest city in the US without a fixed guide way transit system. METRORail has been designed with the intent to enhance environmental, social, and economic development. The rail is one of a number of mobility improvements to counter Houston's ranking as among the top ten worst cities in terms of traffic congestion. This is in some measure due to lower density, vast residential and commercial development patterns that force people to drive more frequently and over longer distances. However, in recent times people have rediscovered that building in proximity to "good public transit connections" is an amenity that attracts the interest of renters, homebuyers and many businesses. This realization has been formed out of a 30-year debate about rail transit systems. It has become apparent that a Transit Oriented Development (TOD) in Houston can work.

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EXECUTIVE SUMMARY

Transit Oriented Development (TOD) refers to urban design and land use characteristics with a transit nucleus that reduces the individual's need to use a vehicle as their primary mode of transportation. It is conducive to development of a cohesive bond that encourages different land uses and often contributes to a sense of neighborhood and livability. The Urban Land Institute (ULI) has specified 10 key principles that must be addressed (Urban Land Institute, 2003). These principles range from creating a vision and initiating partnerships to getting a stronghold on parking and engaging corporate attention toward initiating and sustaining development. These are the fundamental components of this research, but they are also considered in conjunction with other similar concepts.

The objective of this research is to present the concept of Transit Oriented Development (TOD) and detail the fundamental principles associated with its planning and implementation. The concept will be viewed from the perspective of the ten TOD principles compiled by ULI. This information will then be reviewed to present common factors that underlie various types of TOD projects. Currently implemented TOD systems will be explained and reviewed in order to present their distribution of use and then these systems will be related to the proposed Ambassador Way Transit station in Houston Texas.

Information was assembled for TODs across the nation. The Lindbergh City and Buckhead Stations in Atlanta and Bethesda Metro in the Washington, D.C. area served as baselines for comparative purposes. The areas were assessed across the square footage of office, retail hotel, and residential usage. In addition, a survey was designed to gain further insight into the current view of transit representatives and other stakeholders about the proposed Ambassador Way station location. The survey included a battery of eleven items including some closed and open-ended questions and was administered to local Houston officials and stakeholders.

Reviewing and analyzing existing TOD showed that no two stations are the same. The uniqueness of the stations creates a place within itself, while being a planning response conducive to generating non-automotive tripmaking. How Ambassador Way's station area is planned and developed will depend on the particular attributes of that station and surrounding community. It is suggested that by adding key design features, such as continuous and direct pedestrian connections, minimizing the amount of parking proximate to the station, and providing amenities to enhance the on-street experience will be critical to the success of the proposed station. Another recommendation is for the larger Ambassador Way station area to balance the amount of space occupied by parking facilities. This can be accomplished by creating TOD parking standards, which reduce the amount of parking for motorists. Share parking and parking structures are other methods, which can reduce parking facility cost and encourage more efficient land use.

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CHAPTER 1

INTRODUCTION

Transit Oriented Development (TOD) is a concept that has evolved out of a need to balance residential communities, retail divisions and employment locations by integrating the transition between locations via the most efficient and accessible means. TOD has been defined as a set of urban design and land use characteristics conducive to generating non-automotive tripmaking (Calthrope, 1993). TOD goes beyond just reducing the individual's need to use a vehicle as their primary mode of transportation, but it also beckons for the development of a cohesive team of stakeholders to share in the responsibility of its development. Although the term "transit oriented development" initiates a thought of trying to get a community to buy into increasing their transit ridership, there is much more to be considered. Reducing traffic congestion is only one facet considered by advocates of TOD. Implementing a successful TOD system can benefit the whole community. Many focus on the obvious advantages of increased ridership for transit systems, but reducing traffic congestion, improving the quality of air, beautifying the community and increasing the convenience level of accessing various businesses are also key factors to consider when planning a TOD system.

An article published by the Sierra Club explains that the average American driver spends 443 hours per year—the equivalent of 55 eight hour work days—driving a vehicle (Sierra Club, 2000). The article goes on to explain that those communities that are designed to have residents regularly commute to neighboring areas for such things as shopping and recreation bear most of the burden of this excessive time spent on highways. Residents of these types of communities are forced to drive 3 or 4 times more than other persons that reside in better-planned communities. Articles such as this reiterate the fact that there is a major problem associated with the increase in traffic congestion and time spent reaching a specific destination. The article also suggests that this problem is not inevitable, there are possible solutions, which can begin with the planning and implementation of Transit Oriented Development.

In order to efficiently plan a TOD one must understand its fundamental principles. ULI has specified 10 key principles that must be addressed (Urban Land Institute, 2003). These principles range from creating a vision and initiating partnerships to getting a stronghold on parking and engaging corporate attention toward initiating and sustaining development. These are the fundamental components of this research, but they are also considered in conjunction with other similar concepts. One of the major factors to be considered is the growing concern of air pollution. It is well known that urban form, the physical characteristics and patterns of land development in a region, can affect air quality by influencing the travel mode choices citizens have available (Linking Land Use, Air Quality, And Transportation Planning, 2002).

The publication continues by noting that development patterns that locate jobs, housing and recreation proximate to each other, can mean less travel, resulting in fewer vehicle miles traveled (VMT) and likely reducing motor vehicle emissions. This "linking" of facilities to one another and increasing the convenience of accessing them is a component of TOD. The planning of this type of structuring and the underlining goal of facilitating multiple improvements are all a function of designing a successful TOD system.

Background

The pioneers of current day transit systems were initially referred to as commuter rail lines, which use steam engines to power their trips (History of Transit-Oriented Development, 2000). This mode of transportation was very slow in accelerating and decelerating, which mandated the location of stations be miles apart. This system, then gave birth to the electric street railways which obtained their power from an overhead electrical line and used the running rail as a ground (History of Transit-Oriented Development, 2000). These systems were limited in that they could not reach the speed of the steam engine powered vehicles, but the street railways were “cleaner, quieter, and could start and stop more efficiently” (History of Transit-Oriented Development, 2000). These modes of transportation set the path for the current day transit system. TOD is a “planning approach that calls for high-density, mixed-use business/neighborhood centers to be clustered around transit stations and corridors” (CRCOG Best Practices Manual, 2000). The concept of TOD is not a novel plan; cities like Chicago have been doing transit-oriented development since the mid 1800’s (Ohland, 2001). However, due to the surge of traditional suburban development and the success of these communities, the strategies of a transit-oriented development did not flourish. A more common term used for this traditional suburban development is “sprawl”. According to Snyder and Bird, sprawl can be defined as a very low-density development outside of city centers, usually on that is on previously undeveloped land (1998). The benefits of sprawl are quite obvious: low density residential lifestyle, generally larger houses, easy access to open space and the ability to separate oneself from some of the perils of the city life (Snyder & Bird, 1998). It is these comforts that have drawn many people consistently to utilize these recreational and retail facilities for a number of years.

The resurgence of the concept of TOD has been conceived out of the concerns that sprawl has brought. Perhaps it is true that there could be too much of a good thing. The more successful sprawl has become, the more development it has continued to spawn. Therefore, short commutes became longer as more residents continued to flock to these sites, along with increases in the general population. All of these factors add up to a need for an alternate means of living, consequently the call for a revisit to ideologies of TOD become attractive. Sprawl is now viewed as a part of the greater car dependency, loss of open space and agricultural lands, it also causes more energy-intensive development, and the most obvious concern, traffic congestion (Snyder & Bird,1998).

The core concept of TOD is to facilitate people driving their cars less by making the use of public transit, walking, biking and other alternatives to automobiles use convenient and easy (Pennsylvania Environment Council, 2001). Transit Oriented Development is also considered a type of “smart growth”. It is defined in such terms because it addresses the issue of where growth should occur from a regional sustainability perspective; and it coordinates land use and transportation, such that land and infrastructure are efficiently utilized (CRCOG Best Practices Manual, 2000). Smart growth attempts to consider variables that not only address current issues, but is also planned with the flexibility of being able to adapt to future needs.

Current Developments

Orland has written that TOD projects are being developed with greater frequency (2001). Not only have these developments been springing up, but their success rates have been favorable. The city of Portland has experienced success with the implementation of the Portland Westside light rail in 1998. The use of their transit system has increased so tremendously that as of 2001, seventy five percent of Portland's transit users are also car owners (Fergonese, et al., 2001). The Fergonese article continues by stating that the secret to the success of their light rail system was found in some very basic TOD principles which include: having safe and pleasant walk ways, bike paths, pedestrian crossing, and a convenient bus system. Another transit system, MARTA—Metropolitan Atlanta Rapid Transit, operates heavy rail service on more than 45 miles of double track in the city of Atlanta and DeKalb and Fulton Counties (Mathews, 1999). In addition to MARTA being the nation's eighth largest transit system, it has also invested over 3.5 billion in the bus and rail equipment and property. Figures such as these reflect the importance of properly planning for such an investment to not only generate initial revenue, but also maintain long-term benefits. The system has continued to progress since 1975 when the heavy rail system was implemented. Ridership has continually increased and MARTA is reported to serve 78 million passengers per year. This process was gradual; several rail line extensions were done between 1982 and 1988 (Mathews, 1999). This type of growth and development again reflects the level of agility a TOD system must have in order to accommodate needed enhancements.

Implementation of TODs is more than locating a transit stop in a residential neighborhood or business park, and building mixed uses nearby (History of Transit-Oriented Development, 2000). The current demands of TOD have moved beyond merely being an alternate mode of transportation. The planning of an efficient TOD should also include means to improve the livability of the community and neighborhoods, while successfully integrated into the economic pattern of the area (History of Transit-Oriented Development, 2000). These improvements are made by assembling structures that are not only accessible, but also inviting.

Objective of Research

The objective of this research is to present the concept of Transit Oriented Development (TOD) and detail the fundamental principles associated with its planning and implementation. The concept will be viewed from the perspective of the 10 TOD principles compiled by ULI. This information will then be reviewed to present common factors that underlie various types of TOD projects. Currently implemented TOD systems will be explained and reviewed in order to present their level of efficiency and then these systems will be related to the Ambassador Way Transit station in Houston, Texas.

The prevailing research relating to Transit Oriented Development presents the information in an individualized form. Most often researchers focus on only one portion of the TOD system rather than discussing the system in its full context. Some research details the need for TOD in particular locations, while others offer suggestions of factors to consider when developing the projects. Other researchers focus on the economic variables that exist in reference to developers and retailers alike. This research will compile all of these factors in addition to comparing distinct TOD projects with one another. This information will then be made relevant to the Ambassador Way Transit station in Houston, Texas. A survey has been compiled that will more specifically address issues concerning the Houston Transit Station. The survey was administered to business and community leaders knowledgeable of transit-oriented development and the Ambassador Way area. The results of the survey will be presented and discussed in an effort to complete the presentation of a promising productive TOD system.

CHAPTER 2

REVIEW OF LITERATURE

To effectively measure the benefits of (TOD), the review of literature will define the major terminologies affiliated with TOD, in addition to combining these terms in order to note their level of interdependency. Most of the literature on TOD systems focuses on some very basic concepts. The literature defines these terms and presents their level of functionality. This research will review the concepts in a more detailed perspective as well as focus on the components of TOD onto a smaller scale as it relates to Ambassador Way transit station.

Transit Oriented Development is a planning approach that calls for high density, mixed-use business and neighborhood centers to be clustered around transit stations and corridors (CRCOG Best Practices Manual, 2000). Perhaps the most important word of this quote is “planning.” Every part of the TOD process begins with this planning stage, which is crucial in successfully implementing a functional system. While reviewing the literature, it seems that more researchers focused on defining what constitutes a TOD system than fully understanding how one can be successfully planned and implemented. There is a need for a simultaneous review of the features that compose a TOD system as well as understanding the means of creating one. It should be made clear that TOD is not only a finished product, but it is also the means of planning, developing, implementing and evaluating, the system.

Nelson and Niles (1999) indicate that compact and mixed-use development may produce localized transportation benefits; however previous research may not give planners and decision makers confidence that the promised benefits of new urbanism can be achieved. This article clearly acknowledges that although many may have confidence in the sufficient need for TOD, there is some hesitation because there is a lack of clearly defined plans to carry out its development. Although there is not a utopian plan, there should be some structured format that incorporates a level of flexibility, which allows adaptation to unexpected changes or complications. The article continues by suggesting the impact of TOD on travel demand patterns and mode choice cannot be directly measured. It is this type of philosophy that continues to cast doubts over the possible success of implementing a TOD system. The author is correct in stating that the exact measurement is not available prior to implementing a system, but success is more likely to be achieved if careful planning is done to incorporate the needs, desires and feedback of all stakeholders. Another group of researchers state TOD’s are unlikely to be successful unless tied to a comprehensive, integrative regional development program. The article continues by noting that TOD’s require the support of land developers and regulators, transit agencies, financiers and the general public to be implemented and successful (Gatzlaff, et al., 1999).

Figure 1 gives the template for a type of urban TOD. The figure demonstrates how there is a networking of residential living, employment facilities and commercial businesses all centered around a light rail system. This layout displays some of the stakeholders involved in the process. This process must be a joint effort between stakeholders if it is to be constructed properly, but again one has to address the needed processes to reach this consensus among stakeholders.

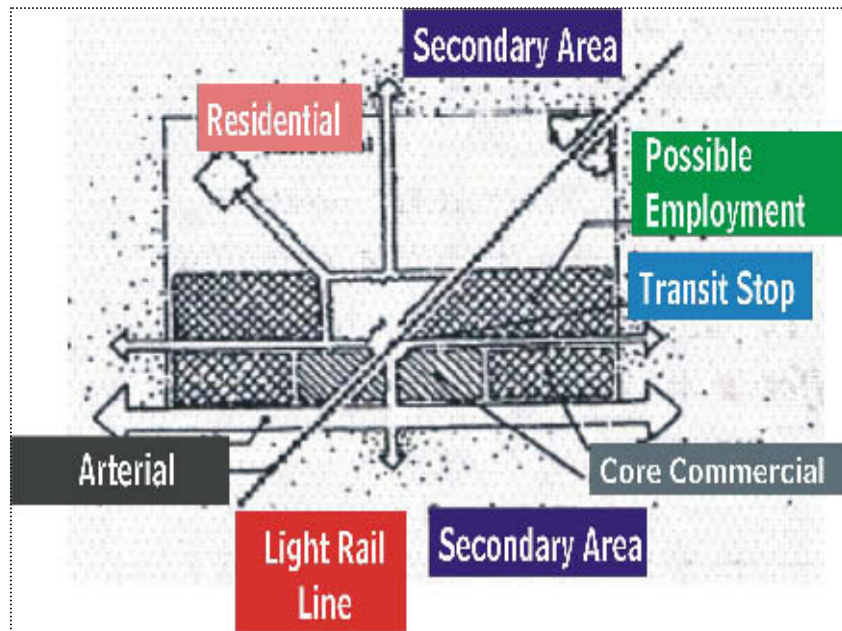


Figure 1. Urban TOD
 (Source: Gatzlaff, et al., 1999)

When considering the role of stakeholders, corporations and businesses immediately come to mind. It is evident how these entities will be included in the conception of a TOD system. There has to be a solicitation of specific companies to encourage them to participate in the development process. In addition, such role players as planners and developers must play a crucial role. It is interesting that the seemingly most important stakeholder, the community, is not always (or typically) at the forefront of discussions considering the processes needed to develop a TOD system. The community is most often referred to as the factor that will determine the success or failure of a TOD system by their frequency of ridership. The concept of “luring” community support is often discussed by providing visually appealing landscaping and increased convenience levels concerning commuting. The ideas of decreasing the amount of time spent in traffic congestion as well as reducing the distance needed to travel are also good “marketing” strategies to sell idea of TOD. The positive effects of a TOD system are rarely discussed but include an increased sense of community and increased exercise.

More and more families find themselves in a rush to complete required lifestyle activities such as shopping, personal care and medical care. Due to traffic congestion, more time is consumed traveling to a particular destination, which leads to a decrease in the quality time spent with other family members. The view of certain perceived tasks can be altered to be seen as an opportunity for leisure and perhaps healthy activities. Researchers tend to address the goal of creating a more convenient environment for the community through the use of mixed-use centers. But again, this does not have an selfless view of the community, because ultimately the increase in mixed-use centers also benefits the retailers. However, an increase in the sense of community and the potential benefit of the physical components seem to focus more on the

enhancement of the community and presents a variety of stores in close proximity, which will increase the probability of walking to frequent the stores. Residents are willing to walk more as shown through a survey conducted by Belden Russonello & Stewart. The concept of increased exercise was addressed by posing the following question: Please tell me which of the following statements describe you more: A) If it were possible, I would like to walk more throughout the day either to get to specific places or for exercise, or B) I prefer to drive my car wherever I go? The results to this survey question are displayed in Figure 2.

This survey clearly shows that the majority of subjects surveyed have a preference for walking, if possible. The survey went on to further categorize the types of trips the

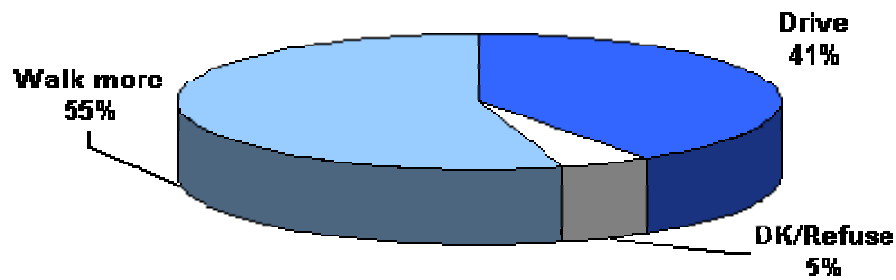


Figure 2. Americans Preference of Walking
(Source: Belden, Russonello, & Stewart, 2003)

subjects would take in order to do more walking. The results to this survey item are displayed in Figure 3. Except for the work scenario, the majority of survey respondents indicated that they would choose to walk for purposes of exercise, recreation and completing errands. This clearly indicates that there is a large portion of the public that would be willing to decrease their dependency on an automobile to complete tasks and visit venues.

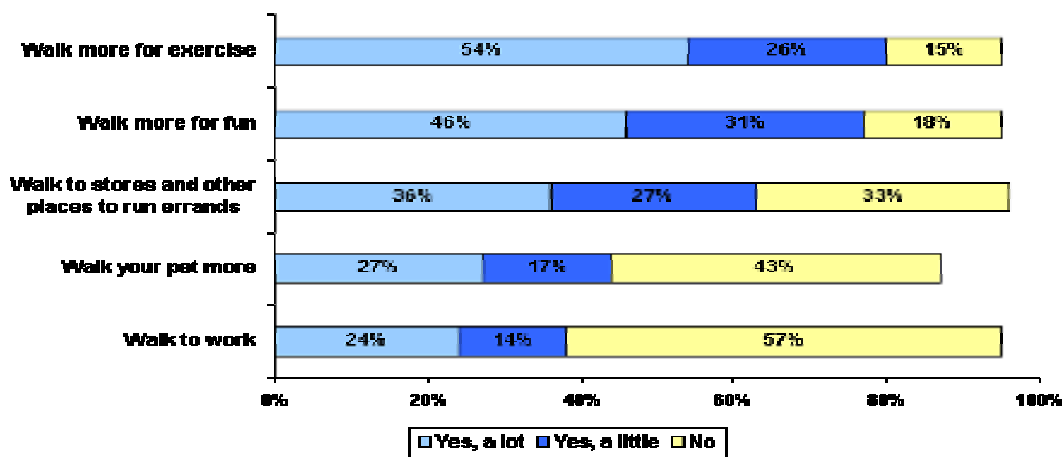


Figure 3. Walk More for Exercise, Fun
(Source: Belden, Russonello, & Stewart, 2003)

This component of the TOD planning process should be seriously integrated into the construction of a system. In reviewing the literature, the public's desire was frequently omitted or overshadowed by the mention of business partnerships and anti-sprawl factors. It is the goal of this research to not only define TOD, but also consider all other facets that are related to its successful construction. While there seems to be variations in the manner in which one can plan and construct TOD systems and the ultimate goals, there is more clarity when it comes to the need for TOD. Some problems that currently exist are as follows:

1. air and water pollution
2. increased congestion and gridlock
3. wasted gas and energy
4. non-sufficient use of open space
5. increased commute times and distance
6. limitations of the people's choices (Sierra Club, 2000)

These factors have forced the hand of city and governmental officials alike to take notice and address these issues in some form. Many have responded by reviewing the concept of Transit Oriented Development systems as a solution. Again, this is not to suggest that TOD is a cure all for most traffic and environmental ills, but it does have a significant affect on relieving some of the aforementioned issues.

TOD is commonly viewed as ten basic principles, as surmised by the Urban Land Institute (ULI). These principles are used to evaluate and implement a successfully operating system. The goal of the ULI is to provide responsible leadership in the use of land in order to enhance the total environment (Dunphy, et al., 2003). One of the ways the organization has strived to enhance the total environment is by reviewing and comparing several TOD systems and compiling the 10 principles that are best applicable to any system. These principles include:

- 1) creation of a vision that is: future oriented; able to be fully implemented, flexible, and inclusive of all stakeholders throughout the process;
- 2) solicitation of potential partnerships which includes public-private partnerships for development opportunities, shared risks, expenses, and rewards that are direct results of: public sector power; private developers' real estate knowledge, and city officials' zoning ordinances and policies;
- 3) compact or higher density of retail and residential interests to motivate demand for transit;
- 4) better regulations on parking with respect to: shared parking; parking near retailers; parking decks; and paid parking;
- 5) creation of destinations that are both economically-beneficial and culturally attractive to the surrounding community;
- 6) development of retail markets that will thrive regardless of availability of transit;
- 7) mixed uses to offer diversity in a number of separate activity destinations along the same rail line;
- 8) incorporation of existing and the potential addition of buses into the transit development;

- 9) encouragement to live around the transit by creating a mix of single and multi-family housing options that are attractive and affordable for those already living in the community and for those who may opt to move into the community;
- 10) engagement of corporate attention as they can influence and stimulate development around transit systems

These 10 principles are the foundation by which the other parts of the TOD system will be discussed throughout the research. The vision can provide a basis for planning development around transit, recognize community potential and the active economic, political and environmental limitations.

One example of implementing this vision is based on the Arlington County Metropolitan Washington Area Transit Authority (Metro) rail corridor where planners, developers and public officials understood that they needed to have high expectations and plan well with a vision and clear goals. Local governments need to be supportive by formulating public policies that support these goals and to develop tools and ordinances to facilitate their implementation (ULI/NMAC/AIA Joint Forum on Housing Density, 2002). This is an indication of how a vision is essential in formulating any TOD system.

Another principle involves the application of potential partnerships; these partnerships should be public-private partnerships to provide opportunities for shared expectations and shared risks, costs and rewards. Similarly, maintaining strong partnerships with local and regional officials, places TODs in a position to reap the benefits that various organizations can offer through zoning ordinances and housing guidelines and specifications, which ultimately offer comfortable, more affordable housing for a larger number of families. Establishing a TOD in a residential area can serve to revitalize local economies and relieve traffic congestion and air pollution on major highways. According to research conducted for Fannie Mae's Location Efficient Mortgage Program, vehicle ownership falls rapidly as density increases, reaching an average of just one car per household when density climbs to 20 to 30 housing units per acre. Many of the best-performing TODs— such as those around Metro stations in Arlington County, Virginia—focus high-density development immediately around the station. Building height drops rapidly and housing forms change from attached to detached as they approach the existing single-family neighborhoods that surround many of these stations (Tumlin, 2003). This is yet another example of how efficiently planning specific partnerships and developing detailed neighborhood profiles can help to incorporate transit services that naturally blend in with existing structures and characteristics of the community.

After the vision has been created, partnerships are established and the neighborhood density is carefully considered, the issue of parking becomes relevant. Reduced parking facilitates such as shared parking, lower residential rental costs and increased use of transit helps decrease traffic congestion and air pollution while increasing walking and bicycling as alternative means of transportation. These factors add to the livability of a community. Unlimited, free parking contributes to the increased use of personal vehicles. In a study conducted by urban planning professor, Donald Shoup (1998), at UCLA, found that ending-parking subsidies is an effective way of reduced vehicle trips by an average of 25%. Another

means to manage vehicle usage is companies providing free or discounted transit service passes for employees as is practiced by a number of transit agencies. The passes are generally valid for unlimited rides on bus and rail lines. In specific, passes on the Santa Clara Valley, Ca. system account for increased transit ridership, while simultaneously decreasing demand for employee parking by approximately 19% (Tumlin, 2003). This reflects one way of using creativity and a perceived reward system to bring about desired goals.

Another principle relates to retailers focusing on a variety of methods to draw the consumer to their doorsteps. The vital component of this is obtaining a location in areas where there is a wide range of mixed uses such as residential development, office space, hotels, churches, or municipal facilities to create a more diverse atmosphere. This combination works even better when centrally located within the downtown centers which tend to naturally lure consumers. In addition to providing a diverse mixed use environment, care must be taken to make each development attractive and visually-stimulating (Mattson-Teig, 2002).

One of the most obvious principles deals with the modes of transportation made available to the community. Incorporating buses and shuttles into the TOD is a must as a variety of modes of transportation must be available to get community members to the station. In addition to buses and shuttles, San Francisco offers a program entitled City Car Share to help reduce the need for individual vehicle ownership and to boost the use of transit services (Tumlin, 2003). City Car Share is a fleet of cars available to members on a per-use basis which allows them to have the convenience of a car when absolutely necessary without the burden of continued ownership and parking. City Car Share members also receive reduced parking fees. Buses, shuttles and programs like City Car Share all help transit systems to increase riderships and decrease traffic congestion and air pollution. Again, this reflects how an individualized component must be put into the TOD system that will work best with the community and transit system alike. Another significant principle of TOD systems relates to corporate attention and interaction in transit projects. Corporations can and do influence development around transit. If transit is viewed as a valuable tool for recruiting talented workers, companies will include transit access on their list of site consideration. Additionally, increased corporate involvement draws the interests of other developers and corporations; hence, success breeds success. According to Niles (1999), rail systems tend to stimulate growth and development in central business districts where transit service is easily accessible and traffic congestion and costly parking hinder motorists. Again provision of density bonuses, tax abatements, tax increment financing, and direct grants all serve to entice corporate attention and involvement in TODs (Measuring the Success of Transit-Oriented Development, 1999).

Another principle specifies that ensuring the success of a TOD system means that retail development must be market driven not transit driven. In addition, transit should support the retail market, but retail should be financially feasible and able to thrive despite the existence of transit systems. Again profiling the communities in which development is proposed will give better insight as to the kind of retail markets that could be successfully fit into a TOD based on specific neighborhood characteristics. Mattson-Tieg argues that owners and developers are returning to retail's original home in city centers (Lifestyle Retail, 2002). Joe Pettipas, vice president, retail, in Toronto office of Hellmuth, Obata, and Kassabaum (HOK), an international architecture firm believes that the advent of big-box or discount centers have resulted in

customers becoming more discerning about the time they spend at any retail environment. He suggests that in response to the convenience of drive-up, big box mall, the retail operator needs to find more reasons for consumers to come in and stay longer. And the longer the shoppers stay, the more money they spend (Lifestyle Retail, 2002). This philosophy reiterates that many individuals tend to focus on the financial factors that the community can contribute to the TOD system, as opposed to noting other considerations that are geared more towards community and health. A focus of the research when detailing the principles in Chapter 4 will be to incorporate these other, less acknowledged factors.

The 10 principles are the foundation by which the other parts of the TOD system will be discussed. These principles will be discussed in detail to present a higher degree of clarity. It is not sufficient to just detail what is needed, but to move from the practical to the applicable realm one must be offered means to successfully reach the end. It cannot be assumed that one program will be suitable for all cities attempting to implement or redefine a TOD system, but there are some basic methods that can be suggested to determine which method will work best in a particular location.

In addition, the 10 principles will be further defined and reviewed, initially on a broad scale that pertains to transit oriented development in general. In Chapter 5 these same principles will be made specific to the Ambassador Way transit station.

CHAPTER 3

DESIGN OF STUDY

The methods used to gather relevant information pertaining to TOD include reviewing the current literature in many forms. This research will employ information obtained from the Internet, transportation journals, newspapers, transportation brochures and planning manuals as well as other forms of published literature. The World Wide Web was used to access historical articles, periodicals and other research databases relating to TOD. Phone calls were placed to various corporations related to TOD systems to request additional information and gain references to other locations providing TOD data. Electronic mail will be used to contact specific companies involved in TOD and to request additional literature or make further inquiries concerning previously obtained information. The research will specify TOD systems currently in existence and relate their level of functioning to the Ambassador Transit Station of Houston, Texas.

A survey was designed to gain further insight into the current view of transit representatives and other stakeholders. The survey composed of a battery of eleven items including some closed and open-ended questions; the survey is displayed in Appendix 1. The instrument was administered to local Houston transit officials. The results of the surveys assisted in formulating the recommendation portion of the research.

Principle Screening

All literature was evaluated for direct relevance to the research topic. The information that was pertinent to developing and detailing a complete picture of Transit Oriented Development was reserved. The data relating to TOD has become more prominent due to many areas generating various techniques to formulate projects. This data has been further reviewed and edited to retain valid information that can be related to the understanding of the Houston Ambassador Way Transit Station. Much of the data collected added validity to some of the most basic principles associated with any successful TOD. In addition, some unique characteristics were extracted from other sources in order to better compliment the presentation of the Houston Ambassador Way Transit Station.

Evaluation

Other forms of literature were received directly from established agencies. This information detailed business practices as well as expounded on methods used by current transit system. The data published in journals hold a certain level of credibility due to the mandated publication procedures. Information obtained from the Internet is not usually held to the same level of credibility. The majority of the data obtained from the Internet was compared to other resources to further substantiate the information, however, in some cases the validation was not viable.

All of the aforementioned sources were used to obtain data. Upon concluding the screening and evaluation process the information gathered was used to list and detail the principles of a successful TOD. New concepts were also derived by combining portions of preexisting transit stations and considering more specific needs of the Houston Ambassador Way Transit Station. The final component of the research will be obtained from a survey that will specifically inquire of needs and goals of stakeholders interested in the Ambassador Way TOD. Results are detailed in the recommendations portion of the research. Specific tasks are as followed:

Task 1-Literature review

Task 2-Identify variables associated with successful TOD

Task 3-Identify short list of successful TOD to establish a baseline against which the Ambassador Way station can be compared

Task 4-Gather data regarding land use, such as parking and development ratio

Task 5-Apply data results to proposed Ambassador Way station

Task 6-Conduct interviews of professionals knowledgeable of TOD and Ambassador Way

Task 7- Synthesize survey analysis and data findings

CHAPTER 4

RESULTS AND ANALYSIS

Principles of Transit Oriented Development

Convenience, design and mixed-use communities that are pedestrian and cyclist friendly are the factors that lure residents to live near a TOD system. Accessibility to employment, municipal buildings, and other desirable uses also play a significant role in attracting residents to these areas. However, it is essential to consider the level of residential density, service and retail availability, proximity of civic and municipal buildings as well as, entertainment, recreational uses, and frequency of bus and light rail connections. Humphreys (2004) explains that the ability of TOD to achieve its social and economic goals depends on people changing their behavior.

Proponents of TOD agree that transit can serve to revitalize older neighborhoods and bring about redevelopment to curb overcrowding in other areas:

Advocates of TOD such as Michael Bernick and Robert Cervero argue that TOD can be a catalyst for urban redevelopment in older neighborhoods. They assert that ‘by creating better quality neighborhoods in areas with superior transit services, private investors will return to these areas, putting them on the road to financial recovery.’ In fact, such neighborhoods may even be more suitable to TOD than those built at a distance from urban centers. According to a 1980 study of older TOD-like neighborhoods in the San Francisco area, residents took 17% fewer auto trips per household than residents of new suburbs, and significantly more walking, biking, and transit trips. Calthorpe explains that some of the advantages held by traditional neighborhoods are their design features, such as compact layout and grid-patterned streets, their lower average household incomes, better transit service, and greater proximity to the central business district (Humphreys, 2004).

Qualitative Principles

In order to more effectively review the ten principles of a successful Transit Oriented Development system, the principles have been categorized in a basic manner. The primary activities deal with planning and development. This is the initial process by which stakeholders participate in (1) Creating A Vision, (2) Making Retail Development Market Driven, Not Transit Driven, (3) Building A Place, (4) Making Buses A Great Idea and (5) Encouraging Living Around Transit. These variables can be defined as qualitative principles because they refer more to techniques used to encourage TOD and they are not numerically measurable factors.

Create A Vision. A vision can provide a vital foundation for planning development around transit. The vision must recognize community potential and the active economic, political and environmental limitations. To successfully meet this criterion, the vision must be future oriented, able to be implemented, flexible and inclusive of all stakeholders involved in the development.

According to Peers (1999), although the vision is in part a collaborative effort, the bulk of the formulation of the vision is the responsibility of the planner. Many planners hope to build new areas, different from the recent pattern of suburban sprawl. They wish the communities to be richer, and better models of development that are not so auto dependent. The author continues by suggesting that communities revert back to times when commercial, residential, retail and open space were within easy walking or short driving distance from each other. This is an ideal type of vision that will more than likely be met with serious limitations. Most residents have become use to the daily routine of using their automobile to reach destinations and many areas are constructed as such. It is difficult to revamp existing communities and change the mindset of residents due to the normalcy that is associated with non-TOD areas. Most planners are forced to work within the confines of previously developed areas. This illustrates the importance of having flexibility when incorporating a vision. The vision of a TOD system must take into account the concerns of the community, meet the code of the city general plans, and make economic sense to the land developers and their bank supporters.

Make Retail Development Market Driven, Not Transit Driven. The focus of retail development as market driven rather than transit driven should lay a foundation for a high level of success. Many times during the formulation of TOD systems planners and developers become consumed with the task of devising a format for promoting the transit system. This can cause a lack of attention to properly arranging a market that is beneficial to the community. The premise should be that those who utilize the transit system to frequent retailers would choose to do so even if it were not conveniently available on the transit line. In order for this principle to be implemented, community input and research are the key elements. Research needs to be done to note the types of venues the community most often frequents. In addition, it is important to note the type of venues that are not frequented, to determine why the community may prefer one type of retail offering to another. It is also imperative to note the demographic composition of the community. This will provide guidance about if the market should cater to single-family homes, professional workers, children, or any other type of category that may dominate the particular market area.

Build A Sense of Place. When developing models of how to build a place centered around a transit system, planners and developers must focus on the physical attributes of the TOD, as well as the level of functionality and efficiency. The core of this principle is rooted around creating destinations that are economically and culturally beneficial. This included focusing on partnerships, land development, and community variability. In the stages of assessing and planning for TOD it is imperative to promote the development of multi-purpose buildings whose uses can be adapted over time. This same flexibility should also be a part of the network of streets and blocks (Patti Banks & Associates, 2001). This type of future oriented planning is important when factoring flexibility into any TOD system.

According to the Urban Land Institute, a major new transit station in a community should contribute more than the transit presence. It presents an opportunity not only for a project at the station, but for a full-fledged transit-centered community, with all the attendant economic and cultural benefits” (Dunphy, 2003). They suggest that this can be achieved by the following.

- ◇ Locating the transit stop at the center of the neighborhood rather than on its periphery. The new station will connect an entire regional transit system to the surrounding community, and its location should reflect the centrality of its role.
- ◇ Designing and positioning the station to foster the creation of an activity center that surrounds the station on all sides.
- ◇ Ensuring that the design of the station is of high quality and reflects the character of the surrounding community.
- ◇ Including engaging public spaces, attractive street furniture, and public art. Public space is important in the creation of place; among other things, it allows for events such as concerts, markets, exhibits, and celebrations—events that bring people and vitality to the area and stimulate economic activity.

Being mindful of these few suggestions will assist in building a place that is inviting to residents, tourists and the overall community.

Make Buses a Great Idea. Most businesses, retail markets, jobs and schools are structured to be accessed via an automobile. Because of this trend, the task of inspiring the community to increase transit ridership is a task that must be skillfully addressed. One important component is the appearance of the buses and shuttles. Buses and shuttles should be clean, attractive, fast, reliable, and provide a comfortable ride.

The vehicles should have many stops, schedules and other available information clearly visible throughout to ensure that riders know when service is available. Care should be taken to avoid buses and shuttles appearing as last resorts; they should be inviting and offer convenience with the utmost in courtesy from the drivers and staff.

The buses should serve a large portion of the community, including some choice riders who have cars (Riggs, 2003). Appealing to this class will address the stigma that is usually associated with public transportation. In order for buses to not be viewed as “a last resort”, there has to be an alteration in the perception on the part of the community and a change in the presentation of the services rendered by the provider.

Encourage Living Around Transit. This component of the TOD system plays an integral part in the planning and developmental process. The system should be structured in a manner that is not only pleasing to the sight, but alluringly livable. The community should be drawn to the area surrounding transit systems to shop, participate in recreational activities, complete errands and also be encouraged to live. Efficient planning strategies that incorporate these types of amenities should also include features such as awning, articulated facades, and street front display windows. In addition, motorists are accommodated through appropriately scaled streets and parking facilities that are placed on-street and behind building (Patti Banks & Associates, 2001).

Quantitative Principles

Encouraging businesses and stakeholders to operate in concert with one another is key in obtaining desired goals. Both public and private sectors share in their responsibility of ensuring that the land development will be ready, available, and properly financed. Another business partner is the retail venues. It is pertinent in creating TOD, that the focus is not solely placed on the transit component. The types of venues made available to the community must be desirable enough so that they are frequented out of initiative, not by default. These are a few of the considerations that must be addressed by TOD stakeholders (or participants) in order to foster a productive TOD.

The principles that refer directly to the measurable factors of the TOD system have been categorized as quantitative. They have been defined as such because specific numbers can be affiliated with their implementation process. This ranges from the square footage of developed areas to the number of parking locations that should be made available when designing a TOD system. These remaining principles culminate the facets that are integrated in the formulation of a successful TOD system.

Apply Potential Partnerships. Partnerships make use of the expertise that all concerned groups and organizations possess. The two most commonly are formed by the public and private sectors. Transit authorities contribute knowledge about how the rail lines actually work as well as a level of experience concerning station designs that work best for TOD. The public sector may have the power to resolve land-assembly problems and influence neighborhood actions and reactions to proposed projects.

On the other hand, private developers bring a wealth of knowledge of real estate and sales experience (Stainback & Simril, 2001). Sales experience is invaluable in getting a community to accept proposed developments and in garnering support from the local chamber of commerce and city council to pass ordinances concerning development around stations. It is essential to balance partnerships in order to efficiently implement a TOD system. The balance comes from an equitable sharing of the responsibilities on the part of private and public sectors. One partner may have the knowledge and experience needed to efficiently address a TOD plan, while the other has the economic wherewithal to make the plan materialize. Each plays their own distinct role, but must work collectively to implement a successful system.

Transit agencies subsidize transit use; they do not concentrate on real estate as an area of specialization. Merging the two components, transit and real estate, is how the public/ private partnerships would be initiated. According to Stainback & Simril (2001) since the public partner has made the effort and investment to finance, design, construct and operate the transit rail or bus system, consequently they must be part of any team finance and develop any commercial development adjacent to the transit. The authors explain that in most cases the private sector has the development, construction, and finance expertise to get the TOD project constructed. A balance must be achieved and no one sector is independent; there is a sense of interdependency that must be achieved.

Think Development When Thinking About Transit. It has been proven that higher densities lead to an increase in ridership. Increasing the density of an area should be viewed from both the residential and retail aspect. Mixed-use centers are an example of making a vast amount of features available in a concentrated amount of space. It is important that an increase in density does not constitute a look of clutter. In fact, when developing a TOD system the structures most often enhance the appearance of the community.

The feature of higher density also offers an opportunity to cater to many different types of community members. When developers construct mixed-use centers that accommodate more of a variety of people this increases the frequency of visits to the areas. Figure 4 displays an example of this type of area.

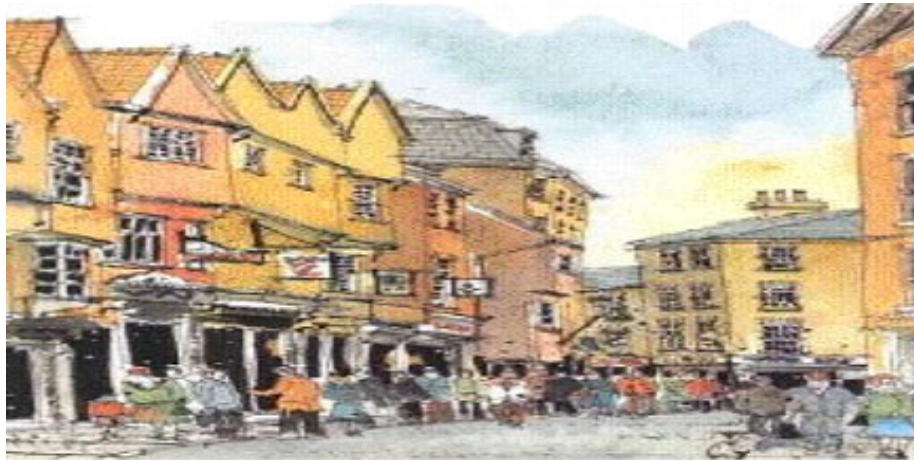


Figure 4. High Density Model
(Patti Banks & Associates, 2001)

This principle ties in very closely with the ideology of encouraging living around transit systems. A community that is constructed with the goal of accommodating its residents while making alternate forms of transportation available will significantly influence the population of the surrounding area to become and remain active transit riders.

Disperse Mix Uses. Encouraging people to live in TODs is essential to the success of the TOD system. Transit thrives in areas of mixed use neighborhoods and communities where streets are accommodating to pedestrians and cyclists. Developing existing and new residential areas that offer the residents a mass of diversity ultimately determines the success of the TOD. Niles (1999) furthers this principle by writing that denser residential development within an easy walk of a TOD center and transit station will generate walk trips. In some cases, these trips may substitute for vehicle trips. He argues that for work trips, regional success is linked with density on the origin and destination ends. At least a few concentrated employment centers served by

transit are needed to attract significant numbers of commuters. Mixed use is a key factor in decreasing dependence upon vehicle ownership as the preferred or only means of transportation in urban areas.

Another researcher notes that the mix and density of land uses is also an important tool in the creation of places where people can have mobility without an automobile (Patti Banks & Associates, 2001). The researcher goes on to include the notion that in order for mixes of land uses to be most beneficial they must be complementary, which will encourage trip interaction. In addition, an integrated land use mix can foster different activities all throughout the day. This variability will enable parking facilities to be sized in manner that is not hostile to the pedestrian or transit customer. The idea should be that if someone has to drive their automobile to reach their destination, then they should only have to “park once” in order to complete specified tasks (Patti Banks & Associates, 2001).

Clustering allows a number of retail businesses to operate under the same roof, but still offer diversity. Recent initiations include stacked entertainment zones that may include restaurants, movie theaters, arcades, clothing and shoe stores, food courts, skating rinks—ice and roller—art galleries, and health spas or fitness centers. Amassing a number of different retailers under the same roof not only offers convenience for consumers but allows other retailers to take advantage of business generated from high traffic flow from other retailers within close proximity (Nelson, 1999).

Engage Corporate Attention. This principle requires the TOD system to market itself to potential partners. If success has been shown in other, similar areas having an operational TOD will make the task less cumbersome. Some businesses may be reluctant to invest in something that has not been proven and is not able to be precisely measured prior to implementation. It is in these instances that extra incentives may be offered to potential partners. These incentives may include certain tax breaks or offers to promote the business in transit brochures or stations.

Attention can be also gained through marketing strategies. If a TOD system is being incorporated into a previously designed area with established businesses, transit officials may opt to purchase gift cards from the retailers and distribute them to riders. This is just one of many techniques that can be used to gain favor with any reluctant partner. It is essential to help businesses understand that a collaborative effort could reap significant benefits for all stakeholders, not to mention economic factors. The fiscal component, namely profits, always seems to attract, would be, reluctant businesses. Research should be done to predict profit margins and the future economic opportunities. The ultimate idea of this principle is to have businesses lobbying for an opportunity to be an integral part of a TOD system.

Get a Hold on Parking. The principle of parking concerns and adequately regulating the issues often associated with it are active points of discussion. Parking structures and shared parking lots are both ways to reduce the amount of space occupied by parking facilities. In a progressive TOD system the parking facilities should be designed to occupy less space, while not compromising visual appeal. The structure should be able to “blend into the streetscape” (Patti Banks & Associates, 2001).

Some cities have manipulated their TOD system to incorporate novel ideas. Portland, Oregon, Boulder, Colorado, and Santa Clara Valley, are a few places that have introduced limits on parking. They have instituted limits on parking in the last few years, trying to control the problem of overcrowded parking garages, congested streets, and air pollution (Millard-Ball, 2002). Millard-Ball discusses how Cambridge, Massachusetts has radically changed its requirement from merely designating a maximum number of parking spaces and instead mandating a reduction of 10% in the number of parking spaces to help reduce the amount of parking available for motorists. This type of methodology makes transit services more appealing than vying for limited parking spaces, which in many cases require a fee for usage.

Another method used to curtail the required parking is the area of shared parking. The idea of shared parking can reduce parking facility costs, as well as aesthetic and environmental impacts, and allows greater flexibility in facility location and site design, and encourage more efficient land use (Transportation Demand Management Encyclopedia, 2004).

Table 1 shows that shared parking can assist in regulating some financial, environmental, and land use efficiency issues. This form of planned parking operations detail specific objectives that will foster some of the needed productivity within the TOD system.

Table 1. Benefits Summary of Shared Parking

Rating from 3 (very beneficial) to -3 (very harmful). A 0 indicates no impact or mixed impacts.

(Source: Transportation Demand Management Encyclopedia, 2004)

Objective	Rating	Comments
Congestion Reduction	0	Depends on parking cost and land use impacts.
Road & Parking Savings	3	Can provide significant parking facility savings.
Consumer Savings	2	Can provide savings to consumers.
Transport Choice	0	Depends on parking cost and land use impacts.
Road Safety	0	Depends on parking cost and land use impacts.
Environmental Protection	2	Reduces paved area.
Efficient Land Use	2	Allows more clustered land use.
Community Livability	2	Allows more clustered land use.

Table 1 shows that road and parking savings is rated the most beneficial of all objectives considered in sharing parking. This would infer that there could be a massive saving if shared parking facilities are properly utilized. Other factors like reducing congestion, transportation choice, and road safety are not as directly affected by sharing parking.

Another factor that must be sufficiently planned, when, implementing a TOD system is the parking. As one of the principles states, getting a hold on parking is essential and there must be adequate preparation put into devising such plans. The initial stage is to assess the area and determine the parking occupancy rates and park demand (Transportation Demand Management Encyclopedia, 2004). Table 2 displays the percentages of the need for parking are compared in

relation to time and location. This can offer suggestions on how to develop shared parking facilities. There is an indication of when specific activities mandate available parking.

Table 2. Parking Occupancy Rates
(Source: Transportation Demand Management Encyclopedia, 2004)

Uses	M-F	M-F	M-F	Sat. & Sun.	Sat. & Sun.	Sat. & Sun.
	8am-5pm	6pm-12am	12am-6am	8am-5pm	6pm-12am	12am-6am
Residential	60%	100%	100%	80%	100%	100%
Office/ Warehouse /Industrial	100%	20%	5%	5%	5%	5%
Commercial	90%	80%	5%	100%	70%	5%
Hotel	70%	100%	100%	70%	100%	100%
Restaurant	70%	100%	10%	70%	100%	20%
Movie Theater	40%	80%	10%	80%	100%	10%
Entertainment	40%	100%	10%	80%	100%	50%
Conference/Convention	100%	100%	5%	100%	100%	5%
Institutional (non-church)	100%	20%	5%	10%	10%	5%
Institutional (church)	10%	5%	5%	100%	50%	5%

Analyzing this type of data allows for strategic development of the role-players. This will allow developers to predict the fluctuation of ridership and adjust transit schedule times to coincide with demand. At Lindbergh City Center (Atlanta, GA), for instance, BellSouth Corporation plans to build satellite parking facilities at four MARTA rail stations (Transportation Demand Management Encyclopedia, 2004). Again, this is not a sure means for expediently decreasing auto usage, but it does set the foundation for the following future goals:

- The parties providing the parking may benefit by replacing high cost on-site parking with lower cost off-site parking. If no more on-site parking can be built, they may have to do this. It is primarily a mechanism to manage on-site supply and demand.
- Neighbors adjacent to the TOD can benefit when the satellite parking provides a good alternative to local spillover parking.
- Parking users will benefit if the overall service quality and cost of the parking/transit option is better than the on-site parking (e.g., travel times from the remote parking are comparable or reduced).

Review of Implemented TOD Systems

The Ambassador Way station will be evaluated and compared with two TOD systems, the Lindbergh station and the Bethesda Station. This comparative analysis will be based on development ratio and will offer some suggestions and insight on the methods that should be used.

MARTA (Metropolitan Atlanta Rapid Transit Authority)

The Lindbergh City Center is located in Atlanta Georgia, on land owned by the MARTA Transit Authority. At MARTA's second-busiest station, the site surrounds the Lindbergh MARTA station and headquarters. The center is within a mile of the most favorable offices, residents, and the retail district of Buckhead. An image of the location is shown in Figure 5.

The task of defining the location and route of the station was strategically done by city planners. Atlanta city planners and developers recognize the need for improved city planning in anticipation of future land needs and have taken a proactive rather than reactive approach to accommodate the city's growing population. Consequently, Atlanta has placed priority on using joint development efforts to create transit-supportive development in station areas. The Lindbergh Center is a product of public-private



Figure 5. Lindbergh Location
(Source: Transit Oriented Development, 1999)

collaboration. MARTA the transit authority is the landowner and the principal long-term tenant is BellSouth Corporations. In 1999, the Atlanta-based telecommunications corporations announced that the company would close its scattered suburban offices and merge 10,500 employees at three locations on the MARTA rapid rail system. Partnerships with various agencies and developers allow Metropolitan Atlanta Rapid Transit Authority (MARTA) to improve connections and plan for future connections as growth demands.

To better prepare for these anticipated needs, Atlanta created a TOD system that would help alleviate the problem before it became a problem—created a vision and implemented it. Change is inevitable and planners and developers must anticipate these changes and try to plan to accommodate them. In studying MARTA (Metropolitan Atlanta Rapid Transit Authority), the case study of the Peachtree Corridor shows:

The Atlanta metropolitan area has been booming in recent years, and this strong regional market has helped spur development around some rail stations as well as throughout the region.

The region has been growing at about 3 percent per year, adding 100,000 residents each year and one million each decade...the region has experienced high growth rates in population and employment for more than three decades...As traffic congestion and air pollution worsen in the region, MARTA may become a more attractive alternative for commuters and for employers trying to bring workers from around the region [Transit-Oriented Development (TOD), 1999].

MARTA is modeled after the Toronto light rail lines development as it has many high-rise, high-density residential structures around the stations (Transit-Oriented Development, 1999).

WMATA (Washington DC Metropolitan Area Transit

The core of the Bethesda station is located within the town center. The site is considered one of the largest commercial centers in Montgomery County (Figure 6). And is the product of joint development. The station is utilized by commuters who not only work in the District, but also those that commute to Bethesda from the District and other parts of the county (Washington Metropolitan Transit Station, 2003). This open accessibility to a larger variety of riders has been a major factor in the transit station's success rate. The goals of the station include the following: (Washington Metropolitan Transit Station, 2003)

- Promote Transit Oriented Development (TOD) by giving priority to Joint Development proposals which contain the following smart growth development principles; reduce automobile dependency; increase pedestrian/bicycle originated transit trips; foster safe station areas; enhance surrounding area connections to transit stations, including bus access; provide mixed uses development, including housing in compliance with local regulations; and the opportunity to obtain goods and services near transit stations and offer active public spaces;
- Attract new riders to the transit system by fostering commercial and residential development projects on WMATA owned or controlled land and on private properties adjacent to Metro stations;
- Create a source of revenue for the Authority to operate and maintain the transit system by expediently negotiating joint development agreements between WMATA and public or private development entities; and
- Assist the WMATA local jurisdictions to recapture a portion of their past financial contributions and to continue making subsidy payments by expanding the local property tax base and adding value to available local revenue.



Figure 6. Bethesda Metro Center
(Source: Transit Oriented Development, 1999)

All of these goals must begin with the primary qualitative component of creating a vision. A clear vision is essential for any plan to be worthwhile and to understand how future trends and changes will alter that vision. When the need for change presents itself, safeguards will be in place to address these needs and allow the system to continue without interruption of service. The Washington DC Metropolitan Area Transit Authority (WMATA) began operation in March of 1976 and has opened extensions every 2-3 years to expand the availability of the transit lines. As of 1999 the line extended 92 miles and included 75 stations on five separate lines; however, recent extensions planned for completion in 2003 expanded the line to 103 miles and includes 83 stations. The data shows an average ridership of 550,000 passengers as of 1998 and an ever-growing ridership, which necessitates the expansions to fully supply the increasing demand for transit (WMATA, 1999).

Another factor used by WMATA was to include all stakeholders with vested interests in the initial proposal. These stakeholders range transit authorities to local and regional county councils and chambers of commerce, land developers and planners, and residents of the communities. Each phase of the project was carried out smoothly because all parties were aware of what was at stake and were allowed to offer some insight. Naturally the input should deal with the individual groups' areas of expertise so that the knowledge offered is accurate and usable. A close working relationship should be maintained between transit and public officials who have direct authority over the regulations and policies, which will impact the proposed project. The Washington DC Metropolitan Area Transit Authority (WMATA) offers a clear example of the need to work closely with local and regional public agencies:

The proliferation of jurisdiction in the DC area has compelled WMATA to establish a comprehensive joint development program to work with local jurisdictions for station area planning. Although WMATA has the authority to develop land directly, unlike BART (Bay Area Regional Transit, California) or most other commuter rail operators, it is still dependent on local jurisdictions for supportive land use policies (Transit-Oriented Development (TOD), 1999).

Summary of an Efficient TOD System

A successful TOD system must be one that carefully considers and plans based on the previously mentioned principles. As noted, the system is based on an integration of these principles. This creates the foundation on which a system may be built. Additional features, as suggested by smart growth philosophies and the new urbanism movement will also cater to developing an efficient TOD system. The system should promote walking and transit riding while offering a sufficient number of alternative locations for the community (Hondrop, 2000).

Retail venues must offer a certain level of diversity to maintain long-term success. All stakeholders must do their part in order for the system to operate successfully. It is imperative that the system is inviting to the community. Even when presented with an option of alternative means, a system should be so alluring that riders will choose transit over other modes of transportation. The transit system should not only be viewed as convenient, but rather a pleasure. This will call for effective planning and development that must utilize the data compiled by researchers while keeping community needs in the forefront of the TOD process.

In order to better compare and detail the features of specific transit stations that are currently functioning a Matrix was devised (Table 4). The matrix displays TOD land use attributes for the previously detailed stations, namely Lindbergh Center Atlanta, Georgia – MARTA, Bethesda Metro Center Washington D.C. Metro—WMATA. Some of the variables included on the matrix are transit service frequency, residual units and the number of specific venues available in each city.

Table 3 shows that both stations have been developed in suburban areas, with Bethesda being the oldest station established nearly fourteen years prior to the Lindbergh station. The Bethesda station also has a higher frequency of trips made during both peak and off peak intervals.

Table 3. TOD Land Use Attributes Matrix

Stations	Lindbergh Center Atlanta, Georgia -MARTA Phase I Characteristics	Bethesda Metro Center Washington D.C. Metro WMATA
<i>Description</i>	Suburban	Suburban
<i>Location</i>	Piedmont Road and Lindbergh Drive, City of Atlanta	West Side of Wisconsin Ave. @ Montgomery Lane, Bethesda
<i>Project Timing</i>	1998	1984
<i>Primary Transit Mode</i>	Heavy rail and bus	Heavy rail and bus
<i>Transit Service Frequency</i>	<ul style="list-style-type: none"> • 4 minute peak hour service to downtown • 8-minute service to other locations. • 9 Bus routes - 8 to 32 minute peak hour service. 	<ul style="list-style-type: none"> • 2 ½ minutes peak Hour (each direction) • 6 minute off peak
<i>Residual Units</i>	<ul style="list-style-type: none"> • 388 condominium units • 566 apartment units 	1,000 units
<i>Sq. ft. Retail</i>	330,000 SF	60,000 SF
<i>SF. Office space</i>	<ul style="list-style-type: none"> • 200,000 SF (MARTA Headquarters office building) • 1,000,000 SF BellSouth Corporation 	370,000 SF
<i>Hotel</i>	190-rooms	380-rooms
<i>Restaurants</i>	330,000 SF	XXXXXX
<i>Entertainment</i>	Movie Theater (sq ft. not available)	XXXXXX
<i>Defining Project</i>	51 Acres	XXXXXX
<i>Parking Standards</i>	Y	N

Other data referring to Table 3 include Lindbergh having an excessively larger retail space by approximately 270,000 square feet. The Bethesda station has a larger number of hotel rooms available to patrons.

The structure of the land use for the Lindbergh station is displayed in Figure 7. The Figure shows the concentration of the mix-use centers. Incorporating residential areas, business offices, retail stores, and available parking has allowed this station to experience a high level of success.



Figure 7. Lindbergh Land Use
(Source: Transit Oriented Development, 1999)

The Bethesda station is similar in that it has made an effort to create high-density environments as well. Figure 8 shows the structure of their land use. The Figure depicts several business offices, hotels and a residential community.



Figure 8. Bethesda Land Use
 (Source: Washington Metropolitan Transit Authority, 2003)

The parking attributes of the same stations were also compiled for evaluation. The search for data pertaining to the Bethesda metro center did not yield any relevant data that would assist in defining and reviewing parking attributes. The results are displayed in Table 4. Items that are included on this table address the TOD parking ratios as well as the methods used to develop the parking ratio.

Table 4. Parking Attributes

Stations	Lindbergh Center Atlanta, Georgia --MARTA Phase I Characteristics
<i>Parking Characteristics</i>	Phase 1 - 5,907 spaces in five parking decks (projected)
<i>Parking Ratios: Standard:</i>	<ul style="list-style-type: none"> • 3.3 spaces per 1,000 square feet of office space • 5.0 spaces per 1,000 square feet of retail space • 10.0 spaces per 1,000 square feet of restaurant space • 1.0 space per apartment bedroom • 1.0 space per condominium bedroom • 1.0 space per hotel guest room, plus 0.5 space per employee

<p><i>TOD Parking Ratios</i></p>	<ul style="list-style-type: none"> • MARTA HQ - 1.0 parking space per 1,000 square feet of office space • BellSouth offices - 2.34 spaces per 1,000 square feet • Speculative office space - 2.67 spaces per 1,000 square feet • Retail/restaurant space - 3.7 spaces per 1,000 square feet of floor area • Condominiums - 1.85 spaces per residential unit • Apartments - 1.0 to 1.5 spaces per residential unit • Hotel - 0.5 spaces per guest room
<p><i>Method used to develop TOD parking ratio</i></p>	<p>As part of the zoning development, there was an extended facilitated negotiations that included MARTA, its selected developers, City of Atlanta Planning, and representatives of five, surrounding residential neighborhoods</p>
<p><i>Creative Parking Strategies</i></p>	<p>BellSouth proposes to build satellite-parking facilities. Certain areas of the parking decks allow shared parking among retail customers, office and retail employees, and other visitors to the complex, and transit patrons from surrounding neighborhoods bound for other destinations. A shuttle van service is also provided.</p>

The above Table displays methods used by developers of the Lindbergh station that allows for efficient means of controlling parking. One method is by the development of a parking facility that has 5 tiers and is constructed to be utilized for shared parking. For customer convenience a shuttle service has been incorporated into their system, which should prove to encourage the community to utilize the mix use centers.

The TOD system must be rigid enough to sustain the implementation process, but maintain its flexibility when faced with unforeseen obstacles. This can be done through a constant evaluation of the system based on not only ridership, but satisfaction of services and options made available to the community. The structure of the facilities must be appealing while maintaining their efficiency of meeting consumer needs. More specific features that relate to the design of TOD systems are listed in Table 5.

Table 5. Major Design Features of Transit Oriented Development

◇ Continuous and direct physical linkages between major activity centers; siting of buildings and complementary uses to minimize distances to transit stops.
◇ Street walls of ground-floor retail and varied building heights, textures, and facades that enhance the walking experience; siting commercial buildings near the edge of sidewalks.
◇ Integration of major commercial centers with the transit facility.
◇ Grid-like street patterns that allow many origins and destinations to be connected by foot; avoiding cul-de-sacs, serpentine streets, and other curvilinear arrangements the create circuitous walks and force buses to meander or retrace their paths; direct sight lines to transit stops.
◇ Minimizing off-street parking supplies; where land costs are high, tucking parking under buildings or placing it in peripheral structures; in other cases, siting parking at the rear of buildings instead of in front.
◇ Providing such pedestrian amenities as attractive landscaping, continuous and paved sidewalks, street furniture, urban art, screening of parking, building overhangs and weather protection, and safe street crossings.
◇ Convenient siting of transit shelters, benches, and route information.
◇ Creating public open spaces and pedestrian plazas that are convenient to transit.

Lastly, for simplification purposes Table 6 displays the five qualitative principles that have been examined. The table shows if the specified station met the criteria, where applicable, of the principles suggested by the ULI.

Table 6. Stations Reviewed Relating To Principles

Principles	Evident in Lindbergh Center	Evident in Bethesda Metro Center
Applying Potential Partnerships	Yes	Yes
Think Development When Thinking about Transit	Yes	Yes
Disperse Mix Use	Yes	Yes
Engage in Corporate Attention	Yes	Yes
Get a Hold On Parking	Yes	NA

Stakeholder Perspective

In order to gain more insight into the views of a TOD system and specify its features to the Ambassador Way station, a survey was administered to area officials knowledgeable about TOD or development near Ambassador Way (Appendix 1). The survey was initially distributed to four individuals, but only three responded. One respondent represented development along Post Oak Boulevard, the others represented agencies knowledgeable about TOD nationwide. The first part of the survey was composed of closed ended items and respondents were asked to select from the lists presented. In some instances respondents were asked to elaborate on items selected. The results of the survey, in conjunction with consideration shown to the literature reviewed an excellent foundation to assess and plan for the Ambassador Way station.

All respondents indicated that they believe that Houston is ready for the new building concepts that would be implemented regarding TOD. There was also a consensus on the reason why Houstonians are prepared for the TOD. Reasons indicated were that the community desires a better means of living, working and participating in recreational activities. Other reasons given include the convenience of the mixed land use and the centralization capabilities. The survey respondents also confirmed that TOD should be used to address the land use efficiency and the public infrastructure issues near the proposed Ambassador Way station. Similarly, the kinds of uses specified that would be preferred were upscale shopping facilities, health clubs, entertainment facilities, hotels, offices, schools and more affordable multi-family residences.

In reference to promoting the Ambassador Way station one survey respondent believed that the city should provide planning support, offer financial subsidies, and help with citizens becoming involved in shaping intersection development. One survey item asked the respondents to indicate how they thought the TOD system should be marketed to developers, elected officials and the community. One respondent replied that developers should be marketed to by offering them a combination of incentives through city policies. In addition, the private sector may be more inclined to participate if they were involved in the planning process and allowed to communicate their needs to promote specific types of development. The other respondent indicated that developers should be shown a return on their investment and there should be a reduction in their capital cost needed for development. In reference to elected officials, it was suggested that there be a more efficient use of the infrastructure and an increase in property tax and sales tax revenue. Respondents agreed that in order to make TOD more marketable to the public at large, should be given the opportunity for a better way of life, which could be offered by increasing mobility and lifestyle choices, while offering more services and job opportunities.

The second portion of the survey was composed of open-ended questions. Respondents were asked to list three preconceived prejudices that were deemed to be a hindrance to the TOD at the proposed intersection. One survey respondent indicated that no one uses transit, which would seem to infer that there might have to be extra incentives established to alter the mindset of potential riders.

One survey respondent believed that the community's perception that higher density creates more congestion would be a factor as would pedestrian access and lastly, perhaps the station would not reflect the values of the community. Both respondents replied that

development opportunities for the public and private sectors would be an attractive venture. One respondent further elaborated by indicating that these sectors would have the common goal of making the community more livable. Another suggestion that was offered to develop creative partnership opportunities was to offer financial incentives and generate community support to maintain effective partnerships. Variations in responses were found in the question asking respondents to specify any potential limitations that may hinder the development of the Ambassador Way station. One respondent believed that there were no limitations because of the value of the property and the location of the mix use area. Another respondent believes that the market is driven by development not transit and adds that the area must be able to draw customers without heavily relying on ridership for success. The final survey question asked respondents if there were any other issues that should be addressed in the planning process, one respondent indicated no, while the other suggested that there has to be an encouragement of more pedestrian activities and a balance of land use that addresses parking.

The Proposed Ambassador Way Transit Station

In order for the Ambassador Way transit station to properly serve the community and corporate stakeholders there must be a consensus of the processes of TOD. The METRORail that is currently operating in the downtown area offers a basis for the planning process. Houston has been exposed to METRORail system and is becoming more familiarized with its offerings. This visibility can only boost the estimated ridership for the Ambassador Way location.

Community input must be sought in order to accommodate the need of residents and consumers. This is perhaps, one of the most significant principles to be considered. An integration of the remaining principles should prove to be advantageous. The Ambassador Way station will be located near the Uptown/Galleria area, which an extremely high traffic area. The visibility is also great because it is not too distanced from the downtown area and is centrally located, in the city. This offers an opportunity for promotions and solicitation of potential developers. Forecasts of population and employment for the year 2025, set by the Houston-Galveston area Council (H-GAC), suggest that the Uptown area will capture a strong quantity of future regional economic growth, leading to increasing population and employment densities within the area. Currently the Ambassador Way and Post Oak intersection has approximately 23 acres of potentially developable land. The current land use composition within a quarter mile of study station is listed in Table 7:

Table 7. Ambassador Way Land Use Today

<i>Defining Project</i>	23 Acres
<i>Residual Units</i>	<ul style="list-style-type: none">• 230 apartments units• 351 condominium units
<i>Sq. ft. Retail</i>	330,620 SF
<i>SF. Office space</i>	290,545 SF
<i>Hotel</i>	126 room

It is important that the TOD system not only be attractive, but it should serve the purpose of reducing traffic, improving air quality and promoting a sense of community. Figure 9 is an example of a form of beautification that may not be as efficient as possible.



Figure 9. Uptown Houston

(Source: Transportation Demand Management Encyclopedia, 2004)

Houston’s Galleria area is located in uptown area (Figure 10). This demonstrates the urban environment the city has integrated into its community and is also centrally located to the downtown area. “This unique place weaves a thriving business district, acclaimed retail stores, luxury hotels, condominium and apartment towers, prestigious residential neighborhoods” (Transportation Demand Management Encyclopedia, 2004).



Figure 10. Ambassador Way Intersection

In addition the area is composed of “high-rise offices and hotels, fine restaurants, and retail centers, such as the world-famous Galleria, host 200,000 office workers, shoppers, and out-of-town visitors daily.” These features are very appealing and they do offer a degree of convenience; however these do not incorporate the concern of adequate transit transportation and parking. These two principles have to be integrated into a model TOD in order for it to have a complete level of functionality. The Figure clearly displays lack of shared parking and parking garages available, in this particular area. The location of the Ambassador Way station will be in the Galleria area of Houston, Texas. The area has a high volume of traffic on a consistent basis. The location is composed of hotels, eateries and office spaces. Figures 10 display the current location of the intersection.

The transit in this area would allow access to the current mix-use facilities. It will be essential that marketing strategies be designed to increased ridership and assist in addressing the traffic congestion problem in this area. Potential riders should be presented with an image that would offer more convenience and a higher quality of life.



Figure 11. Future Uptown Houston
(Source: Houston-Galveston Area Council, 2001)

TOD will bring many benefits to the city of Houston, particularly near the Ambassador Way Transit area. The vision that has been formulated for uptown Houston is shown in Figure 11.

In order to compare the for the Ambassador Way transit station to be effective, it must synthesize the features of previously implemented systems while maintaining enough flexibility to suite the community. The ten principles, as defined by the ULI, adequately suggest methods of strategizing a vision to be employed by the stakeholders in the TOD system. The literature provided also proposes methods of structural development. Means of devising an alluring transit system that benefit the community through variety, convenience, and affordability are also key elements in TOD. A combination of all of these factors, in addition to monitoring the system for effectiveness guarantees the success of the Ambassador Way transit station.

A review of the Bethesda Metro Center, Lindbergh City Center and the proposed Ambassador Way station development ratios (Table 8) reveals that for Ambassador Way to transition to a TOD it would have to imitate both Bethesda and Lindbergh stations attributes.

Table 8. Stations Review

	<u>Ambassador Way</u>	<u>Lindbergh City Center</u>	<u>Bethesda Metro Center</u>
<i>Defining Project</i>	23 Acres	51 Acres	X
<i>Residential Units</i>	<ul style="list-style-type: none"> • 230 apartments units • 351 condominium units 	<ul style="list-style-type: none"> • 388 condominium units • 566 apartment units 	1,000 units
<i>Sq. ft. Retail</i>	330,620 SF	330,000 SF	60,000 SF
<i>SF. Office space</i>	290,545 SF	<ul style="list-style-type: none"> • 200,000 SF (MARTA Headquarters office building) • 1,000,000 SF BellSouth Corporation 	370,000 SF
<i>Hotel</i>	126 room	190-rooms	380-rooms

CHAPTER 5

CONCLUSIONS & RECOMMENDATIONS

Houston, like many other heavily established cities, must increase transportation alternatives to encourage more urban living. prevent suburban gridlock. The incorporation of the city's existing bus and shuttles lines would greatly improve an upcoming TOD project. In particular, the Ambassador Way Transit station would benefit from reviewing standards set by existing TOD projects in other cities. In preparation for the anticipated rise in population in the Houston area, a clear vision must also be implemented which addresses the challenges Houston will face if it does not implement better land use policies. In order to develop and implement an efficiently operating TOD, with long-term benefits, a sharing of risks and responsibilities must be divided among all stakeholders. This includes the economic and community investments made by both public and private sectors. These groups must collectively work to create a market that would be able to withstand the range of diversity in community perspectives and opinions. Another component to be addressed is the balance between housing and the availability of jobs within the foundation of a TOD system. It is unwise to provide housing and recreational facilities, which force the community to commute an excessive amount to their destinations.

A review of the Bethesda and Lindbergh stations and the current development near the proposed Ambassador Way station shows the Ambassador Way Station would benefit from emulating characteristics from both stations. Based on the land use ratios of Bethesda and Lindbergh stations, one suggestion is for Ambassador Way to increase residential, hotel and office space. The increase in residential and employment development will offer a primary foundation for developing a plan to create a successful TOD system.

Reviewing and analyzing existing TOD systems proves no two stations are the same. The uniqueness of the stations creates a place, while simultaneously serving as a planning response conducive to generating reduced automotive tripmaking. How Ambassador Way's station area is planned and developed will depend on the particular attributes of that station and surrounding community. It is suggested that the inclusion of key design features such as continuous and direct pedestrian connections, a reduction in the amount of parking in the area, and pedestrian amenities to enhance the walking experience will be critical to the success of the proposed station. Another recommendation is for the Ambassador Way station area to balance the amount of space occupied by parking facilities. This can be accomplished by creating TOD parking standards, which reduce the amount of parking for motorists. Shared parking and parking structures are examples of strategies that can reduce parking facility cost and encourage more efficient land use.

The recommendation and suggestions of the survey respondents imply that Houston is ready for TOD. And through creative solutions or city incentives, involving neighborhoods, land owners, elected officials and the development industry, creating resourceful partnerships, encouraging more pedestrian activities and balancing land used for parking, TOD is a promising option for the area. These considerations, along with the principles delineated by the Urban Land Institute, will further assist in formulating and implementing an efficient TOD system at the proposed Ambassador Way station.

APPENDIX A

Transit Oriented Development Survey *Component of Data Source*

Please answer the following 11 questions. Your responses will be synthesized for incorporation into study findings. Your name will be listed along with others as a respondent, but not linked with individual survey responses.

1. How would you describe Transit Oriented Development (TOD)?

2. Houston is a largely automobile dependent city. With the addition of the light rail, the Ambassador Way transit station may be one of the many areas designed to be high density and mainly transit reliant. --Do you think Houstonians are ready for the new building concepts consistent with successful TODs such as mixed uses, compact development, and less parking?

Yes

No

If yes, why do you think this way?

If no, why do you think this way?

Single family housing desire is declining

People don't want to leave auto

Convenience of mixed use

Too hot in summer for walking

Convenience of central location

Banks will be reluctant to finance

Want better live, work, play environment

Developers don't want to lose parking

Other, describe _____

Other, describe _____

3. Should TOD be considered as a method to address the efficient use of land and public infrastructure adjacent to the proposed Ambassador Way rail station?

Yes

No

4. Do you think a TOD at the intersection will provide cultural and economic benefits to the surrounding community

Yes

No

5. Identify the top 5 kinds of uses you would like to see adjacent to the Ambassador Way TOD?

- More upscale shopping
- Health Clubs
- Drug store
- Affordable housing
- Entertainment facilities
- Daycare facilities
- Schools, Educational Institutions
- Grocery Stores
- Dry cleaners
- Hotels
- Other _____

6. In your opinion should the city have a role in promoting TOD at Ambassador Way? If yes, please rank (1, 2, 3) your idea of the City's function

- Provide planning support
- Help with citizen involvement in shaping intersection development
- Invest more in infrastructure
- Offer financial subsidies
- Educate to improve understanding of TOD benefits and limitations
- Revise building codes or other ordinances
- Create public-private partnerships

Comments are often the most important part of a survey. Please answer the following questions.

7. Name three (3) possible preconceived prejudices that might hinder TOD develop at this intersection.

1.

2.

3.

8. How would creative partnership opportunities help with the development of TOD?

9. In your opinion, how should TOD be marketed to:
Developers

Elected officials

Community

10. Identify proposed limitations of a potential TOD at Ambassador Way.

11. Are there other issues related to METRORail, along Post Oak that you feel need to be addressed in the planning process to make TOD successful at intersection?

Yes

No

If yes, please describe

APPENDIX B

Selected Transit Oriented Development Examples

DART (Dallas Area Rapid Transit)

The development that is being fostered near the Dallas Area Rapid Transit (DART) system has been defined as the Economic Development Program. “The two most highly visible components of the Economic Development Program are a development information packet and DART Rail Economic Development Conferences / Summits. These two major program items focus on dissemination of information to the development community” (Diaz and Porter, 1999). They have opted to raise their level of visibility while sharing pertinent information relating to the transit system as a means of promotion. The two programs have been designed to carry out the following responsibilities:

- 1)** Developer Information Packet- For stations along both the existing light rail lines and along planned future extensions, DART developed a detailed station profile. Each station profile includes a description of the station site, connection to transportation services, and the environment of the immediate station area. In addition the profiles contained detailed demographic information such as station area population, employment, and income. Most importantly for developers, the station profiles include a distribution of existing land uses and descriptions of potential development sites around stations. Furthermore, these station profiles highlight any zoning, financial support, and tax abatement.
- 2)** incentives associated with development sites. These station profiles highlight any zoning, financial support, and tax abatement incentives associated with development sites.
- 3)** Economic Development Summits- DART organizes these Economic Development workshops in active partnership with local municipalities and the local Chambers of Commerce. The summits serve as forum to share information about transit-oriented development by inviting members of the development community and the planning community to share experiences and insights into the unique nature of developing projects to capitalize on proximity to rail service. In addition, the summits also serve as another venue to advertise opportunities for developers to jointly develop sites around DART’s light rail stations.

These types of techniques have proven to be beneficial for the DART system. Again, there had to be a networking of various sources and resources in order to plan the design for the system and the manner in which it would operate.

Diaz and Porter (1999) further state items that create a better organized and planned joint venture that allows all stakeholders input:

- ◇ Coordination of both internal departments and divisions and between the transit agency and external parties (cities, business organizations, and developers) creates an organization responsive enough to pursue joint development activities.
- ◇ Strong and consistent direction from upper management and the governing body of an agency can help clarify the mission of a joint development program and to facilitate internal cooperation.
- ◇ Strong joint development programs can emerge from an atmosphere of employee empowerment. For example, DART's Economic Development Program developed from initial activities in the agency's Planning Department.

Transit authorities like DART conduct in-depth studies and create profiles that allow developers to not only get a better understanding of the kinds of housing and retailers a community needs but also grasp the makeup of the culture of the people who reside in a neighborhood and characteristics that are unique to that community. TOD systems cannot merely be carbon copies because as each community possesses distinct features that must be addressed if the transit system is to survive. This particular aspect deals with what Tumlin (2003) refers to as the "3Ds" or the three dimension that each TOD must address for each station "density, design, diversity" for the station to be a thriving development. He elaborates that creating mixed use communities and developments allows residents to walk to shops and services, permits employees to make use of the transit systems as vehicles are not a necessity during the day due to the close proximity of a number of retailers within the transit development (Tumlin, 2003).

Researchers have also shown the success of being recognized in downtown Fort Worth by listing some impressive statistics: (Pratt, 2002).

- ◇ Over 37,000 Metroplex employees walk to work each day
- ◇ 78% of the regions 200,000 plus transit riders first access the bus or rail system by foot each day
- ◇ 5.5% of all trips in the region, for any purpose, are made by walking or bicycling

BART (Bay Area Transit, California)

Tumlin (2003) notes that BART is now charging for reserved spaces at many stations where previously all parking was free for all consumers. Costly parking fees and limited parking garages influence more residents to make use of the transit system whenever possible. Creating a balanced mixed use, multi-modal environment increases ridership.

In addition to increased ridership for the transit authority and more pedestrian and bicycle-friendly streets, the cost of housing is lowered significantly as a direct result of limited parking. In a number of larger cities, the cost of a parking space is “bundled” in the rental cost of the housing; however, due to the fact that not all renters own a vehicle, proposals in places like San Francisco near the Balboa Park BART station, they work to “unbundle” the cost of parking for renters. Bundling parking costs and rents and housing costs needlessly increases the amount of rent charged for individuals who do not own a vehicle and do not intend to purchase one (Tumblin, 2003).

In considering planning and methods of obtaining a sufficient return on the investment in a TOD, one cannot solely depend on the funds from the fare box. Jeff Ordway, manager of property development for BART, stated “The trick is to recoup as many dollars as possible through other means, such as boosting the number of people who live within walking distance of your stops” (Commuter Register, 1999). He goes on to acknowledge other variables that must be considered when developing a TOD system. “We require that all parking that is eliminated to make way for development is replaced,” and “We’re very much tied into transit-oriented development as a way of boosting our ridership and our fare-box receipts, but our board of directors also recognizes the need to provide space for riders who drive to station stops” (Commuter Register, 1999). These types of factors demonstrate that there has been a plan implemented that is not only directed toward the economic profit of a TOD, but it also shows consideration in accommodating the community. This balance in development should continue to foster productivity of the BART system.

Portland’s Westside Light Rail

The Portland system has acted as a blueprint for other cities making strides to develop successful TOD systems. This system is one of the older and more successful of all currently functioning systems. “The typical West Coast example for transit-oriented development is Portland, Oregon. The city planned and incorporated zoning patterns that discouraged sprawling, low-density development and built a light-rail system, called the MAX, which encouraged development at its station stops” (Commuter Register, 1999).

The success that Portland has experienced did not come overnight. “Starting in the 1970’s Portland, Oregon embarked upon a strategy to counter the forces of suburban sprawl by investing heavily in the transit system and focusing high density development

in the downtown area and around light-rail stations and bus routes” (Capitol Region Council of Governments, 2002). This methodology of curtailing sprawl and centralizing the transit area near downtown has proved to be the proper method for the Portland station.

The goals of the system were quite clearly stated. They planned to “use pedestrian and transit oriented real estate development as a tool to manage growth, reduce air pollution and vehicle miles traveled, and obtain maximum return on the public investment in light rail” (OneStat, 1998). These goals were derived from a comparison of a previously implement rail systems that were previously constructed in another region of Portland. An analysis of this system yielded very specific details that were taken into consideration. They included (OneStat, 1998):

- ◇ Be clear about goals;
- ◇ Promote transit-oriented development as part of a broader investment strategy;
- ◇ Rezone transit station areas for higher densities;
- ◇ To promote transit-oriented development, offer deal-making assistance;
- ◇ Target public agency efforts at the transit stations which offer the greatest potential;
- ◇ Involve elected officials and citizens, across jurisdictional boundaries, to gain their leadership and support;
- ◇ Consider developers' perspective in program design and implementation;
- ◇ Think long-term; and
- ◇ Establish a system to monitor progress.

These conclusions derived from the analysis are in line with the 10 principles that should be considered when planning a TOD system. It is always essential to note specific features that should directly pertain to the particular system.

The results of the TOD Westside light rail system include approximately “7,000 dwellings and more than \$505 million of residential and non-residential development have been built, permitted or proposed since 1990 within one-half mile of west side light rail stations” In addition nearly “3,600 of the dwellings were completed in 1998 and over 3,000 of them are located in two station areas and one developer is building about 2,000 of these units in three station areas with backing from a pension fund.” Another benefit of this system was being able to “attracting national developers to build TOD projects in the region is a significant achievement” (Daisa, et al, 1998).

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