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Identifying Opportunities for Corridor Transit-Oriented Development along the DART Rail in Dallas, Texas

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Identifying Opportunities for Corridor Transit-Oriented Development along the DART Rail in Dallas, Texas

by

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Report

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Dedication

To Mom, Dad, and Robyn. Without all of the love and support you have given me over the years, I would not have continued to strive for excellence.

Acknowledgements

The journey to where I am today has been arduous, but well worth the struggle. I'd like to acknowledge my advisors for my Professional Report, Ming Zhang and Paul Adams. Two professors who have guided me among my collegiate path for the past five years, Dr. Adams in undergraduate, and Dr. Zhang in graduate, for who I could not be more thankful for inspiring me to pursue my field and driving me to excel. I thank all of the academic mentors, professors, and instructors that challenged me to take the extra step in my academic career at the University of Texas. I'd like to thank Jeffrey Brandon, Matthew Cavallino, and Kevin Forma from the New York City Department of Transportation for introducing me to working within a public agency and making me feel welcome in New York, a city I didn't know but was eager to learn about and experience. I thank Chad Edwards for mentoring me during my time within the Capital Planning office at DART in the summer of 2015, and for providing the inspiration for me in the decision of the topic of this report. Special thanks to Philip Johnson for providing me the passenger ridership and other transit data needed for this report. Also, thank you to the professionals I interviewed for this report: Krystle Nelinson, Dan Johnson, Peter Braster, Christina Day, Jack Wierzenski, and Scott Rohrman. I'd like to thank all of the colleagues and friends I've met within the Community and Regional Planning Program since I started in the fall of 2014. I appreciate your perspectives within the field I had never considered, and I appreciate you struggling along the way with me. Finally, I'd like to thank all family and friends, both in Dallas and in Austin, for keeping me grounded and making me who I am.

Abstract

Identifying Opportunities for Corridor Transit-Oriented Development along the DART Rail in Dallas, Texas

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Dallas Area Rapid Transit (DART), is beginning preparations for two major transit investments within the Dallas-Fort Worth Area: a commuter rail dubbed the Cotton Belt, to the benefit of suburban member cities, and a second alignment within downtown dubbed D2, a subway to relief congestion in Downtown, to the benefit of urbanists and local riders within the urban core. The board has been pressured by both to commit to set aside the other in favor for the project that benefits them the most, and the agency struggle to balance interests between the suburban commuter and serving areas of Dallas that need transit investment. To maintain ridership in a continued sprawling metropolitan area, DART hopes to take advantage of creating and improving Transit Oriented Development projects across the system in collaboration with member cities and willing developers. This report attempts to examine the agency's process in developing TOD, and to determine opportunities for the agency to implement Corridor-level TOD that can help address region-wide issues. Using land use, ridership, socio-demographic, and infrastructure

characteristics of the existing light rail stations within a corridor, and insight from a series of conducted interviews with professionals in the area, a typology can be made for the development within the light rail corridors, along with recommendation for investment for improvement of those corridors.

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Chapter 1: Introduction

On October 24, 2016, Dallas Area Rapid Transit opened two new stations on its light rail, Camp Wisdom, and UNT Dallas, to extend its Blue Line further south. The agency (abbreviated as DART) has operated the city's major public transportation services since the 1980s (DART, "Facts", 2016). Dallas and 11 other member cities raised a one cent sales tax for the purpose of being served by the agency, and since its inception, the agency has grown even further, adding four light rail lines, a commuter rail to Fort Worth (Trinity Railway Express), various shuttle services, and streetcar service to its initial bus system. DART's largest asset is the Light Rail System, which has been in operation since 1996, The Blue Line extension brings the entire light rail system to a grand total of 64 stations spanning almost 93 miles across the Dallas-Fort Worth Metroplex, making it the longest light rail system in the United States (Nicholson, 2016, 1).

The incredible length of the light rail system should seemingly be considered a success among other North American systems. When comparing it to systems of other American cities that grew in population post-World War II, that postulation can be made. But to some, DART's impact could be misleading. In the last twenty years, the agency's light rail has expanded to a daily ridership of 82,000 passengers serving ten cities with its four rail lines (DART, "Facts", 2016). The presumption for DART was that the ability to service more municipalities in the metropolitan area is considered an indicator to the agency's success. However the share of all public transportation modes daily in the Metroplex is still a small percentage (1.4%), especially compared to the substantial share of car commuting (90.7%) in the area (Dallas Regional Chamber, 2015, 38).

The reality is, the metropolitan area is still growing at an alarming rate that is driven by continued sprawl, a growth coupled with increased use of automotive transportation for daily commutes. NCTCOG's Mobility 2035 plan hopes to fulfill multi-modal transportation needs in the Metroplex that is projected to grow to 10 million in 2035 (Dallas Regional Chamber, 2015, 36). Within the area, population is expected to continue growing,

spread throughout all of the counties but mostly in Collin and Denton Counties. DART's upcoming 2040 plan notices this northward sprawl growth, double the rate of the growth within the agency's service area (DART, "2040 Transit", 2016, 37), and visually depicted in *Figure 1.1* below (52).

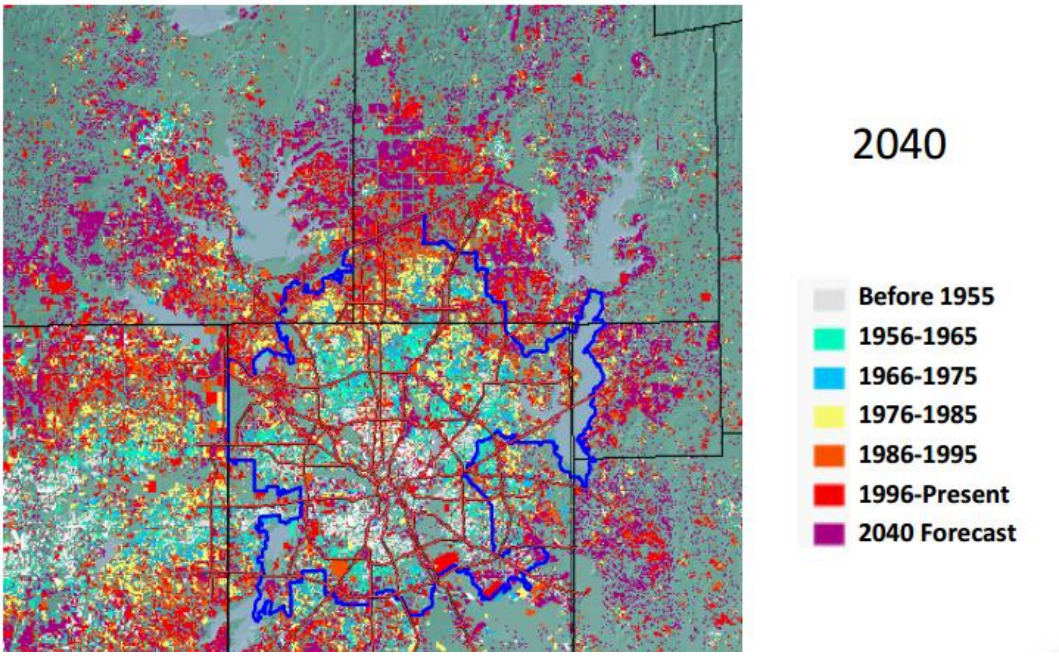


Figure 1.1 – 2040 Population Growth in Denton and Collin Counties.

While employment is also expected to grow rapidly (to 6.6 million in 2040), the growth is projected to be concentrated along major highway corridors in the area, along I-30, Stemmons Freeway (I-35E), Central Expressway (US75), and the Dallas North Tollway (DART, "2040 Transit", 2016, 42). Aside from the Central Expressway and part of the Stemmons Freeway corridors, the remaining employment centers are not served by light rail. While DART had noted these areas in their 2040 plan (54-57), they are not a priority in the short-term to provide anything more than current bus service.

In order to stay competitive with the driving mode, DART has tailored its operation to provide service to these suburban commuter areas as another option for them, but the share of public transportation has continued to be stagnant and heavily subsidized. Two

major expansions to the light rail system are in planning: the Cotton Belt Commuter Rail, connecting northern suburbs to DFW Airport, and D2, a second downtown rail alignment to alleviate train congestion in downtown Dallas (Young, 2016, 1). Each represents the dichotomy presented in providing transit service: whether to achieve ridership through serving areas that are already suited for transit or to extend to multiple pools of population outside of the city that are not currently suitable for denser development. Many local urbanists are proponents of DART's priority for D2, on the condition that the alignment is majority underground to minimize impact on the existing downtown infrastructure. The suburban influence is strong for the Cotton Belt, especially for municipalities that have been contributing to DART for over thirty years but have yet to receive light rail service. DART is caught between commuter interests and urbanist interests, all while attempting to finance the various alignments and mode options for each project.

Meanwhile, some communities within the city are neglected in their general public transportation service, running into first and last mile problems when attempting to reach a public transpiration option. Some of the residents in these communities cannot afford to live further from employment centers in the city because they may or may not have an additional motor vehicle to use, or their current commuting habit is very dependent on transit scheduling. It is important that these communities need a smoother facilitation to alternative modes of transportation to reach employment opportunities, or for employment opportunities to concentrate in different areas in the city. One way to alleviate a mismatched service problem is to improve corridors that are already served by rail, making them affordable and accessible to users that are most in need.

RESEARCH PURPOSE

To combat the still sprawl-driven population growth in America, and especially in Dallas, city personnel look to enhance the appeal and performance of public transportation through Transit Oriented Development, to provide additional mobility through an area, enhance urban quality of life, and stimulate economic development of surrounding

neighborhoods. Connecting land use to transportation through transit-oriented design can expand the market for transit use and inhibit increased automotive use. However, the limited area available near existing stations limits cities' and developers' abilities to tailor new development to the transit system, while adhering to their best interests and cooperating with each other. The purpose of this research is to identify opportunities along the current DART rail system where TOD projects can be implemented at a corridor level. Moving from the individual nodal TOD model to a more regional corridor model allows planners to concentrate desired land uses in certain bands along a transit line, instead of a certain station, to plan smart growth more efficiently. By reviewing DART's light rail operation and understanding Dallas's current land use patterns, street network, bike and pedestrian access, population and employment gradients, and land compatibility, the determination can be made if the city is efficiently planning TOD projects across the system, and if a corridor perspective is needed.

The first section of this report reviews and summarizes efforts to define Transit-Oriented Development, what it entails, and steps that cities can take to implement design and development aspects to pair with existing transit. This assessment is done through a far-reaching literature review. The second section further defines the concept of Corridor TOD, differentiating it from regular TOD, also through literature review. The section notes its advantages compared to regular TOD, defines indicators that are important to apply within the corridor, and focuses on two examples of transit systems that were developed with the concept of Corridor TOD, and their advantages and setbacks. The third section will go into detail about Dallas' history with light rail, current TOD projects in Dallas, and projected growth within the metropolitan area. The fourth section will review several analyses of indicators to define or delineate corridors and sub-corridors that currently exist or could potentially be created along DART. These GIS analyses will apply indicators to quarter and half mile buffers from station areas, with some indicators also compared at a census tract level. This analysis will also be paired with interviews collected from professionals involved in the TOD process within the city. The final sections will summarize the application of Corridor TOD to Dallas and provide recommendations for

application and enhancement within the Dallas-Fort Worth area, through DART's Economic Development Coordinator, willing developers, and appropriate cities.

Chapter 2: Defining TOD

TOD Definition

The concept of Transit-Oriented Development is relatively new, though the idea of transit-based development is not. In the early twentieth century, city planners used streetcar transit as means to link neighborhoods at the periphery to city centers (Dittmar & Ohland, 2004, 5). For some systems, the wealthy used this to their advantage in residential location decision, to escape the negative externalities of the city. These periphery areas became centers of residential development outside of the city, rather than serving multi-use activity areas, as in modern day. This set the stage for initial city sprawl, and decentralization only increased with the rise of the automobile, so transit dependability had become more discouraged along with its compatible development. Modern TOD evolved in the late 1980s with a new wave of rail transit in cities across the United States. The primary purpose of these systems, such as BART (San Francisco), MARTA (Atlanta) and WMATA (Washington DC), was not to link future development patterns and transit, but constructed to combat rampant congestion in their respective cities, and in some cases to work with the automobile, "under the assumption that most people would drive to suburban stations rather than walk, bike, or ride the bus" (6). As more cities developed rail systems, agencies sought to continue transit investment, especially in developing adjacent to stations, enhancing value of land around stations in order to "partially reimburse" hefty public subsidies by capturing the value of increased property taxes. As the twentieth century ended, the regional context mattered more and more within transit-oriented development, influenced by growing ridership numbers, increased congestion and sprawl, and smart growth movements in planning. Peter Calthorpe redefined TOD as a way to "organize growth on a regional level to be compact and transit-supportive…create pedestrian-friendly street networks that directly connect local destinations…make public spaces the focus of building orientation…[and] encourage infill and redevelopment…" (7). Robert Cervero also focused special attention on the relationship between urban form and the type of transit best suited for it (8), especially for a continuously growing metropolitan area.

TOD is generally described as infrastructure, design, and a mix of land uses at various densities within about a half-mile of a station. However, many factors either stretch or shrink this half-mile radius, including street network density, pedestrian and bike access, physical land use barriers (i.e. large parking lots or fields) or natural barriers (i.e. bodies of water), and adjacency to pre-existing land use or neighborhoods. TOD can be a successful tool for cities seeking to infill, especially to meet smart growth measures of walkability and density. TOD's success are dependent on its design, implementation methods, the pre-existing urban form, and providing accessibility through multiple modes of transportation to access points of transit (University of Delaware, 2013). *Figure 2.1* represents the "model" nodal TOD at a neighborhood scale, (2013) and its diffusion with the surrounding urban landscape.

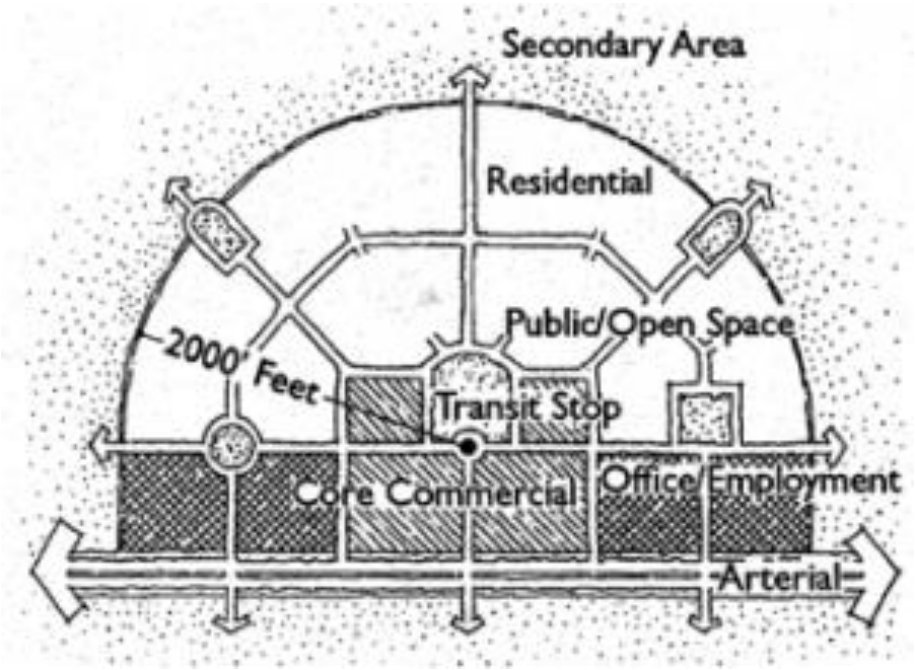


Figure 2.1 – The Transit Village Model

PLACE-MAKING AND DESIGN

High quality design through "place-making" is important to make TODs attractive and pedestrian-friendly places. When designing for TOD, planners need to keep aspects in mind such as creating places for people (in an interactive and social sense), making connections at both the regional level (the transit system) and human level (pedestrian and bike), mixing uses and forms, managing economic investment and "delivery mechanisms" from developers, and designing for change in user lifestyles and demography, including energy and resource efficiency, management of public space, and parking. (Dittmar & Ohland, 2004, 31-32).

Design also seeks to enrich existing infrastructure, encouraging "a distinctive response that arises from and complements its setting" (31). Neighborhood approval is part of this enrichment, given that development around an adjacent station can bring out changes in people's everyday routines. Public involvement in TOD design can help the development keep the character of the neighborhood or compromise with the neighborhood's preferences. In Louisville, Kentucky, Bailey et al. (2007) designed a participatory design method called CAVE (case-wide visual evaluation) to identify design preferences for TOD when in the city's structured public involvement process. Previous consulting for TOD design focused on visual simulation, more of a marketing tool that references sophisticated images of transit developments and "aimed at convincing communities that the particular development illustrated will best meet their needs" (Bailey, et al., 2007, 237). Bailey creates a visual evaluation instead, an analytic framing where composites are made based on assembly of individual factors. The composite expands upon integer and ratio scoring, and must reflect individual components at the human level, what people would likely see when they travel through a TOD, including streetscapes, sidewalks, public spaces (the public view-shed). Case evaluation provides expanded collaborative and participatory questions, including exhaustive pairwise comparisons (one or the other comparison and preference), contingent valuation (choosing combinations of features from a set), to build quantitative preference functions. Concerns and requests made by the public are measured and tabulated to provide elements of a design. The CAVE method was

intended to have the participants "view professionals as responding to them, and, over a period of time, generating ideas to which they contributed" (251). And while problems were encountered regarding the degree of public transportation, especially within low-income communities, in the initial Louisville application of the method, it does set a standard for ensuring TOD design is supportive of the neighborhood while simultaneously providing city goals of sustainable land use mix, accessibility to destinations, and public transport provision.

In an evolving market for TOD, neighborhood preferences of key demographic groups are also crucial to understand (Dittmar & Ohland, 2004, 10-11). The broadest is low-income communities with limited access to more than one vehicle and rely on public transportation. Other niche markets come into play and perhaps overtake developers' interests. Groups of immigrants, especially from Latin America and Asia, are important to retain in provision of remaining close to employment and educational opportunities within the city. "Empty nesters" and "baby boomers" are also a target for TOD, finding the old model of a single family home in a suburb unsuitable for their current stage of life, and may be looking to sell on residential property, downsize, or be closer to urban cultural amenities. Finally, nonfamily households, mostly young professionals, are important to retain, considering their difficulty to balance housing affordability and transportation affordability, along with their lifestyle preferences.

TYPOLOGY

Transit oriented development patterns vary from station to station, either to complement the surrounding urban form or to contrast it to provide needed retail and office options close to the station. Several studies discuss the differentiation of TOD via primary purpose. Olaru, et al. (2010) recognizes a spectrum of TOD types that "offer varied development opportunities and patronage potential" (224). On one end of the spectrum, the transit interchange or terminus purely services multi-modal transfers, aiming to achieve a high level of accessibility by car and feeder bus. Examples of this are park and ride stations

and transit center stations. Because of this modal transfer priority, land uses that would be providing trip attractors are neglected or omitted. The other side of the spectrum is the natural TOD concept, including land uses that act as trip attractors, where the primary modal method to access is by foot rather than car (224). Olaru et al. recognizes that TOD designs tend to fall between the two "extremes" (224).

Atkinson-Palombo and Kuby (2011) break down TOD types through calculated metrics in their study of the Valley Metro Rail in Phoenix. The study used twelve transportation-related characteristics (centrality in the system, park and ride availability, etc.), social and demographic characteristics (numbers of jobs, population, educational attainment, household income, owner vs. renter-occupied), and land use characteristics (residential percentage, vacant, "TOD-compatible") within VMR station areas to create a typology (Atkinson-Palombo & Kuby, 2011, 192), and used an analysis of variance test to test whether there are significant differences among station-area types. Through a hierarchal cluster analysis, the study found 5 "natural groups" of station types (194-196). This included areas with higher rates of high owner-occupied housing and Bachelor's Degrees (classified as "middle income mixed-use"), station areas with high employment and TOD-compatible land parcels ("Employment and Amenity Centers"), station areas with the and highest TOD-incompatible land and lowest income values of all groups ("Urban Poverty"), areas of high residential rates but low owner-occupied rates ("High Population Rental" neighborhoods), and areas with park and rides ("Transportation Nodes").

Other studies attempt to identify different TOD types. *The New Transit Town* (2004) cautions that creating types of TOD is just a starting point, goals that "need to be revised and refined as more exemplary developments come on-line…" (Dittmar & Ohland, 2004, 33). *Table 2.1* lists Dittmar and Ohland's basic categories of TOD, differentiated by housing density and typology, land use mixes, regional connectivity, accessible transit modes, and transit frequency (37).

TOD Type	Land-Use Mix	Min. Housing Density	Housing Types	Frequency
Urban Downtown	Primary office center, Urban entertainment, multifamily housing, retail	> 60 units/acre	Multifamily loft	< 10 minutes
Urban Neighborhood	Residential, retail, Class B Commercial	> 20 units/acre	Multifamily loft, townhome, single-family	10-20 minutes
Suburban Center	Primary office center, urban entertainment, multifamily housing, retail	> 50 units/acre	Multifamily loft, townhome	10-15 minutes
Suburban Neighborhood	Residential, Neighborhood retail, local office	> 12 units/acre	Multifamily townhome, single-family	20-30 minutes
Neighborhood Transit Zone	Residential, neighborhood retail, local office	> 7 units/acre	Townhome, single-family	25-30 minutes
Commuter Town center	Retail center, residential	> 12 units/acre	Multifamily townhome, single-family	Peak service demand responsive

Table 2.1 – Example of TOD Typology

IMPLEMENTATION METHODS

With multiple definitions on how to differentiate TOD across a city, various methods can be used by a city with land use and zoning powers, to ensure that these developments can be implemented and financed. The most common is a public-private partnership measure called a transit joint development, where in return for the right to develop near a transit station, the developer assumes some of the construction cost of the station or makes a direct payment to the transit authority (Weinstein & Clower, 1999, 7). Over 115 joint development projects were completed in the U.S. in more than a dozen cities in the 80s and 90s (8), and come in a variety of modes of location, cost-sharing, and asset-sharing. A station purchase or lease is the most basic, which is a simple purchase of land adjacent to a station. Additionally, a station interface allocates a physical connection (such

as a bridge or pathway) to a transit station from a property. On the flip side, a non-station purchase is one not adjacent to the station, but still within a reasonable distance, considered within the station area (8).

Financing tools for also vary. A benefit assessment district is a tool where the city or transit agency creates a zone around existing or planned transit stations for the purpose of collecting a portion of incremental property tax revenue resulting from the new development. Incentive agreements also come into play, where a developer agrees to build or upgrade a transit station in return for waivers of density or height restrictions, variances on permitted land use or free easements through public land. A development-concession leases occur when transit agency leases station space to a developer or retailer in return for a rent payment and a renovation or upgrade. Cost-sharing agreements occur when developers and the transit agency share a selected facility construction costs, usually for excavation and related structural work. Joint use projects are included in this, that cover the shared use of equipment, such as HVAC, elevator or escalator systems, parking lots and garages (Weinstein & Clower, 1999, 9).

For cities, TIF districts and overlay zoning can also encourage TOD, where a special zoning district is placed over a base to identify special provisions to guide development within a special area (Atkinson-Palombo and Kuby, 2011, 189). Atkinson-Palombo and Kuby also suggest that TOD has to be formulated "in conjunction" with supportive policies by city (190), especially because the transformation of land uses previously evolved with automobile-orientation to transit-orientation is gradual. "Advance TOD", planned well before the construction of a transit line, can be completed with the system "with supportive policies acting as a catalyst for that development" (190).

CORRIDORS AND LAND USE

Research on the success of development near transit corridors and stations emphasizes the positive externalities of proximity to the corridor. This research puts a premium on locations relatively close to transit, citing increased accessibility to locations

outside of the immediate area. The flexibility of commuting time for a resident lowers their commuting costs, and therefore allows them to bid higher on locations with increased prices, through the compensation principle, and therefore subsequently increases housing and rent (Kilpatrick et al., 2007, 305). Other research looks at other impacts that transit makes on land development success. Vessali (1996) looks at a variety of transit modes in a collection of thirty-seven studies, some of which look at property values, while others focus on land use mixes. For the later, the results were mixed. Vessali's review of the 1978 Digemas report of the impact of heavy rail summarizes that townhouses and other dense residential space showed no pattern of clustering near train stations (80-81). An overview of Dyett and Castle (another heavy rail study) found a small increase in various development near stations, but not vertical density (80-81). A review of a ULI report of heavy rail in DC found that land use plans changed to incorporate higher density, mixed-use, and nodal development within downtown and transit stations (80-81). A review of a San Diego light rail study yielded that the transit mode was an important factor in suburban station development, but not the Central Business district (82-83). A review of a Northern Virginia Planning District Commission study of commuter rail found that in resident's minds, access to transit would have a major impact on residential location choice, growing from 6% to 43% in positive responses, through implementation of the transit system (82-83).

Landis et al. (1995) also focuses on property value impacts from light rail (five different transit systems in California) and finds that home prices were found to be capitalized by proximity to rail transit, equal to a premium of $2.29 per meter closer to the station, up from $1.96 per meter in 1990 (33). Additionally, commercial property was not capitalized by transit, at least not across every system observed. As control in the study, the report reviewed a series of highway impact studies on property values, to compare to transit. A review of a Dallas highways study found that a property's proximity to a highway significantly raised its property value (22). An Austin study quantified this premium on undeveloped land at 163%, while a Temple study found that subdivision proximity to a highway was a discount at about 13% (22). In general, proximity to highways were found

to be a correlating factor in affecting property values, but more so commercial and undeveloped land. Residential subdivisions saw a deterrent for proximity to highways, while commercial development saw it as an opportunity. But Landis et al. saw the opposite in transit modes, which could signify that distance to transit isn't a direct premium, but perhaps the answer would be numerous access points along a transportation system.

Many of the above studies see transit as a positive impact land values, while simultaneously concentrate on negative impacts to residential uses, including "the stigma that arises as homebuyers seek to avoid the risk associated with being proximate to the line or route" (Kilpatrick, et al., 2007, 305). The mixed bag of positive and negative impacts can possibly be explained by the negative side getting entangled and hidden on the market side. The report cites a 2003 Cervero report that suggests that negative externalities of transit corridors, such as pollution, crime, and noise, go unnoticed in the market (Kilpatrick, et al., 2007, 307) and therefore not contributed to home prices in dense mixed use areas affected by such externalities (Cervero, 2003). Kilpatrick attempts to separate the positive and negative externalities by using a proxy to simulate proximity without direct access. The study looks at residential sales across 15 miles of Interstate 90 (another proxy to transit in general) in Seattle, Washington (Kilpatrick, et al., 2007, 308), and compares it to sales of the Mt. Baker neighborhood, which overlies a portion of I-90, in which the highway is entirely within a tunnel. The lack of direct access to the tunnel via entrance ramps means there is no positive "public benefit for being close to the "transit" line (310). Sales of residencies were collected between 2002 and 2005 and a set of housing characteristics were included to estimate a hedonic price model for the area. Kilpatrick's results essentially confirm that proximity is a negative externality when all else is equal (residences immediately proximate to or over the tunnel had a 20% diminution in value), but only because direct access is restricted. Housing prices in the area were positively influenced by distance to access ramps, the "access point" to "transit".

If proximity to access points is important, then a transit system can flourish with having more access points, or stations, for residences to access. When planning a transit corridor, it would be essential to space stations evenly and at a distance where the negative

externality experienced isn't as apparent. This distance is generally a mile or less between stations, where residents and employment within the area can willingly reach the transit station via walking within 15 minutes, as in the delineation of a station area and of TOD. This phenomena generally occurs in very-high capacity systems across the board, but may not be able to be done in low-density cities or in areas constrained by natural boundaries or water. Any opportunities that current transit systems have to "infill" a station can diminish this effect. Granted, population and employment numbers have to be high enough, along with neighborhood support, in order to justify the infill. The alternative is to prevent barriers for users to access a station, implementing infrastructure for more ways within a neighborhood to reach an access point.

Chapter 3: Corridor TOD Concept

Transit-oriented development is usually only focused upon at the nodal level, evaluating an impact at an individual station, and prioritizing the areas that passengers from the transit station can reach in a given amount of distance or time. Past that fluid boundary, the makeup of the urban landscape transitions back to the pre-existing urban form. In some cases, this urban form transitions seamlessly to TOD, especially closer to the city center. In many cases, especially within the Dallas-Fort Worth Area, the transition is sudden. Typically, TODs in areas that don't have that kind of denser built development, especially among lower-density residential areas, tend to stick out in the urban landscape. Suburban-style land development encompasses an urban form that is generally low-lying and uniform across a regional context, but adjacent TOD contrasts sharply with that. To alleviate the sharp gradient, there would need to be a designation of an approximate distance from transit lines that can support higher employment and population, along with provision of direct access to a transit corridor for commuters.

Corridor-based TOD expands the aspects of transit-oriented design past the half-mile buffer from a station. A corridor-wide perspective on TOD can prove to be the most proficient way to maximize the benefits of TOD through simultaneous planning at all stations (Thorne-Lyman & Wampler, 2010, 2). In nodal TOD planning, broad regional issues, like parking management, affordable and market-rate housing supply, sprawl and traffic demand, neighborhood and community preservation, and smart growth, are difficult to manage and could be inefficient. Corridor TOD allows these issues to be addressed across an entire region.

In 2010, The Center for TOD released a report delineating the concept of Corridor TOD, declaring it as the "best scale at which to predict the long-range impacts of transit on the market for new development, on commuter travel behavior, and on where the potential for displacement of low-income residents may be greatest" (Thorne Lyman & Wampler, 2010, 2). A corridor perspective allows a planner to understand the context of a specific station along a rail line, and through that can seek specific development and design elements to enhance the existing transit system, transforming the transit access point as an

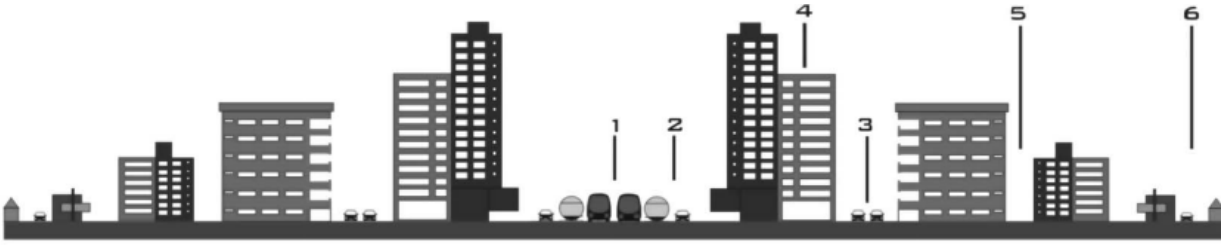
attractive and accessible place. While still keeping individualized and unique identifies for development at single-stations, Corridor TOD allows cities to understand its role within the corridor and expand the infrastructure and design elements to activate areas not previously accessible to the station.

For the purposes of this study, Corridor TOD is defined as the built environment roughly within a half mile of a rail line and of rail stations, spanning the areas of a commuter's travel shed. This is a general area originating at the conjunction points in a city center and ending at the line's terminus, the general "commuter-shed" of a passenger. This also encompasses areas outside of half a mile of the corridor terminus through multi-modal first and last mile connections that effortlessly interface to the corridor. Examples of this would be through bike and trail access, park and ride access, or shared garages. Additionally sub-corridors can be delineated as the transition of one activity corridor to another, usually starting at a major transfer point along the line and ending at the corridor's terminus or the city center.

ARRANGEMENT

The geographic definition of Corridor TOD is still muddled. In nodal TOD, planners generally look at the half-mile buffer around the station, and play with its boundaries depending on topography, municipal boundaries, street-scape, access to other travel modes, or natural land formations and bodies of water. A larger focus at the corridor would expand this to a general axial distance following the rail line along the corridor, connecting and "blending" nodal station areas. This "Linear TOD" would allow land uses featuring commerce and services activities, public facilities, and housing along transport corridors, orderly distributing these benefits and organizing transit. The area of influence that would surround a transit line varies depending on the transit technology, but tends to be larger with larger-capacity modes. The geographical model is based on the 1966 master plan of Curitiba, Brazil, which delineates the axial development "aiming to stimulate the use of public transportation and optimize public urban infrastructure. This includes the

"verticalization" of development adjacent to the corridor and tapering density further from the corridor. The transit line is the central spine of this framework, as opposed to ancillary fast traffic lanes or local streets. *Figure 3.1* below classifies the general corridor development scheme (Duarte, 2012, 185).



1. Bus corridor; 2. Local traffic lanes; 3. Fast traficc lanes; 4. Verticalization and high densities; 5. Medium density; 6. Low density and local traffic

Figure 3.1 – Structural Corridor Development Model.

A linear TOD pattern in corridors allocated an even distribution of "commerce and services activities, public facilities, and housing along transport corridors, orderly distributing these benefits and organizing transit" (Duarte, 2012, 183). This axial shape of corridor TOD is structured to loosely mimic generalized planning efforts for transit corridors. Studies focus on maximizing the corridor in general, rather than how they can be compatible with TOD. Curtis (2008) looks at the "Network City" strategic plan in Perth. This plan formed a join-effort TOD committee of state government planners, infrastructure, public transport and development agencies, to "establish[es] priorities for action across the 100 or so centres and transit nodes" (Curtis, 2008, 299). Network City also produced a coordinated action plan, designating a differentiation of corridors and nodes (299-300). Activity corridors, center on either a main arterial road or suburban railway line and utilize land up to 400 meters on either side of this transport spine (288). Activity centers develop at intervals along the activity corridor as the focus of daily activity needs, including small-scale employment, shopping and services, and medium to higher density housing, all of which is placed within walking distance of the public transport stop at the center. Finally, transport corridors pair with one or more activity corridors to form a network, and provide

a fast moving route for inter-urban travel, thereby overcoming the need for longer distance through-traffic to use activity corridors (288).

The initial purpose on the Perth railway was to provide a transportation mode that could be competitive with the car for markets outside of the central city (Curtis, 2008, 290), a purpose very similar to DART's rail implementation, promoting rapid expansion into suburbs to serve suburban commuter markets. This philosophy seems to ignore the potential for land use integration closer to the city core, in favor of minimizing time-cost to passengers. The further stations are away from each other, the greater the transit system is performing, it seems. Through Corridor TOD planning, land use integration with transit could occur after the establishment of the transit system, reviewing and transitioning already existing development around corridors, as a way of "filling the holes" of development along the system. This "afterthought" of land use integration would be implemented within Dallas. And while an entire corridor cannot feasibility be planned as complete as the Curitiba model implies (Duarte, 2012, 185), political collaboration between municipalities that have land use and infrastructure planning power is essential in creating corridor TOD projects with a broader context than just a nodal improvement.

ACCESSIBILITY

One of the positive attributes of TOD is increased accessibility, describing an individual's ability to reach opportunities in the city, including desired goods, services, activities and destinations (Pitot et al., 2006, 2). Areas of high-accessibility are useful in planning TOD, but the ability to measure accessibility is complicated, especially within a large city. Accessibility is closely tied to mobility, but also includes facets outside of physical transportation, including land use of a destination, temporal components of scheduled transportation, number of travelers in a trip, number of "stops" to chain on a trip, environmental factors such as the weather, and individual factors such as age, gender, and socioeconomic status. The Pitot et al. (2006) study in Golden Coast, Australia, created a GIS tool called the Land Use & Public Transport Accessibility Index (LUPTAI), to identify

areas of high-accessibility that are best suited for TOD management (1). The tool takes all modes taken for in a trip into account, including walking to a public transport stop, or to a mode that takes a rider to a stop, the time taken on public transport, and time taken to walk to a destination. In the end, the tool produces a composite of layers that connects an area's development patterns and transportation supply modes to identify areas with overall poor, low, medium or high accessibility (3).

In Corridor TOD planning, focus would be on areas on low accessibility (Pitot et al., 2006, 15) that could significantly improve with the addition of either a transit line or additional first and last mile improvement, achieving appropriate and equitable provision of public transport services. Alternatively, areas of high accessibility but low population or employment would be prime for development, achieving an appropriate land use mix or appropriate mix of density and accessibility (16). Ancillary results from this study include opportunities to reduce the need to travel and the length of trips, promotion of social equity by promoting a variety of sustainable mode choices, promotion of active transport modes, utilization of already existing infrastructure and services, minimization of new infrastructure, and support of local businesses (16).

TYPES OF CORRIDOR TOD

To better delineate TOD within a corridor, the function of the corridor in a regional context needs to be understood. The Center for TOD created a typology of transit corridors, and strategies for implementing them through corridor TOD (Thorne-Lyman & Wampler, 2010, 5). The three main types discussed each would contain different land use mixes across the corridor, depending on the corridor's purpose.

The Destination Connector Corridor depends on connections to multiple employment and centers, medical and commercial centers, and academic campuses, from residential neighborhoods. Transit corridors that connect multiple activity centers tend to result in higher ridership than projected, which suggests bidirectional ridership throughout the day, and can help "build[ing] regional support for future transit investors" (Thorne-

Lyman & Wampler, 2010, 6). The implications of this type of corridor are demand for development in "destination" station areas, higher-density development due to market demand to access points, potential for destinations outside of downtowns to grow, retrofitting of auto-oriented land development and pedestrian network patterns, and opportunity for pedestrian and bike infusion, especially in areas that are difficult to navigate long distances. Essentially, a unique identity, based on varying land use compositions, can be created for each station along the corridor, and the key to success is to create a seamless transition between the station areas, along with a transition between the corridor and the surrounding built environment.

The Commuter Corridor generally serves only one major activity center, typically the Central Business District (Thorne-Lyman & Wampler, 2010, 6). In the morning, riders originate from residential neighborhoods, require a connector to reach a train station (either by car, walking or biking, or other transit feeder), and travel to a collective employment center in the city. At the end of the day, this trend reverses, where traffic flows away from employment centers. Service is typically moderate to high-frequency during peak business hours, and tapers off during off-peak business hours. The implications for the Commuter Corridor are more residential development at moderate to high densities, depending on market demand, less active commercial and retail markets due to infrequent ridership throughout the day, a necessity to enhance pedestrian and bicycle access to stations to achieve higher ridership, and focus on transit feeder service and park-and-ride lots.

The final type of corridor is the District Circulator, generally made to expedite movement within an "activity node" (Thorne-Lyman & Wampler, 2010, 7). These typically circulate around a downtown or commercial, medical, or educational centers. Ancillary is the connection to neighboring activity nodes, extending the walkability of these districts. This type of corridor is much smaller in scale compared to the other two, and is focused more on connecting areas just outside of walking distance to important destinations. The implications of this corridor are heavy promotion of biking and walking-based streetscape improvements and market-rate developments if the corridor connects major destinations.

FURTHER TYPOLOGY EXPANSION

The Destination Connector, Commuter Corridor, and District Circulator are models to shape the development market along transit lines. Depending on the market within the city, the typology can be further expanded into categories differentiated by either ridership patterns throughout the day or major land use mixes along the corridor.

In the case of Destination Connectors, the typology of the areas connected can easily be further divided. Destination Connectors connect multiple types of activity centers and would experience different ridership numbers throughout the day. A corridor with multiple employment centers across the corridor would experience constant activity and ridership throughout most of the day. Peak hour ridership would be relatively similar to off-peak numbers. A corridor connecting retail and commercial opportunities, either through regional, lifestyle, or smaller neighborhood centers, will see ridership spike later during the day. This can be seen especially in corridors connecting urban culture centers (including museums, opera, symphony, and art and science centers) and entertainment districts (including sports stadiums, fairs and amusements parks). Districts holding seasonal or annual events will see ridership spike dramatically during those times of the year (such as the State Fair) and return to lower levels off-season. Finally, intermodal transit corridors move people from activity centers to transfer points along the corridor, especially active during peak hours. At these points, the user has to debark the system to transfer to another mode or debark the current route to transfer to another route. These corridors also facilitate movement from activity centers to major inter-metropolitan transportation centers that experience ridership throughout the day (rather than at peak hours), such as a regional rail terminal or an airport.

On Commuter Corridors, ridership peaks during rush hour commutes in the morning in the direction of the employment center, and evening in the direction of the multiple residential areas. Off-peak ridership is generally much lower than peak hours. These corridors also differentiate by neighborhood type. Neighborhoods that are higher in single-family owner-occupied housing are more likely to use other means of transportation to commute and therefore interface less with the corridor. These are generally higher-

income areas that have the flexibility to take other means of transportation to their destinations, and despite living within a close proximity to the station, it is possible these residents never interact with the corridor at all. The majority of the ridership that originates from these areas comes from stations allocating Park and Rides, pulling potential riders from outside similar neighborhoods that aren't in close proximity to the station, thereby expanding the commuter-shed to riders in areas where commuting via car would be temporally competitive with commuting via public transit. On the other hand, residents of higher renter-occupied housing areas are more likely to directly interface with the corridor and therefore more likely to use it. The riders that live in these areas may not be able to afford alternative methods of transportation such as a first or second car, or are paying higher transportation costs in effect for cheaper housing. Alternatively, they are more disposed to the lifestyle of public transit and made their housing and transportation decisions based on that. Lower-income areas, whether primarily owner or renter-occupied, are even more likely to require the need for public transportation modes. If the corridor exists in these areas, then ridership should be constant, but especially more constrained to peak and off-peak hours of operation, and more prone to first and last mile problems to access the station.

District circulators will not maintain the ridership of the previous two Corridor types, usually because it serves at a much lower scale. These corridors vary more often by mode rather than areas served. A personal transit mode such as monorail connects a major activity center to multiple auxiliary centers, just far enough away to be difficult to walk for some users. A streetcar would connect a major activity center to a mix of residential, employment, and retail options at much smaller intervals (block to neighborhood level) then the major transit mode. Shuttles run a loop between a station along the transit line to a major activity center or point of interest well off the corridor.

When determining a typology for a corridor, the understanding is that it is not uniform across the entire corridor. Because a commuter-shed has the potential to be quite large, a passenger can travel through many different types of activity centers before they reach their destination. This is especially true if a system serves suburban commuters well

outside the city center, and if a passenger's trip purpose may differ based on time of day, day of week, socioeconomic and lifestyle factors, or life cycle factors. Corridors will serve different clientele of passengers depending on the main activity centers on its path, so a single typology is not mutually exclusive across the board.

INDICATORS FOR CORRIDOR TOD

Objectives for corridor-level TOD include guiding growth and development within a region, supporting regional economic growth, enhancing regional and local equity, promoting reinvestment within the city, linking and engaging local stakeholders in the transit-planning process, and maximizing existing TOD benefits and potential. These elements can be established through concise design and density patterns along transit corridors. When analyzing an area, whether to implement a new transit corridor or to reorient development, several indicators need to be apparent or worked on to ensure a more cohesive corridor tailored to its purpose. These include varied land use mix but distinct at stations, above average FAR and density for businesses, appropriate job housing ratios across the line, block-level improvements to increase walksheds within communities near stations, and equitable accessibility to public services. Considering that the neighboring area around stations drastically differs based on its location in the system, these indicators need not be same for each station across the board. However, understanding and repositioning the station's context through these indicators can help shape the corridor.

The indicators found in a transit corridor are based on the TOD Standard Scorecard, developed by the Institute for Transportation and Development Policy (ITDP, 2014). The first 2 principles deal with pedestrian and bike infrastructure, insisting that a TOD provide "unobstructed" pedestrian footpaths, furniture and landscaping elements, active building edges, safe street design for cyclists, and connecting paths to trails and on-street bike lanes, as seen in *Figure 3.2*. These can be modified to include all forms of transportation access to the station. Provision off bus lanes allows a multi-modal connection and extends a commuter's access to areas not served by the rail. Access via automotive transportation is

also integral. Parking provision, either directly adjacent to a station or an area garage or lot, is necessary to allocate for a significant contribution of potential riders, especially among suburban stations. Connections to pedestrian and bike pathways, along with providing bike racks, indicates integration with the outside network. A corridor with these elements, even outside the direct station area, indicates a good structure for TOD.

Figure 3.2 – Bike and Pedestrian Cohesion in TOD Development.

Next, a connectivity indicator would be measured by multiple paths through short street blocks, to the access point (ITDP, 2014). Short blocks and permeable paths (as seen in *Figure 3.3*) imply an area designed to be pedestrian-oriented rather than vehicular-oriented, thus tend to psychologically encourage more walking in a station area. A corridor that passes through areas with long blocks will have poor connectivity, and also tend to have less accommodations to support multi-modal connectivity.

Figure 3.3 – Connectivity and Short Blocks in TOD.

The "transit" principle can be modified to transit frequency. A higher frequency station is able to facilitate movement of more people on the fact that more trips will arrive and leave a station within a given amount of time. Stations served by multiple lines would be considered more active than other stations. Stations at transfer points, whether to another line, or another rail mode or system, would have more activity within the direct station area. More activity in a station area, designated by movement of people, indicates more opportunity to interface with the surrounding environment.

The next principle is land use mix. It is necessary to provide a balanced mix of complementary uses and activities within a local area (ITDP, 2014). This is the broadest of the indicators, as one mix will not suffice for every place along a corridor. Land use mixes near a station have to be provide the area with a unique character, match certain aspects with the surrounding neighborhood but still tailor to the transit system, and must be varied in use, as seen in *Figure 3.4*. Diverse uses provide opportunity for interaction with the surrounding area at different times during the day, making it both an origin and a

destination to some extent. This diverse use also keeps the area safe in creating a lively human environment.

Figure 3.4 – Varied Uses within TOD.

The next two principles, density and compactness, are relatively close, and are the key factors to prevent sprawl. Vertical growth through up-zoning "absorbs" urban growth and in turn fosters support for the transit service (ITDP, 2014). Areas of high population and employment density are key indicators of this principle within a corridor, implemented within the half-mile area along a transit line, and on a slow gradient depending on distance to the city center. Calculating job-to-housing ratios can determine whether a part of a corridor is more tailored to destinations (employment) or origins (housing), and determining a balance within a corridor that is tailored to the clientele of the corridor. Areas low in either part (population or employment) provide an opportunity for densification through either up-zoning or rezoning. Compacting land uses in a convenient location minimizes time needed to reach the location and maximizes potential for interaction. Small and varied parcels closer to a station or a transit line would indicate a compact TOD.

Figure 3.5 – Vertical Density within TOD.

The final concept, Shift, looks for opportunities for urban resources to be transitioned away from vehicular travel and toward a supplement to transit modes (ITDP, 2014). This entails minimizing area solely occupied by motor vehicles through off-street parking, driveway density, and overall roadway area. This can be complicated, especially in areas containing highways or large arterials, or suburban stations that rely on park and ride lots to provide for potential passengers. The key is to divert automotive traffic around a station and direct pedestrian traffic towards a station. The shift indicator goes hand and hand with both the connectivity and access indicators, but will not be focused on in this report's methodology.

MODELS OF CORRIDOR TOD

The Center for TOD's "Transit Corridors and TOD" provides examples of implementation of corridor-wide TOD plans across many different rail systems in North America, including the Minneapolis North Star Line, Valley Metro Rail in Phoenix and Tempe, Arizona, and the Blue Line in Charlotte, North Carolina (Thorne-Lyman &

Wampler, 2010). However, the best examples of Corridor TOD can be found in Curitiba, Brazil, and Arlington, Virginia.

Curitiba

In 1965, due to public request, a new master plan was proposed for the city of Curitiba, controlling its growth along two main transit axes in the city, as seen in *Figure 3.6* (Tadamun, 2014). This articulation of urban form allocated that high density development was "allowed almost exclusively along the transit main structures, the axes aiming to stimulate the use of public transportation and optimize public urban infrastructure" (Duarte, 2012, 184). This was opposite to what literature and historic practice, suggest, that transit follow urban expansion. The city fulfilled this transit plan with Bus Rapid, providing for physical features such as segregated bus lanes, integrated routes, terminals to handle feeder-to-trunk transfers, on-level access between the bus floor and platforms, a single fare collection system, and prepaid fares.

Figure 3.6 – Axial Development Surrounding the Curitiba BRT Corridor.

The results of this Bus Rapid transit plan are astounding. The 22-kilometer north-south axis serves over 400,000 passengers per day, compared to the entire Rio de Janiero's subway system that serves 600,000 passengers a day. A 28% increase of ridership was

projected from 2007 to 2014, a faster rate than the city itself is growing, so this surprising ridership number has planners already starting to plan an upgrade to a higher-capacity system in rail (Duarte, 2012, 185).

To explain this phenomenon of higher ridership than what would be projected by population growth, Duarte conducted an origin-destination study of the transit line's riders (Duarte, 2012, 186). The study found some surprising results. The city center was still a major destination of those in the OD survey, though there did stick out a few regional centers outside of the CBD. Additionally, while a significant amount of riders live within the corridor, as expected when the city's strategic plan was made, the majority do not. These passengers do so due to discrepancy in terms of municipal land zoning along the corridor and their socioeconomic reality, relying on feeder systems to take them from their home to a terminus along the corridor (187).

Curitiba's BRT is successful through efficient first and last mile connections to the major transit system, either through feeder buses, shuttles, or pedestrian infrastructure, so the corridor is impacted and performs greater than expected, allocated by these significant populations that do not live within the corridor. Nevertheless, several factors come into play in the discrepancy of land use along the corridor and the supporting ridership. This includes high rent along the corridors, land speculation of land owners, and a mismatch of transit demand to public housing supply that's not located along the corridors (Duarte, 2012, 191). Duarte's recommendation is to provide possibilities for land value capture for future transit lanes, and to implement carrot and stick policies (192-193) for landowners, incentivizing compatible and de-incentivizing incompatible zoning and land uses, as means to prevent further land speculation along the corridor. This would make more affordable land available for housing for residents that require the transit line to commute daily. Along with the upgrade to a higher-capacity transit system (183), continued expansion of regional growth centers is expected in Curitiba.

Washington Metro

On the American side, the Rosslyn-Ballston corridor is the best achievement and framework for Corridor TOD. The corridor consists of five stations in Arlington, Virginia, along the Orange Line of Washington Metro, that began operation in 1979. Each station was built simultaneously in the 1970s as a part of a collective neighborhood coalition. The original alignment of this corridor was along Interstate 66, bypassing important commercial areas in Arlington, but county officials lobbied to have the route changed due to public inquiry and interest. A joint effort by county officials, staff, and citizens created a 12-year plan for development along this new corridor (City of Arlington, 2016). The stations were placed roughly half a mile from each other (where station-to-station was immediately walkable), and through a "bulls-eye" system, development intensified in height and density approaching each station, and tapered off the further away. Each station serves as a "focal point" for the neighborhood, and each with unique land use mixes and identities. Rosslyn Station is a commercial and office center. The Courthouse station serves the civic government for Arlington County. Clarendon Station is a pure "urban village", and acts as the area's center for nightlife. Virginia Square Station is mostly residential, but also contains the Federal Deposit Insurance Corporation and a division of George Mason University. Ballston Station was developed as a new "downtown", containing a mall, along with a residential and commercial mix. *Figure 3.7* illustrates the land-use makeup of the Rosslyn-Ballston corridor in context with surrounding neighborhoods.

Figure 3.7 – Axial Development in the Rosslyn-Ballston Corridor.

As a way to “encourage and enable use of alternatives to the automobile”, local planners leverage continued service to public transport and provide transport demand management programs. Other provisions include pedestrian and bicycle facilities, tight parking regulations, and general marketing of the success of the corridor (Buehler, et al., 2015, 308). Additionally, the involvement of local citizens and area planners continues past the corridor’s initial beginning. “The Arlington Way” is a citizen participation outreach by the county, “characterized by inclusive, accessible, respectful, constructive, persistent, and purposeful dialogue” (307). As a way to bring together policymakers and planners, along with bringing about development and design innovations and refinement of planning principles throughout the corridor, initiatives such as PLACE (Participation Leadership and Civic Engagement) keep outreach to the community a priority (307).

The unique identity-making of the initial land planning and continued public involvement within the corridor has translated to great success today. The corridor is very attractive to developers and cited to be “a model by other jurisdictions” and “some of the most successful real estate markets in the Washington area” (Rich, 2012). In 2012, 1,100 residential units were actively under construction in the corridor, with another 1,100 units planned within the following 36 months. Residential rent was considered one of the highest in Virginia, while vacancy rates were at 2.7%, considered the lowest in Northern Virginia. On the commercial side, over 23 million square feet of privately-owned office space was available in the corridor, with plans to construct an additional one million square feet of space, even with a low 8.7% vacancy. In total, 30,000 housing units and 3,800 hotel units serve the major growth in the corridor (City of Arlington, 2016), with the quarter-mile radius of the corridor up 107% in population from 1990 to 2000 (28% of Arlington County’s total growth in that time). On the ridership side, from 1990 to 2012, the corridor saw an increase of average weekday passengers (Buehler, et al., 2015, 304) from 67,600 to 96,000 trips (42%). The share of people using public transport in the county increased from 18% in 2000 to 27% in 2006. And despite the enormous growth of development, traffic has only minimally increased, and single-occupancy commuting has moderately decreased

(from 55% in 2000 to 47% in 2006). With rents as high as they are anywhere in Virginia for both residential and office space, and vacancy as low as anywhere in Virginia (Rich, 2012), population continuing to grow at a rapid pace, and ridership at a very high level (Buehler, et al., 2015, 304), it seems the corridor continues to flourish.

Still, the corridor faces some challenges. The incredibly high land rent forces affordability concerns. A zoning framework within the area provides incentives for developers that can include it, including density bonuses, and "a requirement of one-for-one replacement of affordable units in a designated area called the Special Affordable Housing Protection District" (Bueheler, et al., 2015, 308). Other issues focused on in the corridor are historic preservation, cohesive design of the built environment, and continued improvement of facilities for pedestrians and bicyclists. Continued efforts by the community and by planners will help this corridor further prosper. Nevertheless, corridor-oriented TOD thrived in the Rosslyn Ballston Corridor by providing a framework and context for office space outside of DC Proper for Virginia commuters, a pedestrian-oriented environment to navigate the area, a unique identity and point of attraction for each station along the corridor, and a strong continuing relationship with the community.

Chapter 4: Dallas Rail

ORIGIN

DART began in 1983, when Dallas voters cast in favor of a regional transportation agency to manage public transportation assets within the Metroplex. (DART, "DART History", 2016). Operation began in the next year, providing bus service in Dallas County. Ridership numbers in the first years were big enough for the agency to expand to all of its member cities, including express bus service to the suburbs of Richardson, Plano, Carrolton, and Farmers Branch. Initial regional rail plans had the rail system at 147 miles in length, but was cut back to 93 miles due to lower revenue resources and the reliance on long-term bonds. The DART Transit System Plan was adopted in 1989, with the agency purchasing right-of-way from surrounding railroad companies from 1988 to 1994. Construction began on the light rail in 1990, and the first phases were complete in 1996. The Blue Line ran from Illinois Station in South Dallas to Pearl Street in Downtown, while the Red Line ran from Westmoreland Station in West Oak Cliff to Pearl Street in Downtown. Initial ridership in the line's first month exceeded projections by about 20%, creating momentum for additional expansion. The Red Line expanded north to Park Lane Station in 1997, spanning a 3.5-mile subway underneath US 75. This expansion doubled passenger ridership on the Red Line and prompted an acceleration of funding for construction to the suburban member cities. Richardson (to Galatyn Park Station), Plano (to Parker Road Station), and Garland (to Downtown Garland Station), all received light rail extensions in 2002.

The first five years of the rail service saw ridership grow every year, reaching 50,000 daily in 2001 (DART, "DART History", 2016). In fact, ridership turned out so well on the initial two lines that in 2000, 77% of voters approved expansion of the system, accelerating the creation of the Green and Orange Lines (Dittmar & Ohland, 2004, 156). The Green Line was completed in 2010, connecting North Carrollton-Frankford Station in Carrollton at the north, and Buckner Station in Southeast Dallas at the south, to Downtown Dallas. The Orange Line was opened in 2012, connecting Beltline Station in Irving to

Downtown Dallas. The line leading up to Plano was also designated as Orange Line, providing double frequency service (during rush hour) along DART's busiest corridor.

Since the Green and Orange Line's completion, other extensions have further added to the system. This includes the infill Lake Highland Station in the namesake neighborhood in Dallas in 2010, the Blue Line extension into the suburb of Rowlett in 2012 (where the northern terminus currently is), and the Orange Line extension to DFW International Airport in 2014, connecting downtown to one of the busiest airports in the country (DART, "DART History", 2016). In 2013, DART began a streetcar service from Downtown to the Bishop Arts District of Oak Cliff. Plans are being made to extend the streetcar to connect with the privately-owned McKinney Avenue Trolley in Uptown. The most recent expansion (opened this October) is two stations (Camp Wisdom and UNT Dallas) on the south end of the Blue Line, connecting the Dallas campus of UNT to downtown. Trains run from about 5 AM to 2 AM each day, in fifteen minute headways during peak hours and 20 minutes during off-peak hours. Stations that serve multiple lines will have even smaller headways than that. *Figure 4.1* shows the current DART system map (DART, "DART Rail Expansion Maps", 2016).

Figure 4.1 – DART Current System Map

CURRENT TOD PROJECTS

From the beginning, planners within DART understood the transportation and land use connection. Former executive director Roger Stumble conducted market research and analysis to identify initial opportunities at each station and designated staff to act as liaison to willing developers (Dittmar & Ohland, 2004, 156). The initial research on development along DART by UNT researchers Weinstein-Clower in 1999 signified that the introduction of rail was a positive impact on property values in 11 of 15 neighborhoods (Weinstein & Clower, 1999, 15), and that property valuation were 25% higher within a quarter mile of station areas than control groups (Dittmar & Ohland, 2004, 156).

Despite this, at the turn of the century, the City of Dallas had not designated TOD as a special planning and zoning category. Instead, the market drove its initial implementation. Local brokers and developers recognized that DART impact was a net positive on the local economy, claiming the rail's presence was good for development marketing. Around some of the rail system's stations sprouted award-winning urban village designs and mixed-use orientation, most of which were new and ground-breaking to the region, and unique to their respective local area. A 2003 follow up to Weinstein and Clover's initial 1999 report found that the rail line enhanced residential properties by 32.1% from 1997 to 2001, opposed to a 19.5% growth at control areas. Office properties at rail stations grew in value (24.7%) almost double of control groups (11.5%), and market value of vacant lots grew by 11.1% just due to proximity to light rail (Dittmar & Ohland, 2004, 157). Transit-adjacent projects built since the rail's opening had valued at over $1 billion in 2004 (160) and much larger today. DART claims that TOD projects along DART have generated $7 billion in new and planned development, 43,000 new jobs, and $229 million in tax revenue (DART, "Rail-connected", 2016). While those numbers seem over-inflated, it exudes confidence in the agency's ability to affect development.

The potential of Transit Oriented Development was a big motivating factor in the rail's expansion, especially to the suburbs. At Downtown Plano Station, an initial $800,000

investment grew to a 3.6 acre transit village, bringing multiple businesses and multi-family development to revitalize the historical downtown of the suburb. New renters within the village were attracted to the 450 unit project, considered "more ambitiously urban" than anywhere else in Plano (Dittmar & Ohland, 2004, 159). The station's presence attracted further developers, bringing in $40 million in TIF generation, and raising values of land by almost 200% (Schmitt, 2011, 1). In Richardson, Galatyn Park Station saw a 500-acre mixed-use development, including a hotel, performing arts center, and a 2-acre public plaza Plano (Dittmar & Ohland, 2004, 158). The station further expanded the city's Telecomm Corridor, containing thousands of acres of offices and corporate campuses in the telecommunication sector. Other suburbs have opted into developing near their stations and historic downtowns, including Carrolton, Farmers Branch, and the Las Colinas section of Irving.

Through TIFs, public-private partnerships, and federal grants, DART has been able to fund innovative TOD projects throughout the Metroplex. Most recently, NCTCOG has awarded a $1.4 million federal grant to DART for infrastructure projects to improve accessibility to 28 stations along the Blue and Red Lines, focusing on "last-mile" accessibility, making pedestrian crossings safer, completing sidewalk networks, and understanding parking utilization within station areas (DART, "$1.4 Million", 2016). There are also some current development projects in full swing at many stations. Several suburban downtowns are looking to improve the pedestrian interface with their respective stations, including Farmers Branch, Carrollton, Garland, Rowlett, and Plano. Cityline Station, at the Richardson-Plano border, is under accelerated development, creating 160,000 square feet of retail, 10.8 million square feet of office space, and over 5,000 multi-family units (Johnson, 2016, 25). Planners see the station as a major conjunction of highways, pedestrian trails, and both light rail and commuter rail in the Cotton Belt Rail. Upon its completion, the commuter rail will directly interface with the station, allowing residents and workers to connect directly to DFW Airport (Cotton Belt) and to Downtown (DART). Appraised values in the two TIF districts funding the TOD are projected to be $737 million (35-37).

Figure 4.2 – Cityline Station in Richardson.

Perhaps the most notable TOD already existing in Dallas lies at Mockingbird Station, an important lifestyle center four miles north of downtown. The first station in the expansion of the Red Line opened in 1997, adjacent to the wealthy Park Cities and Southern Methodist University (both across Central Expressway). However, development didn't really flourish until 2001. Developer Ken Hughes started the private venture next to Mockingbird Station with no public involvement and no guidelines to follow. Initial projects at the 10 acre site cost $105 million, and included 150,000 square feet of office space, 183,000 square feet of retail, 211 apartments, and 1,440 parking spaces (Dittmar & Ohland, 2004, 160). In addition to the variety of development around it the station is a transportation hub, serving three DART lines (Red, Orange, and Blue), and including connections to the Katy Trail, a frequent shuttle to SMU, and multiple local bus connections.

Mockingbird Station's success lied its design and place-making. Randy Shortage, architect for the firm that designed the station area, noted that attention to the retail aspect was integral, especially the "thought given to which shops go where, their relationship to other shops, to the street, to the street corner, and to the rail station, and who will be walking

past the shop at what hour of the day or night." (Dittmar & Ohland, 2004, 172). In 2001, at its first phase completion, the station area was considered unlike any place previously within the Dallas area. A *Dallas Morning News* critic noted that with the station's opening, "the urbanity quotient shot up dramatically" (161). The design of the area was described as "a complex, citified, and intriguing environment that made the visitor want to explore and that was full of the kinds of 'messy vitality' Robert Venturi advocated". It was apparent Ken Hughes was aware of the psychological and emotional impacts that development would make to a user upon entering or exiting a station area, and advocated to facilitate the movement through the space to create "…activity [that] breeds a sense of excitement and security" along with convenience (162). *Figure 4.3* illustrates the development above and surrounding the partially-underground station (Dittmar & Ohland, 2004, 163).

Figure 4.3 – Mockingbird Station in Dallas.

However, the station's main challenge is pedestrian movement to the station itself. Ken Hughes noticed the difficultly of the station's placement in conjunction with Central

Expressway only 700 feet to the east, effectively blocking high volumes of pedestrian traffic in the west. (Dittmar & Ohland, 2004, 162). The rail line also starts to descend to a three mile underground tunnel, as it goes south, and the station lies in a cut portion above ground, but twenty feet below the development. Connections to the station down below were crucial, along with providing the immediate place-making when ascending from the station on the elevator or escalator. Outside connections were "tenuous at best", but hope to be improved since the project's inception, including a planned pedestrian bridge to connect to the Katy Trail, current shuttle service to SMU, and collaboration with the City of Dallas to slow traffic and provide better pedestrian infrastructure on Mockingbird Lane. Nevertheless, the tenuous pedestrian connections to the station and the station area makes Mockingbird Station a development that should have been much more successful.

The current transit corridors of DART have sprung some notable TODs since the beginning of the system's opinion. But despite this, the prevalence on inter-urban travel for suburban commuters implies a majority of one-way directional trips on the system (outside to inside) during peak hours, neglect and isolation of TODs along the line, and passenger and system congestion at the Downtown stops, served by all 4 lines. This will only worsen with current population and employment projections.

CORRIDOR TOD IN DALLAS

Along with the Cotton Belt Commuter Rail and D2, agency officials are in the stages of managing urban growth and enhancing TOD-compatible areas around existing stations. Continuing research into corridor development in Dallas, and designating a corridor-oriented boundary for this development, could be beneficial with this process, by delineating the focus of each of DART's corridors. To get a perspective on the corridor concept within Dallas, a series of interviews were made with various officials and a developer in the Dallas area, as will be further discussed in the Interview Analysis sections of the Methodology and Findings chapters.

Jack Wierzenski, the Director of Economic Development at DART, claims that the agency has a corridor approach when selecting service lines for either rail, BRT, or local bus service, and has a corridor approach when selecting sites than are suitable for TOD projects, but strives to create an individualized identity for each station rather than physically delineate a corridor.

> "We want each station to be independent in terms of the development around it, whether it's a destination or an origination site. Whether it's the local goal, or the regional goal, it's the same thing. How to connect those areas and get people out of their cars." (Wierzenski, personal communication, November 3, 2016).

A similar sentiment can be found in other cities. In Carrolton, collaborative efforts that can be found in Corridor TOD planning did not really flourish between Carrollton and its adjacent member cities, even with collaborative efforts in public works and police services. While the city struggles to create an identity at every station, recognizes the importance of establishing the identity of their city's stations within the regional context of the region-wide corridor (Nelinson, personal communication, October 20, 2016). In Plano, the idea of a corridor context is consistent with the city's outlook on TOD, based on their comprehensive plan. The city advocates creating unique identities for stations in their TOD plans, though advises that the real estate cycle is important in determining that for their specific stations and may affect the broader context proposed in Corridor TOD (Braster & Day, personal communication, October 21, 2016).

Some criticisms of the concept come from a few different sources. Scott Rohrman, a developer in the Deep Ellum neighborhood in Dallas, prefers the term "matrix" rather than "corridor" because the latter implies that the can only be accomplished through linear development, when it's the fabric of a surrounding neighborhood and the connection to a station that is most important (Rohrman, personal communication, October 20, 2016). Additionally, he feels density should be tied to the market and not physically limited to just a corridor. Dan Johnson, City Manager of Richardson, recognized the inability of DART and member cities to have acquired all of the land along the rail corridor at the time of its development. Because of this, there are significant gaps to reaching a theoretical corridor

TOD within the Metroplex, especially along sections of the corridor where stations are further than a mile apart. Dan counsels that highest and best use would supersede a specific use to benefit to a specific corridor, in TOD planning.

> "…the ability to see a rhythm within our 4 rail stations and how they fit with others along the way isn't under some big master plan. There's no one by governance that can regulate it. We are the keepers of the land use for our area, and no one else can tell us that." (Johnson, personal communication, October 20, 2016).

Dan does recognize, however, elements of TOD that can be stretched along a corridor, and that trails and pedestrian infrastructure are the keys to doing so, as ways to simulate and guide corridor development or to connect entry points to the transit system to pockets of development within a corridor not near a station. The caveat is that he cautions that natural gaps in the corridor, such as creek systems or major highways, may discourage a continuous course of infrastructure allocation.

DART Expansion and TOD

Upon the approval of both D2 and the Cotton Belt Commuter Rail in late October (Fancher, 2016, 1), DART has sent mixed messages to suburban municipalities, developers, neighborhoods, and urbanists alike. From the Cotton Belt, Addison will receive rail service for the first time in 30 years of paying for it. Populations living in the northern counties also will get one more option in traveling to the DFW Airport, along with across the Metroplex itself. However, the agency's decision to fast-track (initially scheduled to open in 2035, pushed up by at least a decade) this lucrative commitment in supporting suburban interests alienated those who are working to improve the reliability of DART within the city. D2 was being planned to reroute two of the light rail lines through downtown, serving the Government and Farmers Market Districts of Downtown, and decongest the areas already served by rail downtown. To developers and Dallas City Council members, the desire to sink the new line underground partially or in full, along with improving the bus network, superseded any other commitment DART could make in

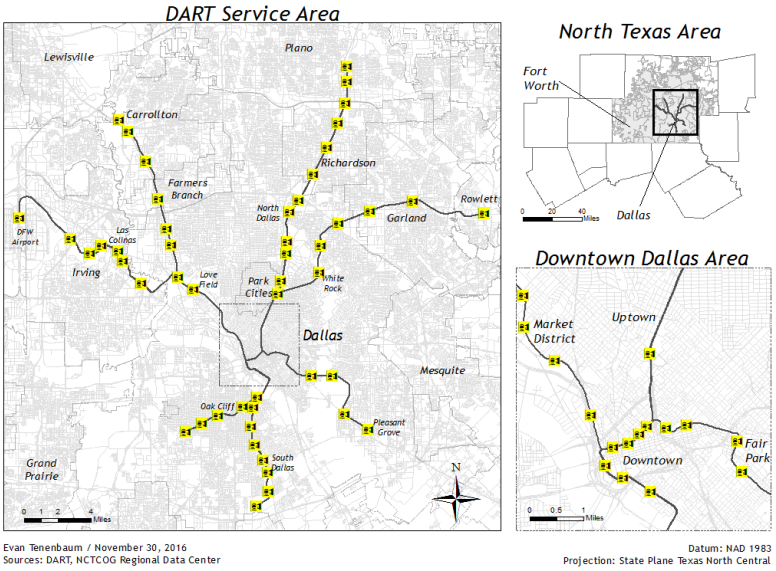
the short-term. DART's ability to build D2 underground was dependent on the commitment it would take regarding the Cotton Belt, and vice versa.

So, as *both* projects go forward with a scheduled operational date of 2022, the discussion between urban and suburban interests driving DART continues. When DART rail was first constructed, priority is given to ensure that suburban commuters can reach a station by providing parking, rather than prioritizing placemaking, where riders can interact with a station. As the system continues to expand, the assurance of supplying the population and density needed to support urban rail is even more important, and through Corridor-oriented TOD, opportunities can be found on the existing system to strengthen the connection between land use and transportation around DART stations.

Chapter 5: Methodology

STUDY AREA

To better understand the characteristics of Dallas area neighborhoods that would adhere to Transit Oriented Development, two separate units of study will be needed. The first unit encompasses neighborhood characteristics that are derived at the census tract level. Census tracts are geographically at a comparable level to neighborhoods and are at an adequate aggregation level. Census tract information is pulled from 5 counties in the Dallas Fort Worth Area: the 4 counties in which DART Rail currently operates, and the addition of tracts from Rockwall County, which contains a significant commuter population that comes into Dallas via the Blue Line. These five counties contain 5,700,465 residents in an area of 3,797.6 square miles, and serve as a proxy to total potential users of light rail within the Metroplex. While the DART service area does not fit this delineation, commuters that feed into the light rail corridors majorly originate from these counties. *Map 5.1* shows this study area in context of the position of the rail lines.



Map 5.1 – The Selected Study Area

The other study area unit delineates the boundary of current and potential TOD characteristics near DART Rail stations. Land use, transportation, and infrastructure

characteristics of quarter-mile and half-mile buffers from stations are used to create a proxy for an expanded Corridor TOD, applied to a half-mile buffer of each DART rail corridor.

The corridors are defined as the single-directional corridor in which commuters travel to reach employment centers along one line. The Red Line contains two major corridors: the Oak Cliff Corridor (Westmoreland to Downtown), and the Richardson-Plano Corridor (Parker to Downtown). The Blue Line is composed of the Garland-Rowlett corridor (Rowlett to Downtown) and the South Dallas corridor (UNT Dallas to Downtown). The Green Line is composed of the Carrolton Corridor (N. Carrollton/Frankford to Downtown) and the Southeast Dallas Corridor (Buckner to Downtown). The Orange Line shares one corridor (due to its alignment) with the Red Line in the Richardson-Plano, and also contains the Irving Corridor (DFW Airport to Downtown). Sub-corridors can further divide clusters of activity areas along a corridor. For instance, the Richardson sub-corridor contains the 4 stations in Richardson along the larger Corridor.

INDICATOR ANALYSES

To better understand the characteristics that would adhere to TOD in Dallas area neighborhoods within DART rail corridors, an analysis of current characteristics across the current system is needed. Based loosely on the initial methodology of the Atkinson-Palombo and Kuby Valley Metro Rail study (2010), and using modified preferences from the Institute for Transportation and Development Policy's TOD Standard Scorecard (2014), indicators are created and tested for significance across the corridors of the four rail lines. Certain indicators are measured within the half-mile buffer of the entire transit line, while a few others are measured at a quarter mile. A comparison of the metrics of these corridors, and the stations along each, will be made, determining the current and potential adaptability to corridor-wide TOD, based on CTOD typology and the regional context from collected interviews with professionals (see Interview sub-section). From this recommendations of densification, addition of bike and pedestrian infrastructure, public

space, mechanisms for accessibility to stations, and land use mixes, near and in between stations, based on the corridor's typology.

Data for this analysis is collected from various sources, such as the North Central Texas Council of Government Regional Data Center, the American Community Survey, US Census, Dallas Economic Development Guide, City of Dallas, the Center for TOD Database, and directly from DART. Some variables and attributes will be calculated and joined to several GIS shapefiles of DART station areas, while other analyses will be done directly through GIS. Statistical summaries will be made on the entire system, the each line, and each corridor of each line, with some metrics also calculated Metroplex-wide for comparison.

INDICATORS

Demographic Indicators

The first category would be determining populations near stations that would most require the use of transit. This category is very wide and includes demographic and economics metrics that determine the mix of transit users of DART. Indicators in this category are straightforward, determining for corridors with the highest rate of populations having 0 or 1 vehicles available, percentage of using public transportation, biking or walking, number of vehicles available per housing unit, median income of population, transportation costs as a percentage of housing costs, age, and educational attainment.

Bike and Pedestrian Connection Indicators

The next indicator category would be transportation access to and from stations. Facilitating first and last mile movements is essential to the permeability and place-making of development in transit corridors, especially in areas outside of the half-mile buffer of the station, but inside the half-mile of the line. The indicators are presence of bike trails near the station and presence of pedestrian infrastructure near the station. Because of incomplete data sets obtained for bike trails, bike lanes, and pedestrian infrastructure, these

indicators will be of a qualitative analysis. The presence of a connection to bike or pedestrian or infrastructure within a station plan or the corresponding city's comprehensive plan would be sufficient for the indicator. The presence of these attributes indicates a station area with multiple transportation options upon exiting the transit system, and less of a reliance on automotive transportation.

Connectivity Indicators

Connectivity indicators measure the walkable area around a station area and connections to other modes of transportation. This indicator will be measured in both station areas and corridor-wide, through design preferences will be more oriented toward just station areas. Shorter blocks and obstruction-free paths are key in movement through a station area.

Three indicators will be taken for this category. The first is service area (for walking) percentage. The ArcGIS Network Analyst will be used to generate 5 minute and 10 minute service areas (quarter and half mile) around every light rail station. The result would be the percentage of the service area calculated by the corresponding aerial buffer (as-the-crow-flies). A higher percentage indicates a more connected station area due to multiple paths around street blocks.

Another indicator is other transit connections. Being able to facilitate movement from one mode of transit to another can ease first and last mile difficulties for those commuters who do not have a car and live so far away from the station that they cannot walk or bike. The number of shuttles or bus lines connecting to a station are agglomerated using the dissolve and spatial join functions in ArcGIS. A station with a number of transfer opportunities lower than the corridor average indicate less opportunities well outside of the station that are reachable. A corridor with a lower rate of transit connections indicate that improvements need to be made to ensure accessibility to the corridor in modes other than the car.

The presence of park and rides at stations provides access to residents that do not live in the immediate area of the station, which is crucial for increasing ridership for a

station and activity for a station area. However, it takes up a significant amount of space at a station site. This indicator is calculated by the percentage of stations within a corridor that have a park and ride component. A high percentage indicates high vehicular dependability and design priority. Alternative methods of parking, whether on-street, off-site lot, or parking garage, are encouraged (depending on city parking regulations for transit districts), while on-site lots are considered potential for redevelopment.

Station Performance Indicators

The transit frequency indicators will measure a station's performance compared to other stations in a corridor. Ridership data for each station was obtained from Project Manager Philip Johnson of DART, indicating the average total count for riders per day at both peak and non-peak hours. But it's important to note that both directions of the transit system have separate ridership counts. The differentiation between the directions are noticeable during peak times of day. For instance, a station might experience more passengers in the morning going towards the city center than going the opposite direction, and vice versa during the evening. These counts are agglomerated based on if the individual station serves multiple lines. From this, indicators are derived. Hourly passenger flow is the total number of passengers that goes through a station at peak and non-peak times. A high hourly passenger flow rate indicates a well-performing station. Peak-to-non-peak (PNP) ratio is the percentage of total passengers going through a station during peak hours as a whole of the total. A station with a low PNP ratio indicates that its ridership isn't heavily reliant on peak hour ridership that is attributed to commuting, and would also indicate that the station acts more as an activity center. A station with a high PNP ratio indicates is performance is heavily reliant on peak ridership, acting as an origin center, and could potentially use ancillary development to activate the area during non-peak times.

Mix Indicators

As the largest category, for the mix indicators, land use around the station area will be analyzed. This was chosen at stations rather than whole corridors because developers' preferences for projects will be more lucrative and relevant directly near stations versus

just within proximity of stations, and because the distance between stations is generally longer in Dallas than other comparable cities. But, by looking at these indicators across the entire corridor, it is easier to pinpoint certain land uses mixes that are Transit-compatible and those that could become so through infusion of TOD. Getting an established land use mix that is transit-compatible could involve redevelopment, so it is important to identify areas near stations where that could happen. Land use categories are taken from the 2010 land use data set from the NCTCOG Regional Data Center. The shapefile was intersected with each buffer (quarter, half, half on corridor) and dissolved and summarized by land use type. Similar land use types were also grouped for category simplification.

Several indicators fall under this category. The first of these indicators is land use variance, measuring the variety of land use types within a station area, excluding uses under 1% of the total area, undeveloped land, and uses that are undevelopable (such as water bodies and flood control). This is calculated as the difference from the mean number of land use categories along a corridor. Having too small of a variance (negative) indicates a lack of diversity within a station area, which could be a missed opportunity or potential for development through rezoning. Having too large of a variance (positive) indicates a lack of cohesion in the area.

The next mix indicator is a unique use. This is derived by having a dominantly-used land use type within the station area, typically one that comprises of at least 20% of the area, is directly adjacent to the station, or draws significant ridership. This indicates a land use that gives a primary reason for passengers to travel to that station.

Another indicator would be percentage of non-transit-compatible land use. This groups land uses within a station area that have the least potential to interface with the system, due to an environmental restriction, adhesion to a vehicular use, or an unknown or no plan for use. This includes environmental protection uses such as flood control, water bodies, lakes, and rivers, industrial and warehouse uses, utility use, transportation uses such as parking, farm, ranch, and timberland, and undeveloped or vacant land. A station area with a high percentage of non-transit compatible land use indicates low interface with the transit system.

Subtracting environmentally-restrictive land uses yields a redevelopment potential sub-indicator, finding land uses that are not currently compatible (like above), but can be most easily turned over to compatible uses through rezoning. Parcels used for single-family residential, parks and flood control are left out as they are the hardest to convert, considering they are incumbent and well-established within a neighborhood (single-family), or are physically unsuited with development (flood, control).

The compatibility indicator measures the opposite, finding current land uses that are compatible with TOD. This includes uses that generate either origin or destination trips to a station. The best signs of this are the RCO category (retail, commercial, and office use), the CHE category (civic uses, health centers, and education), multifamily housing, park space, and mixed-use (a new but sparsely-used category in the dataset). Higher percentages of these categories indicates more potential for origin trips and destination trips.

Finally, the adjacency indicator takes the percentage of compatible and redevelopable land uses at a quarter mile and half mile and determines if there's a statistically significant difference between their mixes. If there is a difference (quarter mile percentage minus half mile percentage), this would indicate a different development pattern or habit occurring directly adjacent to a station rather than just in a general vicinity of a station (in transition to the surrounding area). A positive variation indicates more compatibility closer to a station, while a negative difference would indicate more dispersed compatible uses.

Density

Density indicators are also integral to TOD success. Creating compact and vertical environments improves performance of the system by allowing more dense and varied uses closer to a station. All of these indicators were collected from the Center for TOD Database, either metrics collected from the 2010 Census or from the 2009 LED Work Characteristics.

Population density is the first and most important indicator, but very simple. The more people within a station area, the more potential there is to use the transit system. This

is calculated by total population within a station area divided by the size of the area. The average population densities of all of the stations along a corridor are determined and compared against the other corridors and the entire Metroplex. This calculation is also extended to both housing density and employment density indicators. Areas of high housing density are areas with higher potential as an origin, while employment density are areas with more potential as a destination. Similar to population density, total housing or employment is divided by area. The average of the indicator of all of the stations along a corridor and compared against the other corridors and the entire Metroplex.

From these, job-to-housing ratio can also be considered. Calculating this indicator for a station area determines whether the station is more of an origin or a destination along a corridor, and can guide future growth within that node by providing supplementary development. The ratio is as simple as dividing the number of employment opportunities by the number of housing units in the station area. A ratio over one indicates more employment opportunities than residencies in an area, and therefore more of an inclination that the area attracts more residents from outside the immediate area. A ratio under one indicates more residencies than employment, and therefore more of an inclination that the station is an origin or there is a substantial lack of employment in an area. Averaged across the entire corridor, delineating Destination and Commuter Corridors can become clearer.

For physical density, measuring street compression is essential. The indicator for average block size for a station area measures the compactness of the street network and ability to create compact development without large-scale parcelization. This attribute is calculated by dividing the total number of blocks in a half mile buffer of a station by the area. High street compression (small street blocks) designates higher physical density of the area and more-suitable network for development.

INTERVIEW ANALYSIS

To understand the main stakeholders involved in the development of TOD, and to understand their local perspective in the regional context, a series of interviews were

conducted with several professionals in the Metroplex. These were conducted to fill in the human element gap in the analyzed data, to get perspective on the human actors in the TOD process, to assure that recommendations of corridor TOD are compatible with both city comprehensive plans, TOD standards set by DART and existing literature, and developers' financial interests. From three major players in the development of TOD, the developer, the city, and the transit agency, careful introspective was given on the TOD process, the steps taken to regionalize the process, the feasibility of a corridor approach, and warnings to its implementation within the perspective of Dallas. Interviews were conducted on October 20, October 21, and November 4 at the respective city offices (city officers), at the DART main building (transit agency), and a coffee shop in Central Dallas (the developer).

For a private developer's perspective on the relationship with transit agency in the development in TOD, developer Scott Rohrman at 42 Real Estate, a firm based in the Deep Ellum neighborhood in Dallas, was interviewed. For a city's perspective on TOD, three separate cities, all along DART's busiest light rail corridors, were chosen, to interview officials, each with different expertise and familiarity of their cities' TOD projects. The three cities, Carrollton, Plano, and Richardson, all are suburbs with a large potential population to use and access the light rail within their respective cities. From the City of Carrollton was the Development Program Manager, Krystle Nelinson. From the City of Plano was the Director of Planning, Christina Day, and Director of Special Projects, Peter Braster. From the City of Richardson was the City Manager Dan Johnson. Finally, from the transit agency in DART, Jack Wierzenski was chosen. As the Director of Economic Development, he works with many of the area's cities and private developers to plan TOD across the light rail system.

The main takeaways from these interviews will be discussed in the Interview sub-section of the Results and Findings chapter of this report. The full transcript of every interview will be disclosed in the Appendix Section of this report, sections A through E.

Chapter 6: Results and Findings

DEMOGRAPHY

Results for corridor demography are within Tables 6.1 through 6.3. The two new stations were omitted due to unavailability of data, but the infill Carpenter Ranch station was included.

	Number of stations	Household Size (persons per household)		Population Change (2000-2010)	Job Change (2002-2009)	Median Household Income Change (2000-2009)	
		HHSize	SD	Mean	Mean	Mean	SD
Entire System	63 (65)	2.399	0.854	-2.01%	-2.94%	15.35%	15.11%
Red Line	25	2.222	0.766	-4.65%	-6.33%	19.35%	12.90%
Blue Line	21 (23)	2.032	0.904	2.65%	-8.95%	15.58%	16.62%
Green Line	24	2.546	0.85	17.07%	-0.65%	16.02%	15.12%
Orange Line	30 (24 off-peak)	2.000	0.807	6.77%	-1.51%	19.01%	13.08%
Richardson-Plano	13	2.133	0.368	-12.85%	6.26%	18.64%	12.81%
Oak Cliff	6	3.222	0.69	-2.48%	-20.68%	24.87%	10.93%
Garland-Rowlett	8	2.313	0.523	-2.21%	-2.42%	19.41%	18.17%
South Dallas	7 (9)	2.821	0.391	-0.82%	-11.33%	11.39%	16.46%
Carrollton	12	2.893	0.641	-4.22%	8.85%	15.15%	16.33%
Southeast Dallas	8	2.585	0.861	14.71%	18.80%	13.39%	15.20%
Irving	13	2.045	1.110	12.83%	6.29%	17.88%	14.57%
Richardson-Plano	13 (7 off-peak)	2.133	0.368	-12.85%	6.26%	18.64%	12.81%

Table 6.1 – Corridor Demography, Part One.

Household Size

Household sizes across the entire Metroplex average around 2.73 persons per household, much higher than the populations along all DART lines (2.40). This signifies that on average, more households with less children or individual households are within close proximity to the city's rail transit lines. Across each line, there's little variation in average household size to the whole system, with the exception of the Orange Line, (t-score of 2.14). This can be attributed to less housing available along the line, especially within the Irving-Las Colinas corridor, and the housing that is available being mostly multi-family units. Across corridors, variations can be found in the Oak Cliff corridor, which has a much higher average household size than the entire rail system (t-score of 2.28) due to it passing through a few Oak Cliff neighborhoods. The other corridors are not statistically significant at 95% confidence, though a few (South Dallas, Irving) are close.

Population Change

The population change in the Metroplex from 2000 to 2010 was 23.27%. But along populations along DART rail, the population has actually decreased at a rate of 2.01%. An increasing region-wide population, but decreasing transit-adjacent population, indicates an outward-expanding population growth, and a displacement of population overall along the rail line. This could signal potential opportunities to provide housing adjacent to DART, especially along stations without a unique station area identity. When looking at each line, population is increasing faster along the Green Line than other lines, mainly attributed to mixed use and multifamily developments built within the Deep Ellum-Fair Park sub-corridor at the end of the 2000s. The Orange Line attributes growth to development in the Irving Corridor, while the Blue Line's growth is credited to downtown. At a corridor level, population mainly suffers from displacement due to outward suburban growth. The Southeast Dallas Corridor's population growth is mainly in the Deep Ellum-Fair Park sub-corridor, while the Irving corridor's growth is mainly in the Las Colinas area.

Employment Change

The employment change in the Metroplex from 2002 to 2009 was 10.72%, but across the DART rail system, employment actually dropped by 2.94%. An increasing region-wide employment, but decreasing transit-adjacent employment, indicates an outward-expanding employment opportunities to follow population. While this may help in decentralizing employment away from downtown, it also decreases accessibility to these opportunities for populations along the rail line. Every rail line suffered employment, but numbers could be slightly affected by the Great Recession of the late 2000s. At the corridor level, several corridors saw increased employment during that time. Employment in the Richardson-Plano corridor increased due to an increase of office parks and campuses in the Telecom area of Richardson, Texas Instruments near LBJ/Central Station, and the North Dallas sub-corridor. Employment in the Southeast Dallas corridor was attributed to the Deep Ellum-Fair Park sub-corridor, while the Carrollton corridor's employment growth was due to an influx at the SMD/Parkland Station. The most alarming numbers for employment change are in the South Dallas corridor (-11.33%) and Oak Cliff corridor (-

20.68%), which skew the overall system's numbers. The sharp decrease in employment in these areas indicate less accessibility to employment opportunities for people living in these areas, and as employment has grown in other corridors, these populations would have to travel further to access these employment opportunities.

MHI Change

Despite both population and employment decreasing along DART corridors, the average Median Household Income of populations from 2000 to 2009 have increased by 15.35%, yet still slower than the Metroplex (16.98%). However this can be misleading, as the standard deviation of these changes is 15.11%. The variation of changes in median household income are so different across the whole system, it points to there being very little correlation between proximity to the rail system in general and increase in Median Household Income. At line level, no rail line has a statistically significant difference between changes in Median Household Income to other lines. Even further, no corridor within each line stands out in a statistically significant change in Median Household Income to the entire system. Because median household income changes so rapidly (from increase to decrease) from station to station, it's difficult to discern a pattern and attribute it to the corridor. Statistically significant differences can only be found through disaggregation of the area and looking station by station, then assumptions can be made about the populations then.

	Number of stations	Percent Age 18-59	% Age 25 with High School or Less Education	% Age 25 with Bachelors or Masters
Entire System	63 (65)	68.25%	49.97%	28.86%
Red Line	25	71.22%	41.97%	35.31%
Blue Line	21 (23)	72.10%	38.95%	36.32%
Green Line	24	73.51%	52.78%	27.90%
Orange Line	30 (24 off-peak)	74.31%	40.30%	37.87%
Richardson-Plano	13	68.29%	37.54%	39.53%
Oak Cliff	6	58.80%	73.32%	10.37%
Garland-Rowlett	8	68.15%	34.63%	42.04%
South Dallas	7 (9)	57.07%	69.30%	8.27%
Carrollton	12	68.45%	63.14%	21.28%
Southeast Dallas	8	67.68%	61.28%	20.49%
Irving	13	73.76%	56.47%	27.41%
Richardson-Plano	13 (7 off-peak)	68.29%	37.54%	39.53%

Table 6.2 – Corridor Demography, Part Two.

Age Demographics

The percent of population of the 18-59 age group, consisting of young professionals and mid-life workers most likely to access and use transit, within the Metroplex is 58.82%. This number is much higher across all lines and all corridors of the rail system, save for the Oak Cliff and South Dallas Corridors. This indicates a more youthful population in those areas, especially representative of the 0-17 age group. As these corridors go through established Dallas neighborhoods with a more traditional family structure, it seems that the population in these corridors is skewed slightly younger.

Education Demographics

The percent of population in the Metroplex with a high school diploma or less is 41.85%. The percentage of population around the DART system in general is slightly higher at almost 50%. Each line varies in difference to the whole system, with the Green Line at the highest percentage of population with a high school diploma or less. At the corridor level, differences start showing up. The Oak Cliff (73.32%) and South Dallas

(69.3%) corridors have a significant population that has a high school or less education, that skew their respective rail line numbers (Richardson-Plano and Garland have much lower percent of population with a high school diploma or less). This is also mirrored in the percent population with a Bachelor's or Master's degree, with more educated populations living closer to the Richardson-Plano and Garland corridors, and less educated populations within the Oak Cliff and South Dallas. A goal to strive for is to provide access to opportunities of higher institutions within these lacking corridors, which the new UNT Dallas station (serving the namesake university) hopes to do.

	Number of Stations	Avg. # Vehicles Available	SD	% w/ 0 or 1 vehicles available	SD	Avg % Public Transp, Bike, Walk	SD	Transportation /Housing Ratio	SD
Entire System	63	1.464	0.329	56.43%	15.26%	10.51%	8.82%	0.829	0.251
Red Line	25	1.419	0.202	60.73%	13.81%	10.81%	6.36%	0.733	0.226
Blue Line	21	1.284	0.451	56.29%	20.46%	13.04%	7.12%	0.773	0.293
Green Line	24	1.484	0.316	55.69%	16.39%	12.68%	10.81%	0.815	0.261
Orange Line	30 (24 off-peak)	1.429	0.342	58.46%	14.38%	9.45%	7.46%	0.714	0.254
Red - Richardson-Plano	13	1.401	0.182	60.14%	14.05%	7.34%	2.82%	0.737	0.167
Red - Oak Cliff	6	1.583	0.231	52.86%	14.81%	8.82%	5.09%	0.956	0.221
Blue - Garland-Rowlett	8	1.549	0.312	54.40%	13.50%	6.82%	4.28%	0.724	0.204
Blue - South Dallas	7	1.34	0.045	62.88%	7.37%	13.89%	6.06%	1.06	0.248
Green - Carrollton	12	1.616	0.207	48.88%	13.36%	9.34%	10.52%	0.809	0.176
Green - Southeast Dallas	8	1.388	0.423	59.24%	19.13%	13.33%	11.33%	0.984	0.278
Orange - Irving	13	1.504	0.472	53.52%	14.77%	7.88%	8.30%	0.821	0.246
Orange - Richardson-Plano	13 (7 off-peak)	1.401	0.182	60.14%	14.05%	7.34%	2.82%	0.737	0.167

Table 6.3 – Corridor Demography, Part Three.

Transportation

The average number of vehicles available for populations near a DART station does not vary much across the system, with no line having a statistically significant difference. Populations along the Blue Line are the closest, mainly attributed to the South Dallas corridor, but is still not quite statistically significant enough (t = 1.97) to make a difference across the line. Additionally, no corridor has a statistically significant difference in vehicles

available compared to the whole system. Comparing these populations to a broader scale, the average number of vehicles for populations across the entire Metroplex is 1.79, much higher than the 1.464 for the whole system, implying that the populations adjacent to the system tend to rely less on vehicular transportation.

For the population that lives adjacent to DART stations, a majority (56.43%) do not have more than one vehicle available. If their household is larger than 2 people, than it's likely they would require other means like public transportation to get to work or school. Comparatively, the Metroplex population with one or less vehicle available is 39.85%, indicating a wider variety of transportation options for populations outside of the vicinity of the transit system. No rail line, or corridor within a rail line, differs at a statistically significant level from the whole system, with the closest being the Carrollton corridor of the Green Line (t=1.60).

The percent of population actually using public transportation, biking, to walking to work is a very low 3.16%, across the entire Metroplex. Comparatively, populations near DART are at a 10.51% rate. No rail line, or corridor within a rail line, differs at a statistically significant level from the whole system, with the closest being the Richardson-Plano corridor of the Red and Orange Lines (t=1.28).

The transportation-to-housing ratio of the Metroplex is at about .76, indicating on average more is spent on housing than transportation out of people's incomes. For the DART system, the ratio is .829, indicating people area spending slightly more for transportation costs. Only the Orange Line is significantly different than the whole system (t=2.05), spending much more on housing than transportation, most likely due to higher home prices in North Dallas, Plano, Richardson, and Irving, along with overall centrality within the Metroplex in Irving. At a corridor level, the transportation housing ratio in the South Dallas corridor (1.06) is statistically different (t=2.31), indicating residents actually spend more in transportation than housing, likely due to a bad housing market and low accessibility via available transportation. The other corridors are not statistically different than the whole system.

CONNECTIVITY

Results for corridor connectivity are within *Table 6.4*. All 64 existing stations, plus the infill Carpenter Ranch Station was included in this calculation.

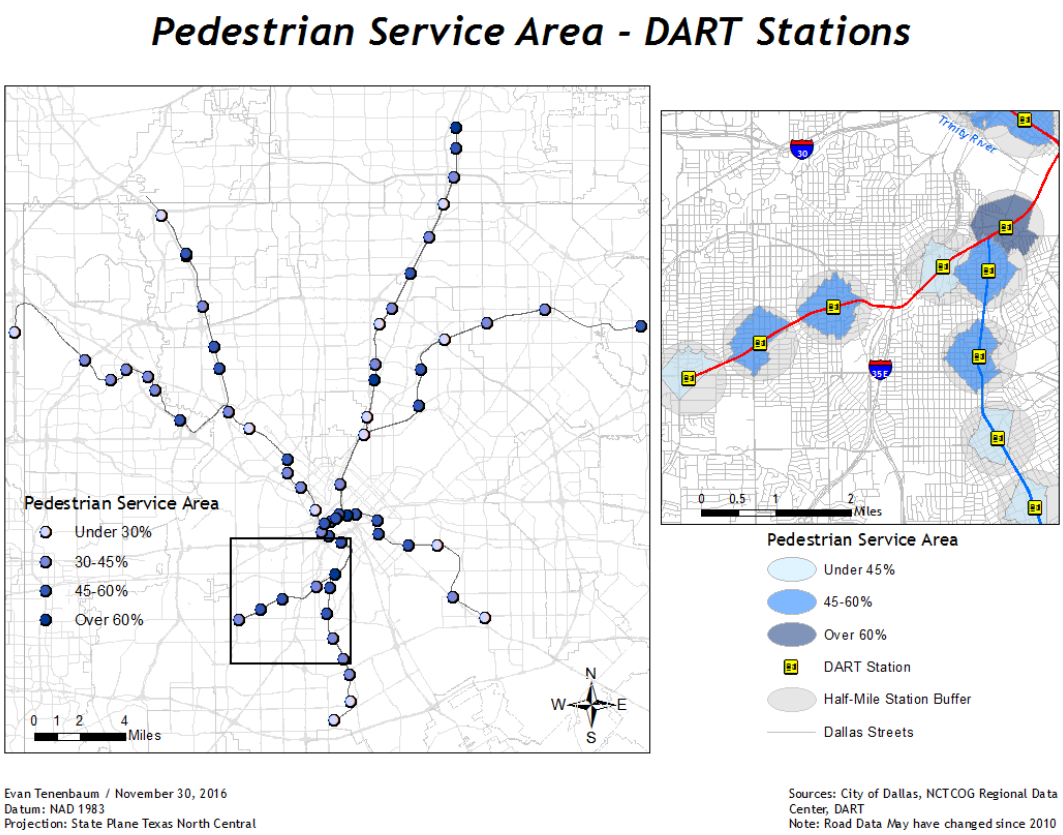
	Number of stations	Ped network		Transit Network		Parking
		Service area percentage	SD	Avg. # Connections	SD	%
Entire System	65	42.28%	13.35%	7.34	8.60	60.00%
Red Line	25	45.82%	12.56%	10.76	11.94	48.00%
Blue Line	23	44.02%	14.00%	11.13	12.49	56.52%
Green Line	24	43.61%	14.50%	10.96	10.62	54.17%
Orange Line	30 (24 off-peak)	41.49%	11.49%	8.57	9.75	50.00%
Red - Richardson-Plano	13	40.82%	13.06%	3.92	1.59	69.23%
Red - Oak Cliff	6	49.83%	9.28%	4.67	1.37	50.00%
Blue - Garland-Rowlett	8	40.52%	10.29%	4.25	2.59	87.50%
Blue - South Dallas	9	41.36%	16.80%	3.56	2.17	66.67%
Green - Carrollton	12	38.15%	14.63%	5.75	4.17	75.00%
Green - Southeast Dallas	8	45.68%	13.31%	8.25	6.08	50.00%
Orange - Irving	13	37.73%	7.16%	6.00	3.98	46.15%
Orange - Richardson-Plano	13 (7 off-peak)	40.82%	13.06%	3.92	1.59	69.23%

Table 6.4 – Corridor Pedestrian Network, Transit Connections, and Parking Provision.

Pedestrian Network

The service area percentage within half a mile of all stations is around 42.28%, meaning that a little over two-fifths of an aerial buffer around each station is accessible using the current street and sidewalk network. However, no rail line, or corridor within a rail line, differs at a statistically significant level from the whole system, with the closest being the Red Line with a service area percentage of 45.82% (t= 1.14). Despite this, corridors do significantly differ from each other. The highest percentage corridors run through existing and established neighborhoods, such as the Oak Cliff corridor of the Red Line, and the Deep Ellum, MLK, and Pleasant Grove neighborhoods of Southeast Dallas (Green Line). These neighborhoods are dense and, packed with shorter blocks, making pedestrian navigation easier. In contrast the lowest percentage corridors such as the Irving Corridor of the Orange Line, are built through previously undeveloped and low-density

areas of North Dallas and the suburbs. Some of these corridors (Richardson-Plano, Garland-Rowlett, and Carrollton) were constructed with purchased right-of-way from existing railroads that ran along major highways in the metropolitan area, therefore access to rail stations would be blocked for a significant amount of area on the opposite side of a massive highway. *Map 6.1* below compares the pedestrian network service areas across the system, with an inset on the Oak Cliff Corridor to show the physical format conducted by the Network Analysis.



Map 6.1 – System-wide Pedestrian Network Comparisons.

Other Transit

The average number of transit "connections" that can be made at any DART rail station is 7.34. This includes access to any bus lines, shuttles, commuter rail (i.e. the Trinity

Railway Express at Union Station and Victory, the Denton A-train at Trinity Mills, and future Cotton Belt Rail connections at DFW, Downtown Carrollton, and Cityline Stations) trolleys, streetcars, or APT connections directly or within the half mile of a station. At line level, the number of connections are much higher, due to the set ignoring low-transit-connected stations that do not serve the line, and the large number of transit connections at downtown stations that are shared by every line. This skews the line sets to be much higher than the whole system average. In the corridor sets, the downtown stations are not included, therefore the number of connections is significantly lower than the whole system average, with the exception of the high number of transit connections in the Deep Ellum and Fair Park sub-corridor of the Green Line, and numerous buses, shuttles, and Las Colinas APT along the Irving Corridor on the Orange Line. While the remaining corridors has relatively the same average number of transit connections, all are much lower the average of the whole system. This is concerning for the corridors that pass through areas where the population is less reliant on vehicular transportation (see Transportation set of Demography section), and would require a larger amount to maintain accessibility to employment and housing throughout the city. It's also important to note a few individual stations act as their own Transit Center, including Illinois Station on the Blue Line, Arapaho Center Station on the Orange and Red Lines, and MLK Station on the Green Line, and provide more transit connections than the average on their respective corridors.

Park and Rides

The main pull of DART is accessibility to stations via parking, pulling in large ridership from populations not within walking distance (and even some not within the DART service area). In total, 19,459 spaces are available at the 38 Park and Ride Stations across the system (39 with the inclusion of the planned Carpenter Ranch). Some corridors include more Park and Ride Stations than others, and therefore more of an opportunity for connections to vehicular modes. The Irving corridor has a 46% inclusion of Park and Ride Stations (6 of 13 stations), the lowest among all of the corridors. This corridor runs through areas with only privately–provided parking, such as Las Colinas, the Burbank area,

Southwestern Medical District, and Victory Station. On the other side, the Garland-Rowlett corridor of the Blue Line has a Park and Ride at every single station with the exception of Cityplace/Uptown. While provision of Park and Rides can be useful in attracting automotive commuters, it puts a limit on station area walkability and development potential, so this balance will need to be addressed at certain stations.

STATION PERFORMANCE

Results for corridor passenger volume performance are within *Table 6.5*. All existing stations along with the infill Carpenter Ranch station were included in this data set.

	Number of stations	Ridership (passengers/hour)					
		Avg. Peak Rate	SD	Avg. Off-Peak Rate	SD	PNP Ratio	SD
Entire System	65	2085.73	1472.94	379.92	317.12	59.35%	11.76%
Red Line	25	2969.84	1718.29	494.19	360.95	60.41%	5.25%
Blue Line	23	2481.58	1971.45	441.03	339.44	60.56%	8.28%
Green Line	24	2693.08	1584.60	506.40	412.02	61.21%	10.08%
Orange Line	30 (24 off-peak)	2918.96	1664.89	700.55	295.26	50.02%	11.60%
Red - Richardson-Plano	13	2918.15	1388.89	411.24	248.42	64.15%	3.74%
Red - Oak Cliff	6	1379.18	1016.20	237.28	169.38	57.69%	2.66%
Blue - Garland-Rowlett	8	2167.50	1969.25	359.73	297.57	57.58%	3.60%
Blue - South Dallas	9	1300.14	835.63	186.78	161.25	66.90%	9.37%
Green - Carrollton	12	2629.69	949.58	507.75	345.03	61.19%	12.70%
Green - Southeast Dallas	8	1355.30	468.27	176.96	75.81	65.37%	3.20%
Orange - Irving	13	2107.50	1278.13	615.22	245.15	43.15%	11.38%
Orange - Richardson-Plano	13 (7 off-peak)	2918.15	1388.89	595.76	197.98	61.10%	1.97%

Table 6.5 – Station Performance Indicators for DART corridors

From the table above, some implications can be derived. All lines of the rail system performance better than average of the whole system, because of the inclusion of high-performing stations shared amongst all lines (the downtown stations) in the calculation, and the exclusion of the lower-performing stations that are exclusive to one line. But when divided into corridors, the dichotomy can better be found. Every corridor along a line has a noticeably different average station performance for both peak and non-peak hours,

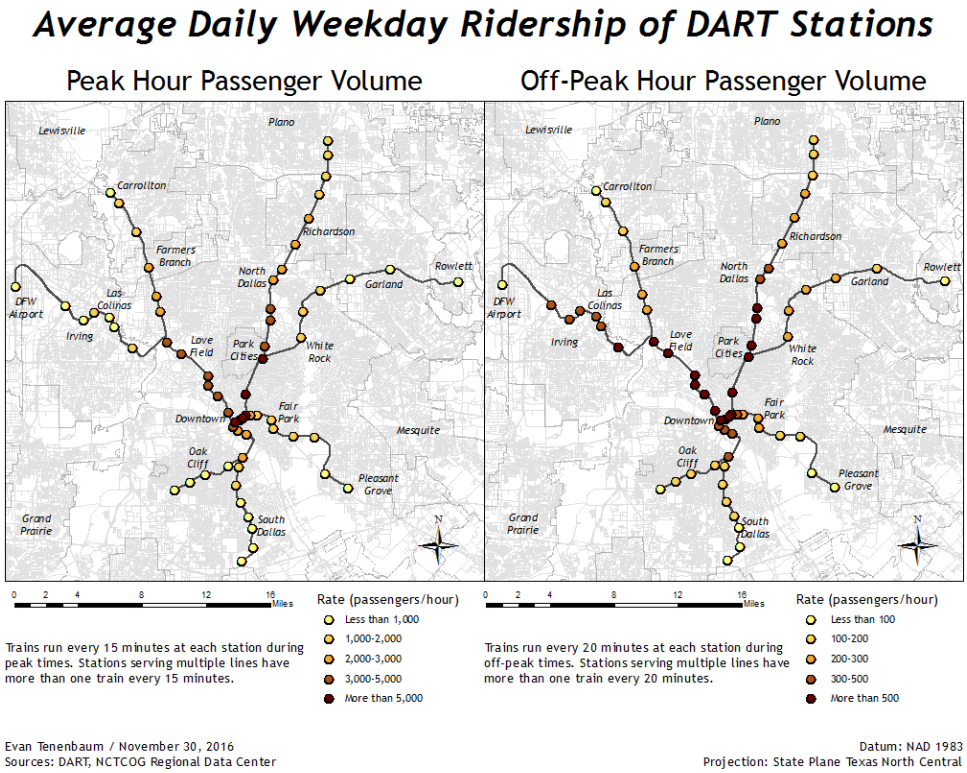
depending on how many neighborhoods and employment centers outside of downtown that the corridor serves.

As expected, peak hour performance is mostly tied to more commuter-oriented corridors, where a majority of ridership is served between 7 and 9 in the morning, and 4 and 6 in the afternoon. During peak hours, headways on all lines are 15 minutes, but stations that serve multiple lines will be served more often than that. For instance, the four downtown stations that serve all 4 lines (Pearl-Arts District, St. Paul, Akard, and West End) have a new train (from each line) every 3 minutes and 45 seconds, providing more opportunity to pick up and drop off passengers. The highest station performances outside downtown are mainly along the Richardson-Plano and Carrollton corridors. The Richardson-Plano corridor is enhanced by serving both Orange Line and Red Line trains at all stations during peak hours. At a headway of 15 minutes per line, and with the Orange and Red Lines alternating arrivals, each station along the corridor is being serviced every 7.5 minutes. Sections of other corridors are serviced by multiple lines (Green and Orange serve Northwest Dallas; Red, Blue, and Orange serve Uptown and the Park Cities), but no other corridor is completely double-served during peak hours. The higher frequency relative to other corridors works to its advantage during peak hours.

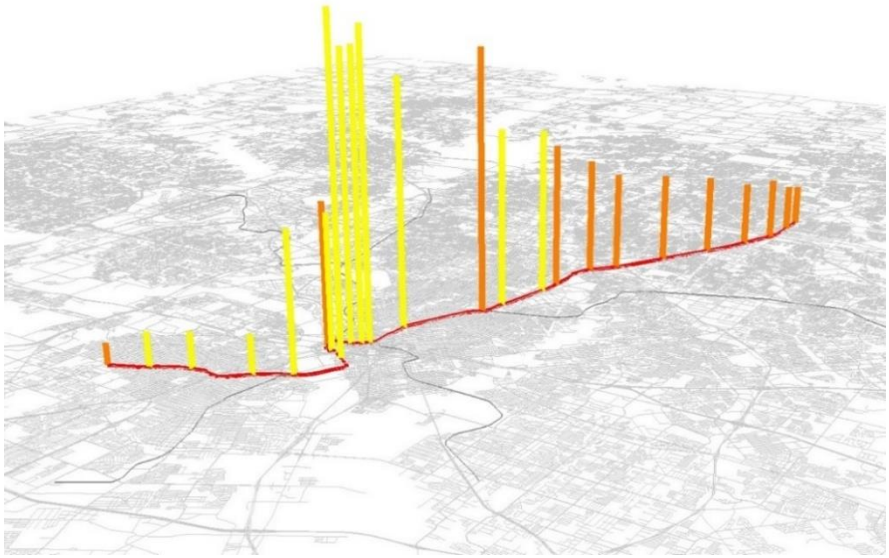
During non-peak hours (the other seventeen hours of operation), ridership takes a big dip across the board, with hourly rates 18.2% of peak hours. During this time, headways on all lines decrease from 15 minutes to 20 minutes, with less opportunities during the hour to pick up and drop off passengers. The corridor that performs the best during this time is the Irving-Airport corridor (29.2% of peak-hour ridership) along the Orange Line. This corridor is enhanced by being double-served (with the Green Line) in the Northwest Dallas "sub-corridor" from Victory Station to Bachman Station, but additionally is helped by ridership going to and from the Las Colinas area (University of Dallas to Carpenter Ranch) and the DFW International Airport. Meanwhile, corridors with high peak ridership take a much larger dip during non-peak hours. The Richardson-Plano corridor has an hourly rate of 16.64% of peak hours for the Red Line and 20.42% for the Orange Line (which stops at LBJ Central, 6 stops short of during peak hours).

This phenomenon is also seen in the PNP Ratio. The Irving corridor only experiences about 43% of its entire ridership during peak hours, indicating a larger share of ridership during non-peak hours than other corridors. Every other corridor has more than half of its ridership attributed to peak hours, with the South Dallas (66.9%) and Southeast Dallas (65.4%) with the highest. The numbers indicate that every corridor is dependent on four hours of the day for ridership, and the remaining seventeen experiences only minimal interaction. The corridors with lower percentages (Irving, Garland-Rowlett) indicate corridors closer to pure Destination Connectors, while higher percentage corridors (Richardson-Plano, South Dallas, Southeast Dallas) are closer to pure Commuter Corridors. But to further define these corridors, the remaining indicators need to be analyzed.

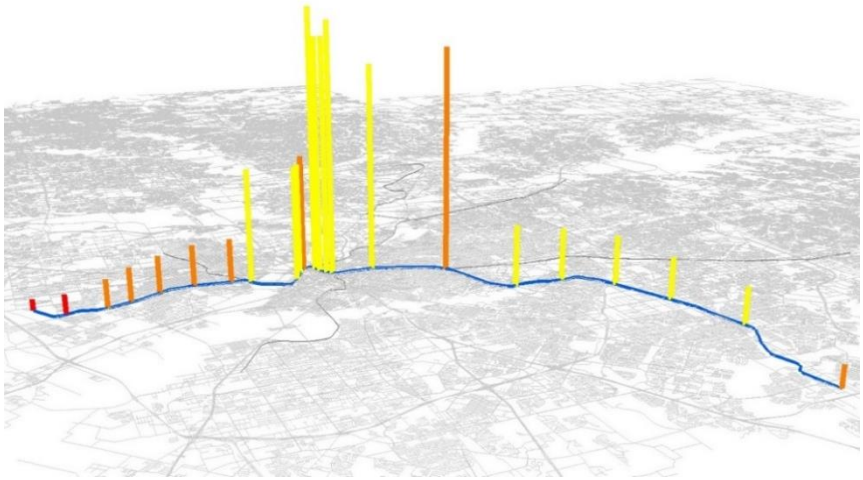
Map 6.2 shows where ridership is geographically concentrated during peak hours and off-peak hours along each line. A 3D map of each line was also created (*Map 6.3* through *Map 6.6*) to understand the total passenger volume of a station, where ridership picks up along a corridor, and how the PNP ratio is affected. The more red a station is, the more that station's share of ridership is attributed to peak hours. Green means a more even split of peak and non-peak ridership.



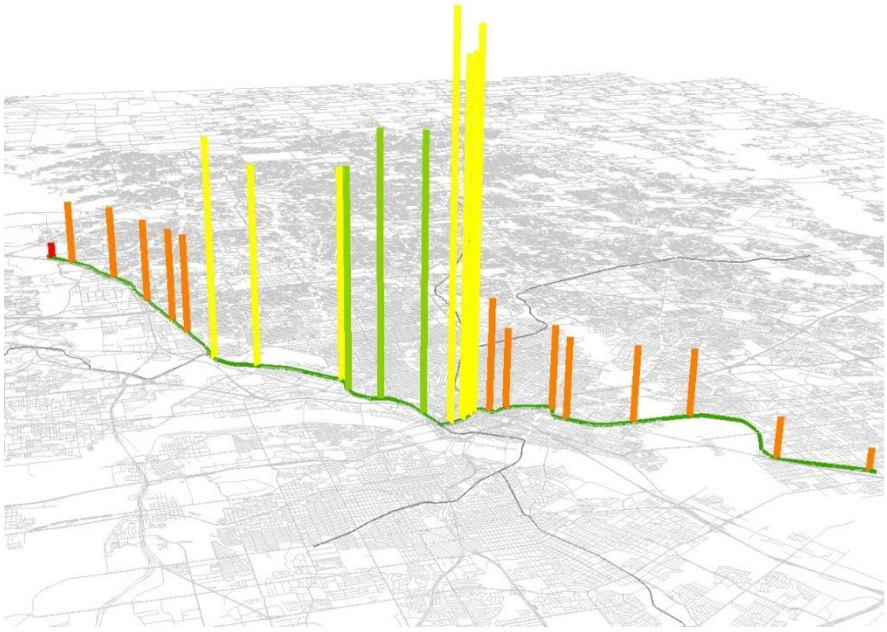
Map 6.2 – System-wide Peak and Off-peak Passenger Volume Comparison.



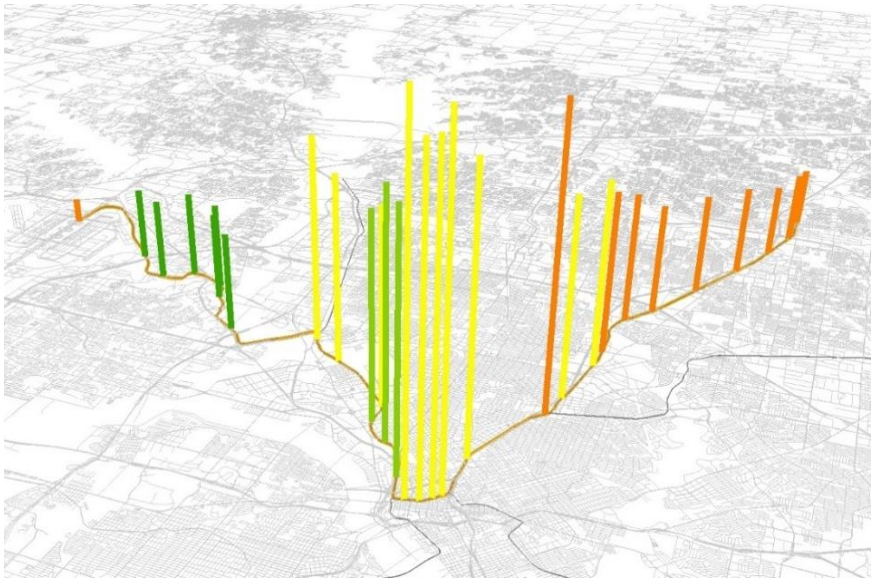
Map 6.3 – Total Passenger Volume and PNP Ratios across the Red Line.



Map 6.4 – Total Passenger Volume and PNP Ratios across the Blue Line.



Map 6.5 – Total Passenger Volume and PNP Ratios across the Green Line.



Map 6.6 – Total Passenger Volume and PNP Ratios across the Orange Line.

STATION MIX

Results for land use mix performance are within *Table 6.6*. The 4 potential infill stations (Knox-Henderson Station on the Red-Blue-Orange Line, and Carpenter Ranch, South Las Colinas, and Loop 12 Stations on the Orange Line) were also included in this data set due to their operational status tied to land use mix around the area and potential interest by DART. Network distance is not used because the ratio of the road network to the aerial distance is considered within the Connectivity section. Both quarter-mile and half-mile buffers serve as the generalized boundary of station areas at each current station, but half-mile buffer was used for most of the calculations. Differentiating quarter and half mile buffers is important in determining which land uses, pedestrian infrastructure, trail access, and building densities are better suited just being in the area and those that are better suited for direct interfacing with the station, when planning TOD (seen in the adjacency % category).

	Number of stations	with Infill	Land Use Variance	% Non-Compatible Land Uses	% Redevelopable Non-Compatible Land Uses	% TOD-Compatible Land Uses	Adjacency %
Entire System	64	68	5.32	35.60%	17.91%	37.82%	5.04%
Red Line	25	26	5.54	32.37%	16.16%	36.93%	6.09%
Blue Line	23	24	5.33	37.29%	18.84%	34.17%	6.55%
Green Line	24	24	5.54	27.04%	14.44%	43.48%	3.64%
Orange Line	29 (23 off-peak)	33 (27 off-peak)	5.12	30.23%	16.73%	41.06%	4.20%
Richardson-Plano	13	14	5.79	31.72%	17.48%	41.72%	6.71%
Oak Cliff	6	6	5.83	52.75%	17.11%	22.61%	9.73%
Garland-Rowlett	8	9	5.67	32.48%	13.38%	41.77%	7.66%
South Dallas	9	9	5.44	57.97%	28.78%	22.62%	9.16%
Carrollton	12	12	5.50	28.32%	15.04%	45.65%	4.01%
Southeast Dallas	8	8	6.00	33.71%	15.87%	39.86%	3.41%
Irving	13	16	4.67	34.28%	17.88%	39.61%	2.17%
Richardson-Plano	13 (7 off-peak)	14 (8 off-peak)	5.79	31.72%	17.48%	41.72%	6.71%

Table 6.6 – Corridor Land Use Mixes and Compatibility.

Variance

Variance is generally even across the board, with very little deviation within any corroder or line compared to the whole system. The Irving Corridor comes the closest to deviation, considering the large amount of undeveloped land near the airport and land in flood control along that corridor. Individual stations do stand out as having little variation, specifically stations around undeveloped areas (such as UNT Dallas, Camp Wisdom, Beltline, Cityline), while some are too varied and indicate a lack of land use cohesion (8th & Corinth, Westmoreland, Hatcher). Stations with high variance but designed to be mixed-use (Mockingbird, Downtown Plano, Victory) get more leeway in this case.

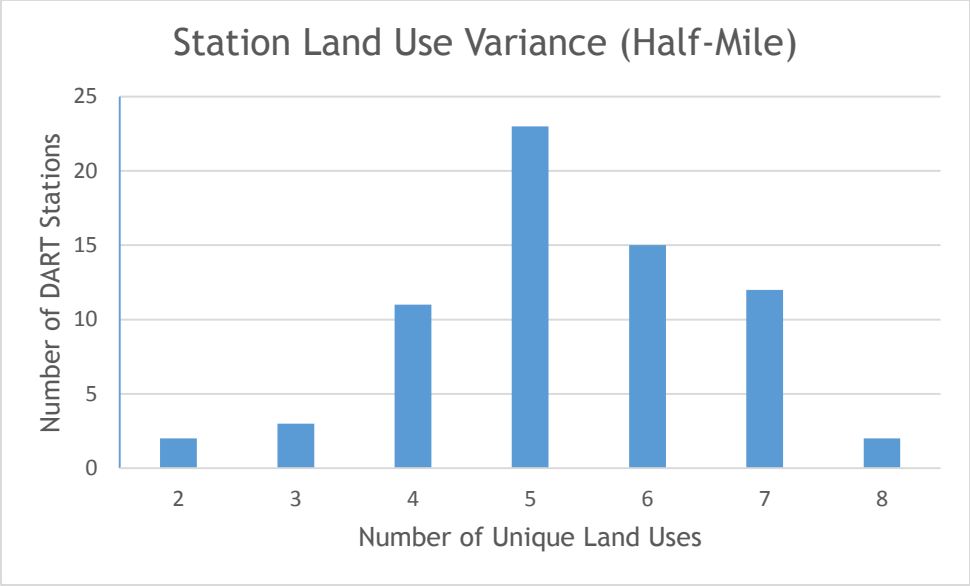
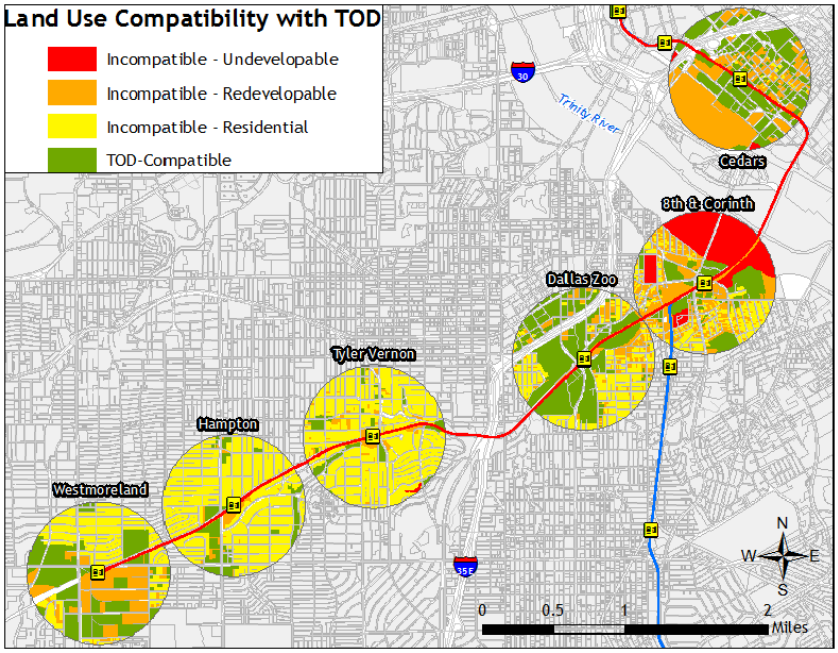


Figure 6.1 – Land Use Variance across the DART Stations.

Land use Incompatibility

Once again, there is not much variability in incompatibility of land uses across all of the stations. The Blue Line does have the with largest amount of non-compatible land uses compared to the rest of the lines, which can be attributed to its path through single-family neighborhoods in South Dallas Corridor and the White Rock sub-corridor of the Garland Corridor. In addition, it travels through heavy amounts of industrial land at the Garland-Dallas boundary, large amounts of parking allocated for the Garland corridor, and vacant land in South Dallas. The Green Line has the least amount of non-compatible land uses, as it does not run through that many single-family neighborhoods except at the Southeast terminus and in the Farmers Branch Carrollton area. Additionally, industrial uses are concentrated at only one station (North Carrollton-Frankford), and there is sparse amount of vacant land scattered throughout the line. The Orange Line is most affected by undeveloped areas near the Airport in the Irving Corridor. The Red Line is most affected by various single-family neighborhoods, spread out industrial centers, and scattered vacant

parcels in the Oak Cliff corridor. *Map 6.7* shows a sample of compatible and incompatible land uses in the Oak Cliff corridor.



Map 6.7 – Land Use Compatibility within the Oak Cliff Corridor.

Redevelopable and Compatible Land Uses

The highest opportunity for redevelopable parcels is in the South Dallas corridor, considering that the two new stations along the corridor are surrounded by large swaths of undeveloped land. The Green Line provides little opportunities for redevelopment through rezoning due to little amount of vacant land, and one concentration of industrial land at the terminus on the line. The focuses for redevelopment in this corridor would have to be at the northernmost stations (in Carrollton) and areas of low-density commercial uses (Royal, Walnut Hill/Denton, Burbank).

For currently-compatible land uses, the greatest amount is on the Green Line, attributed to the multiple employment and multifamily centers Downtown, Victory, Deep

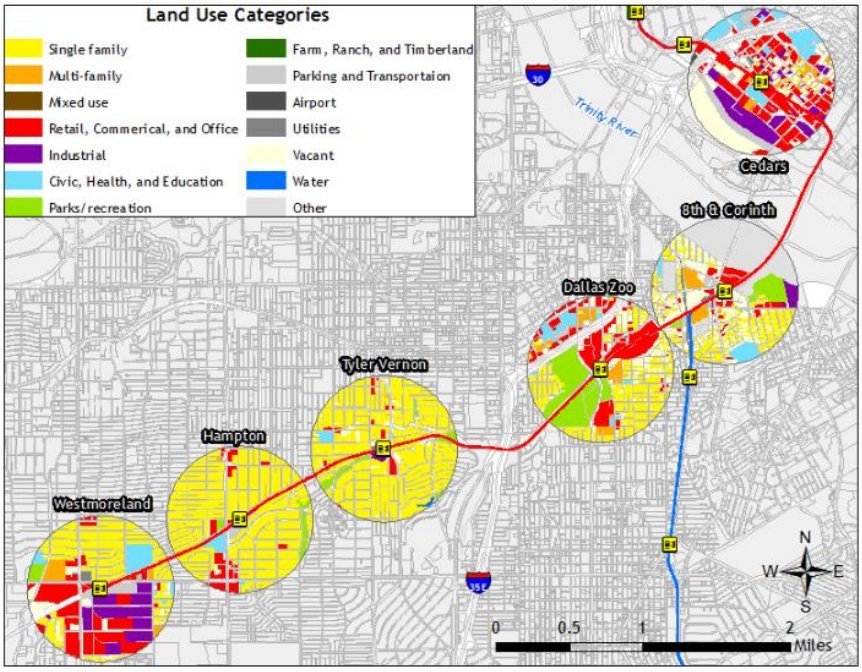
Ellum, and the Southwestern Medical District. Suburban downtown stations across the entire line (Carrollton, Farmers Branch, Plano, Garland, Rowlett) show great compatibility, but their compatibility seems geographically isolated from the rest of the system and adjacent stations. The lowest compatible corridors are the Oak Cliff and South Dallas corridors, each with a severe lack of retail and commercial activity that is very present in other corridors.

Unique Station Identity

At a quarter-mile from the station, land uses that directly interface with the station become much more apparent and can create an identity that is exclusive to just that station. Each station along each line has some land use factor directly adjacent to the station that differentiates it from another. Many stations are identified for the major arterial it abuts (Parker Road, Spring Valley, Royal Lane, Ledbetter, Beltline, etc.), but do not have a significantly unique land use tied to it, compared to adjacent stations. Some stations have a suburban downtown identity in name and in land use mix (Downtown Plano, Downtown Carrollton, Farmers Branch, Downtown Garland, and Rowlett), and their land use mixes are significantly different than adjacent stations. Some stations on the system are specifically identified for an incumbent neighborhood or employment center (Deep Ellum, Cedars, Cityplace/Uptown, Burbank, Las Colinas), while others are specific places of interest directly adjacent to the station that may not represent a majority in the land use mix, such as Convention Center Station, (Civic), Dallas Zoo (Parks and Recreation), Fair Park (Parks and Recreation), White Rock (Parks and Recreation, Lake), VA Medical (Health) and DFW Airport (Airport). Others involve probing the land use mix to identify the station's primary purpose. Cityline Station, at the city border of Plano and Richardson, contains a significant amount of Farmland (part of FRT category) and undeveloped land, but already planned for conversion to transit-oriented retail, commercial, and mixed-use development. Others include Walnut Hill (serving the Texas Health Presbyterian Hospital, in North Dallas), Westmoreland (industrial park in West Oak Cliff), Bachman and Mockingbird Stations (lifestyle centers in Northwest Dallas and the Park Cities).

Adjacency Percentage

A half-mile buffer encompasses a wider variety of land uses for each station across the system. However, comparing these mixes to quarter mile mixes can show the diffusion (or lack of) the station area within surrounding neighborhoods. For a specific land use, a larger percentage at a quarter mile than at a half mile indicates prominence directly adjacent to a station. For instance, on the Red and Blue Lines, every station has some retail or commercial elements (RCO), but in different amounts. When narrowing the scope from half mile to quarter mile, these RCO uses are much more prominent with the Richardson-Plano and Garland-Rowlett corridors, with residential uses dissipating. Similarly, multifamily development is more prominent within the Irving Corridor at quarter mile versus half mile, when accounting for those developments in Victory, Las Colinas, and near North Lake College. A sample is of corridor land use mix is provided below in *Map 6.8*, for the Oak Cliff Corridor.



Map 6.8 – Land Use Mix within the Oak Cliff Corridor.

For all lines and corridors, the quarter-mile buffer on average contains a higher percentage (positive adjacency %) of compatible land uses and redevelopable land uses, compared to half-mile buffers. The difference is slightly smaller on the Green and Orange Lines, indicating a better diffusion of TOD-compatible uses near the line. The Red and Blue Lines have a much larger difference, especially noticeable in the South Dallas and Oak Cliff corridors (again, attributed to surrounding single-family neighborhoods, lack of commercial and retail, and scattered vacant parcels).

The full land use mixes for each station at both a quarter and half mile are available, for comparison of concentration of land uses within a station area, in *Figure 6.2* through *Figure 6.9*.

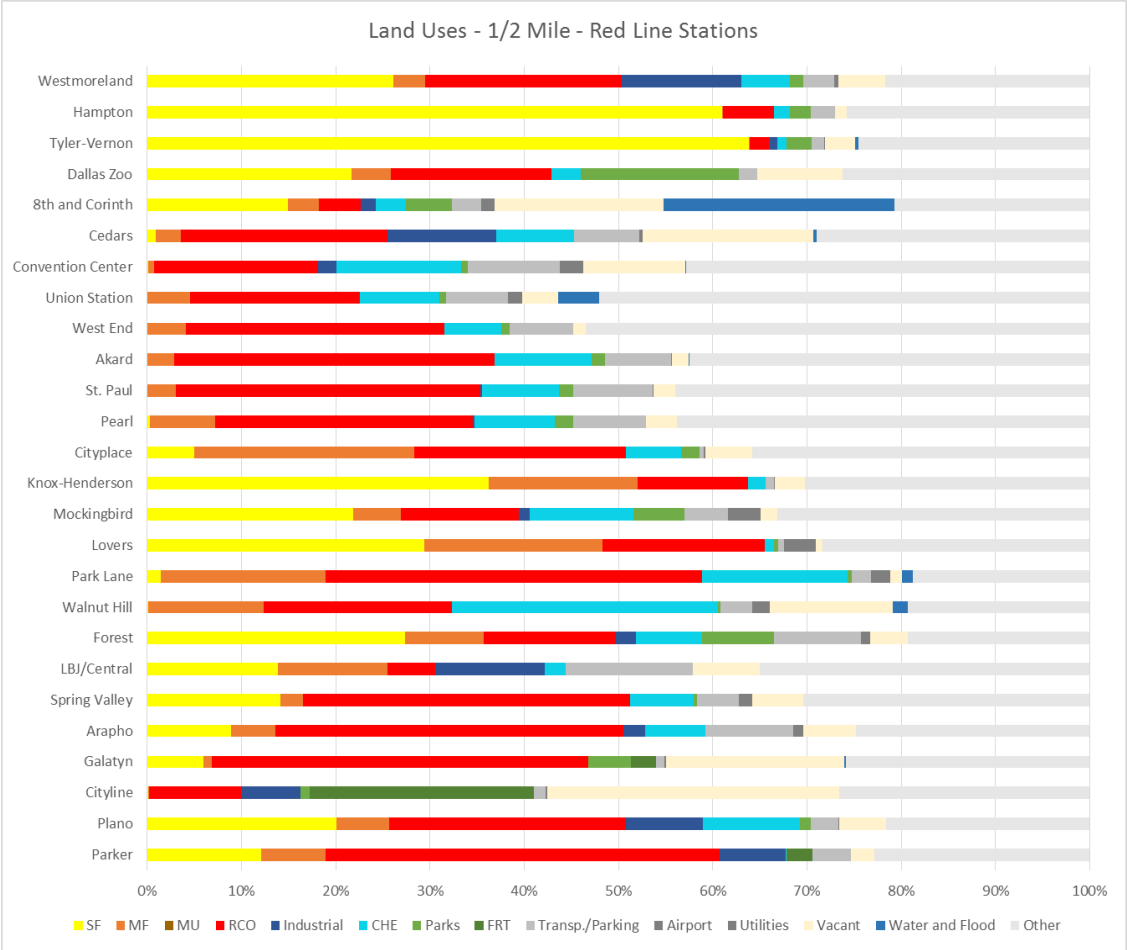


Figure 6.2 – Red Line Half Mile Land Use Mix.

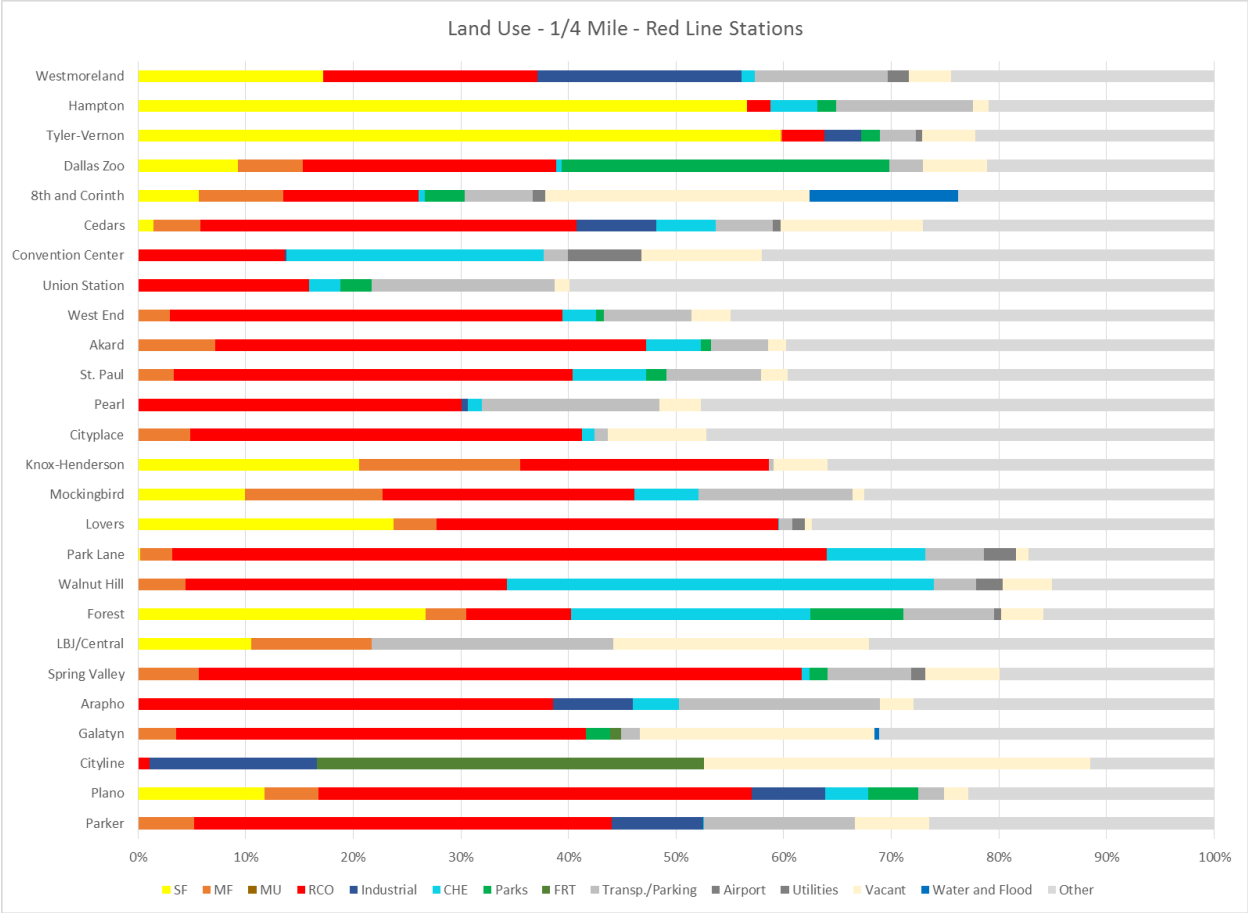


Figure 6.3 – Red Line Quarter Mile Land Use Mix.

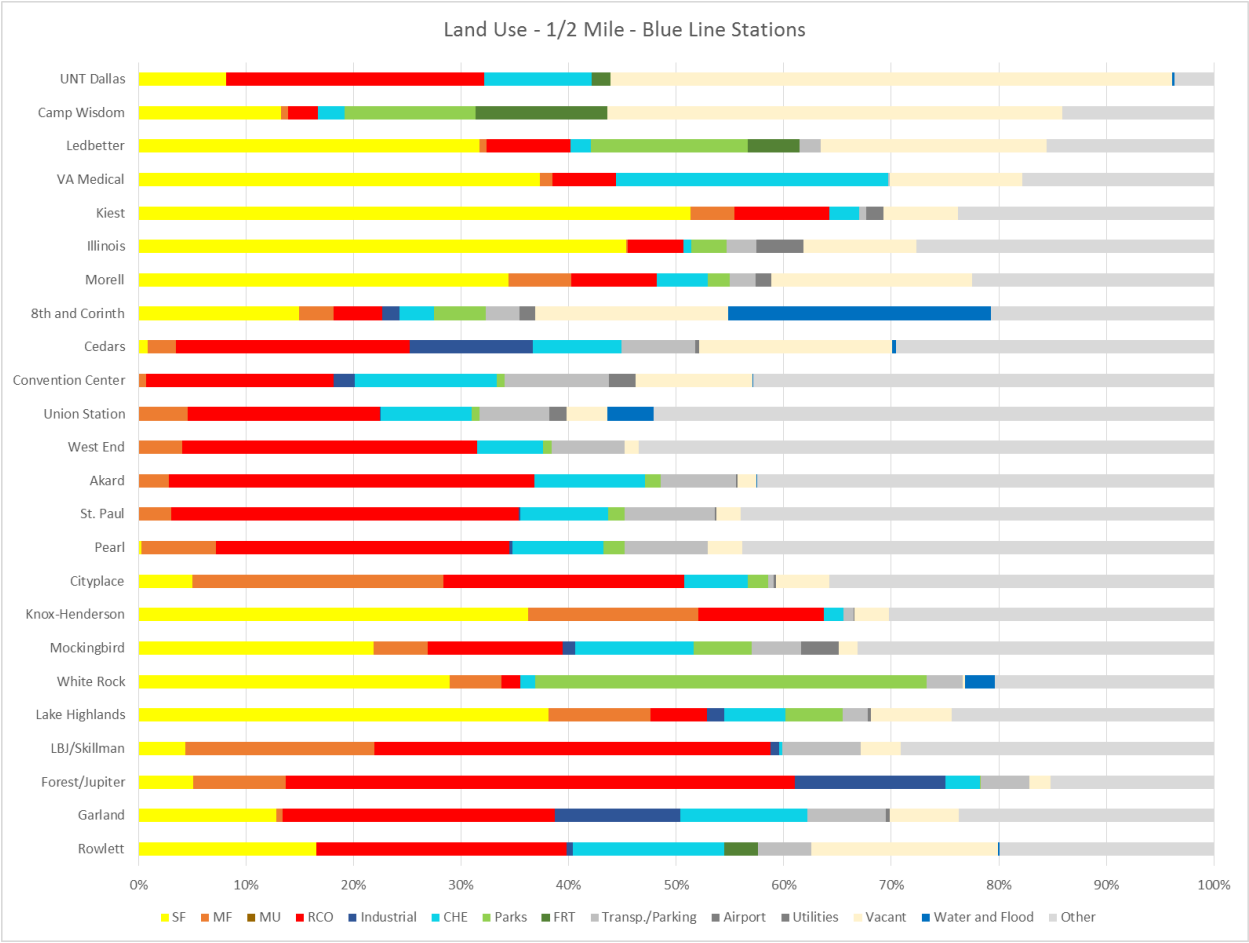


Figure 6.4 – Blue Line Half Mile Land Use Mix.

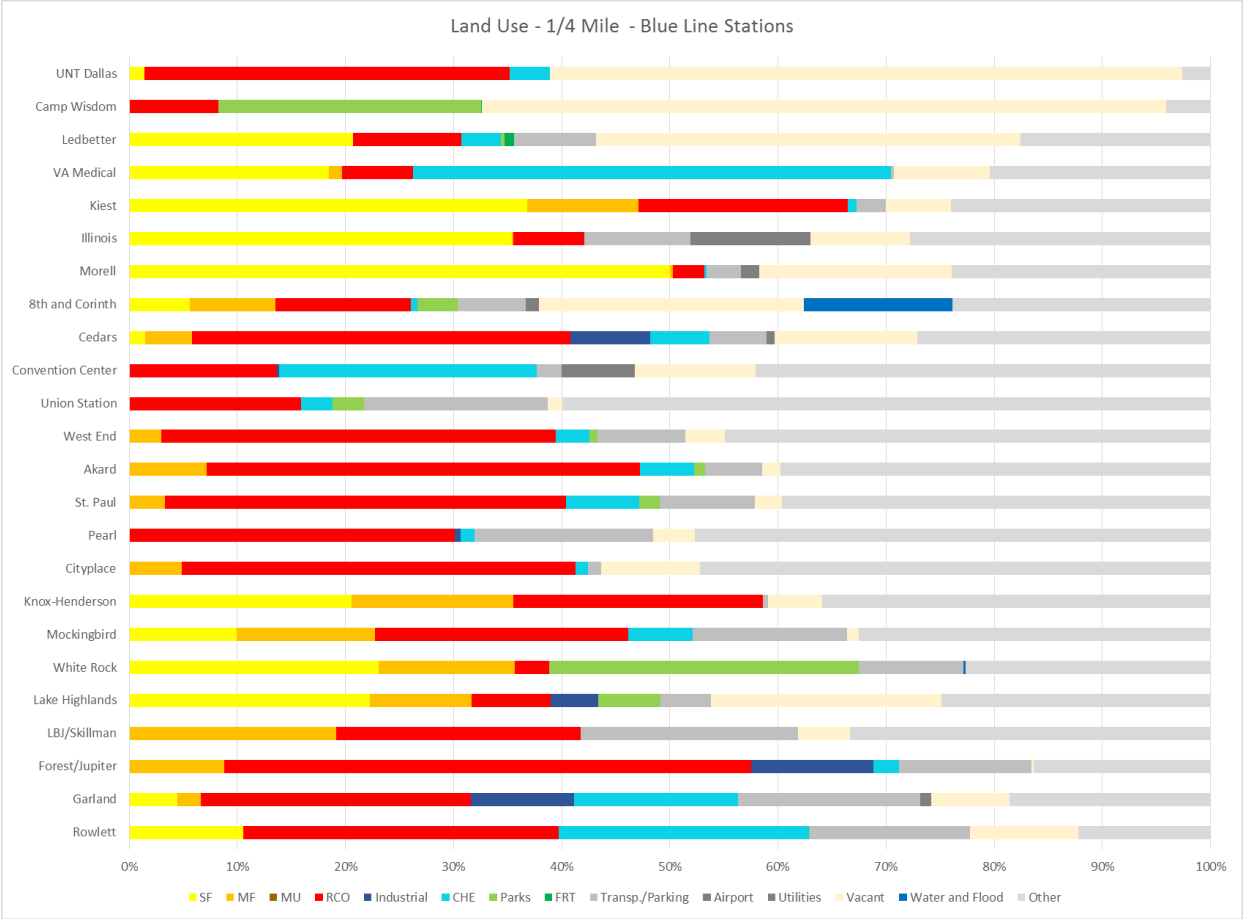


Figure 6.5 – Blue Line Quarter Mile Land Use Mix.

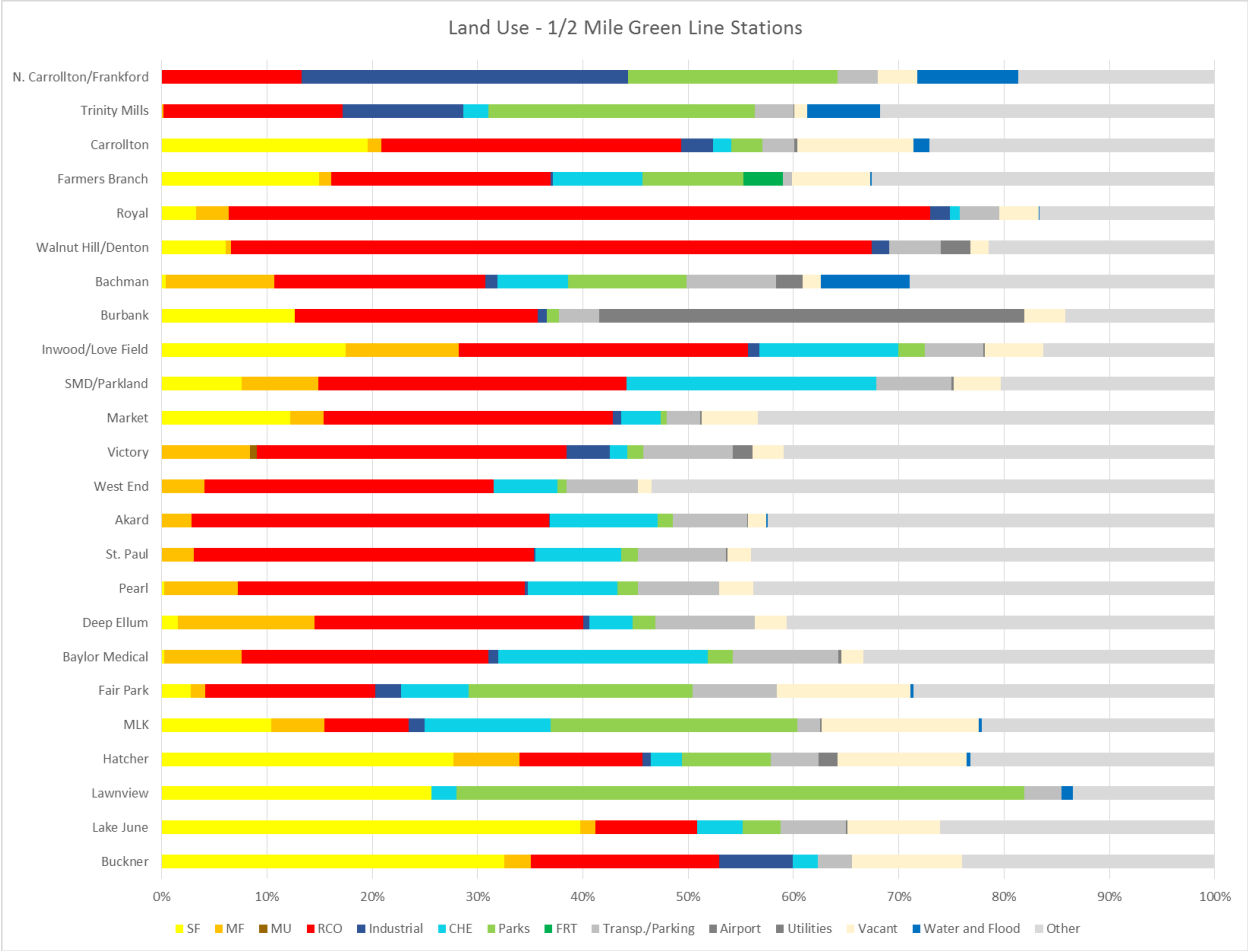


Figure 6.6 – Green Line Half Mile Land Use Mix.

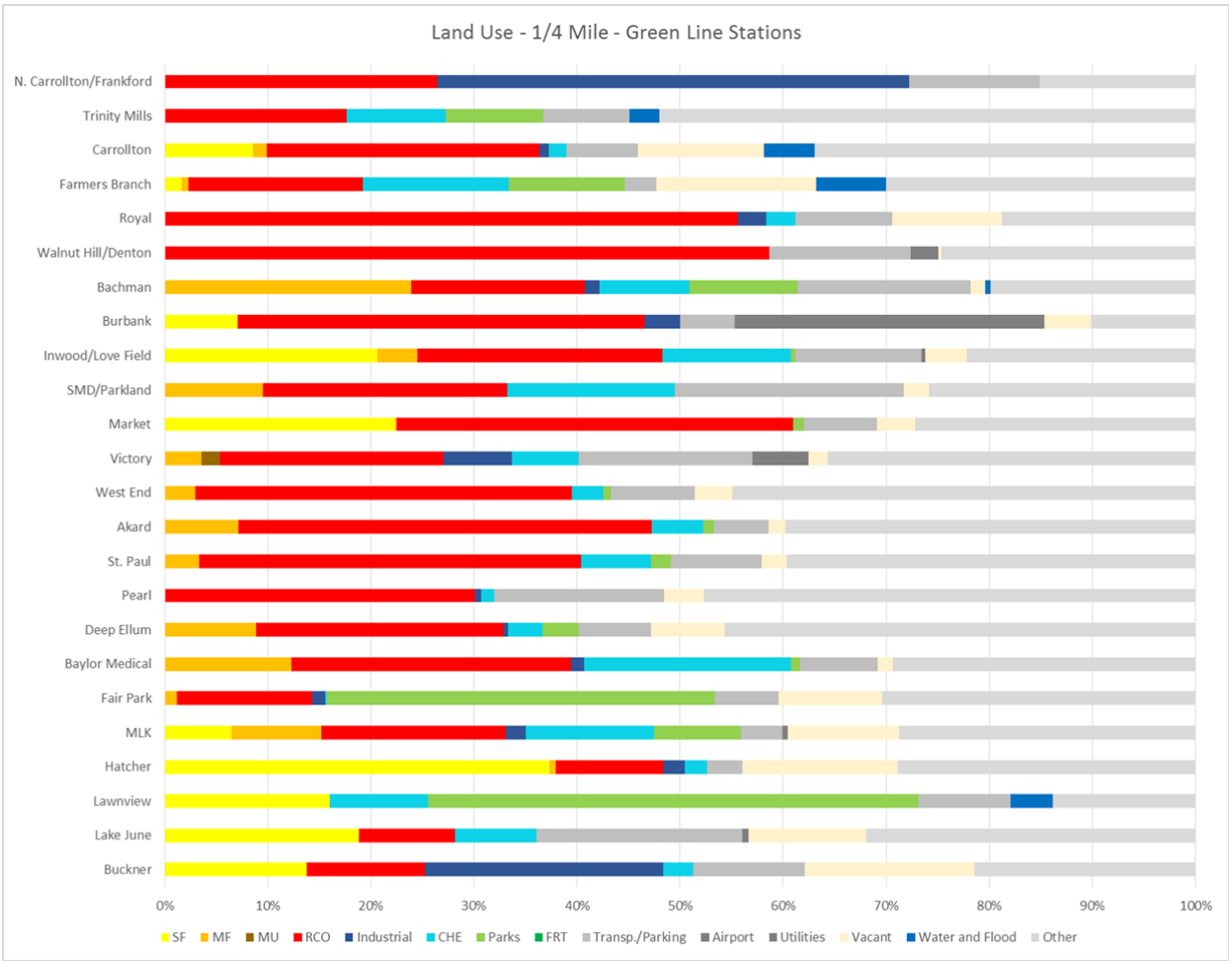


Figure 6.7 – Green Line Quarter Mile Land Use Mix.

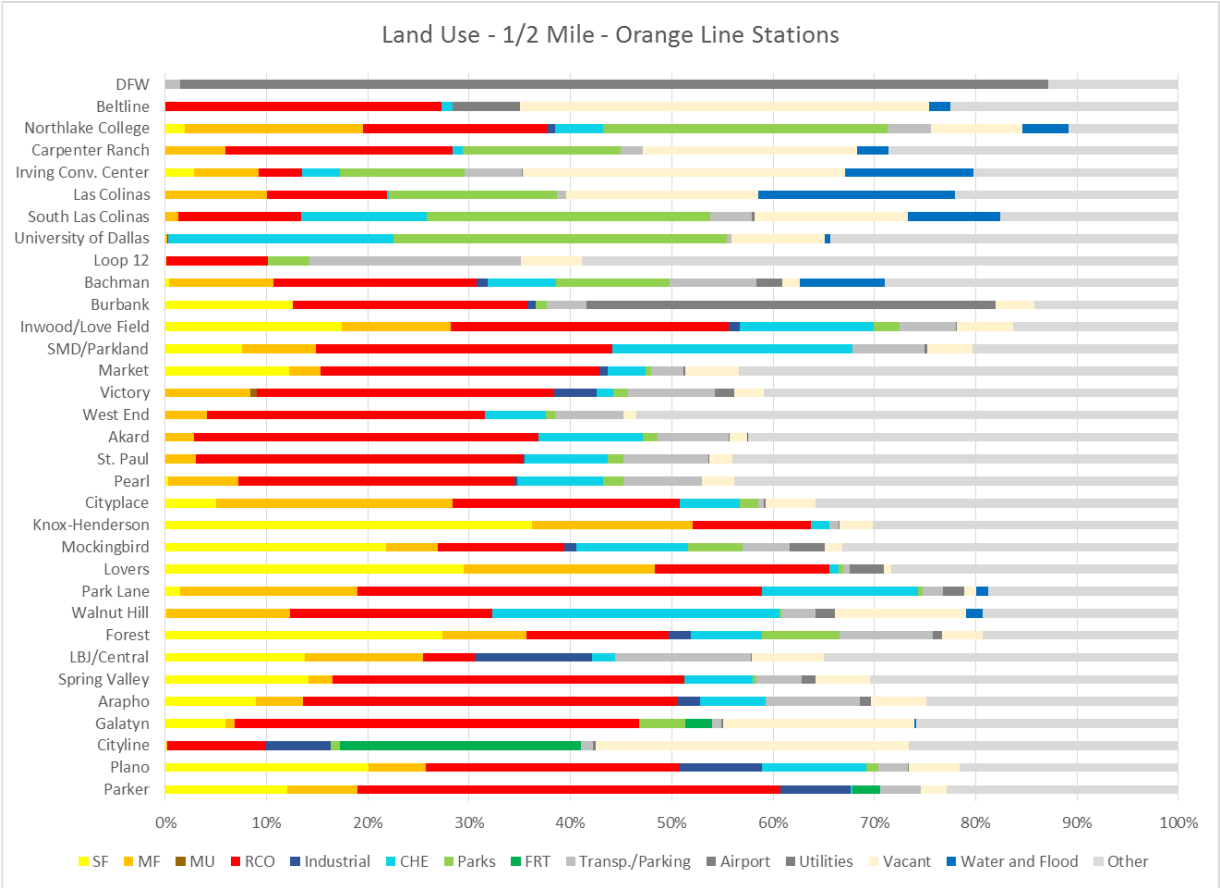


Figure 6.8 – Orange Line Half Mile Land Use Mix.

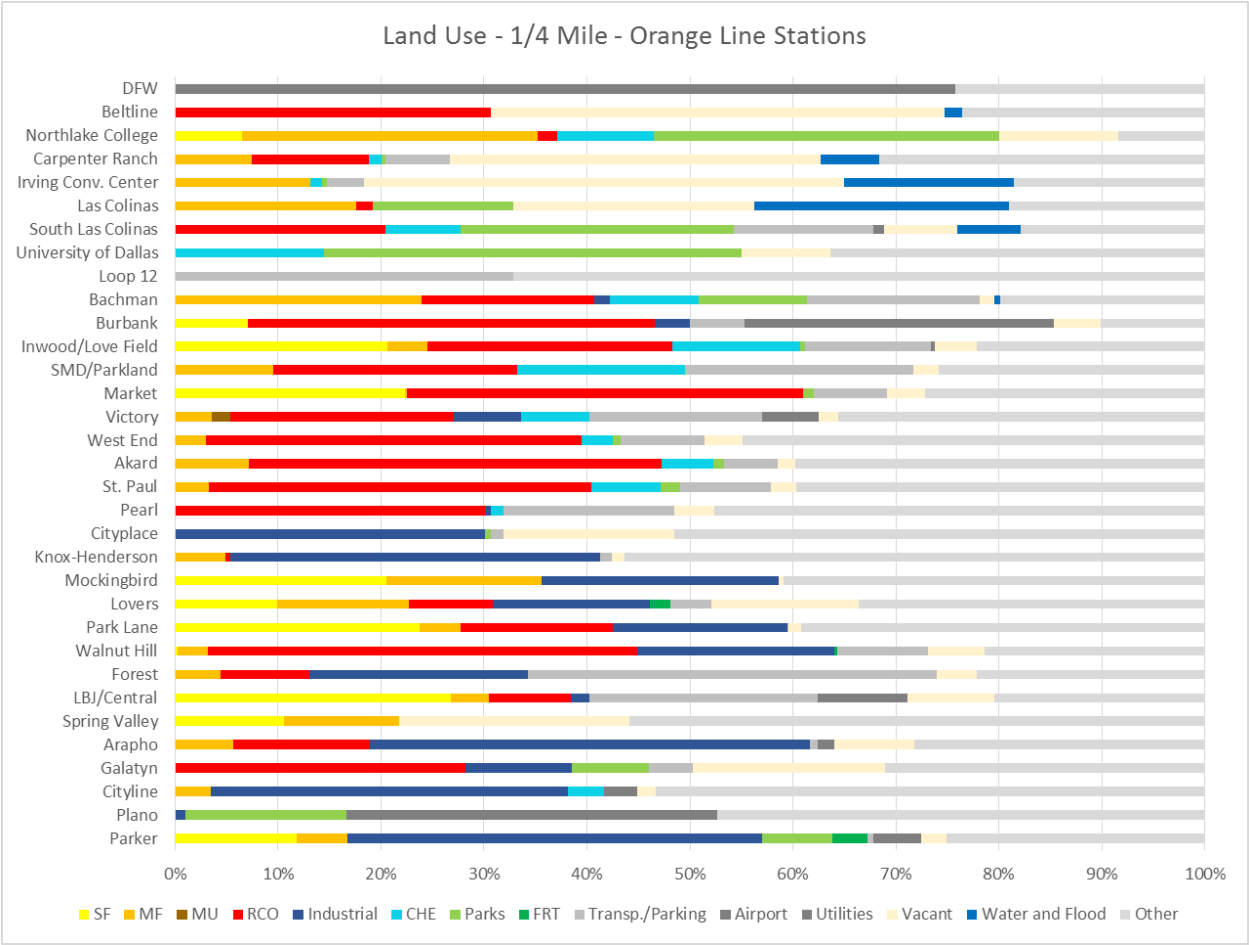


Figure 6.9 – Orange Line Quarter Mile Land Use Mix.

DENSITY

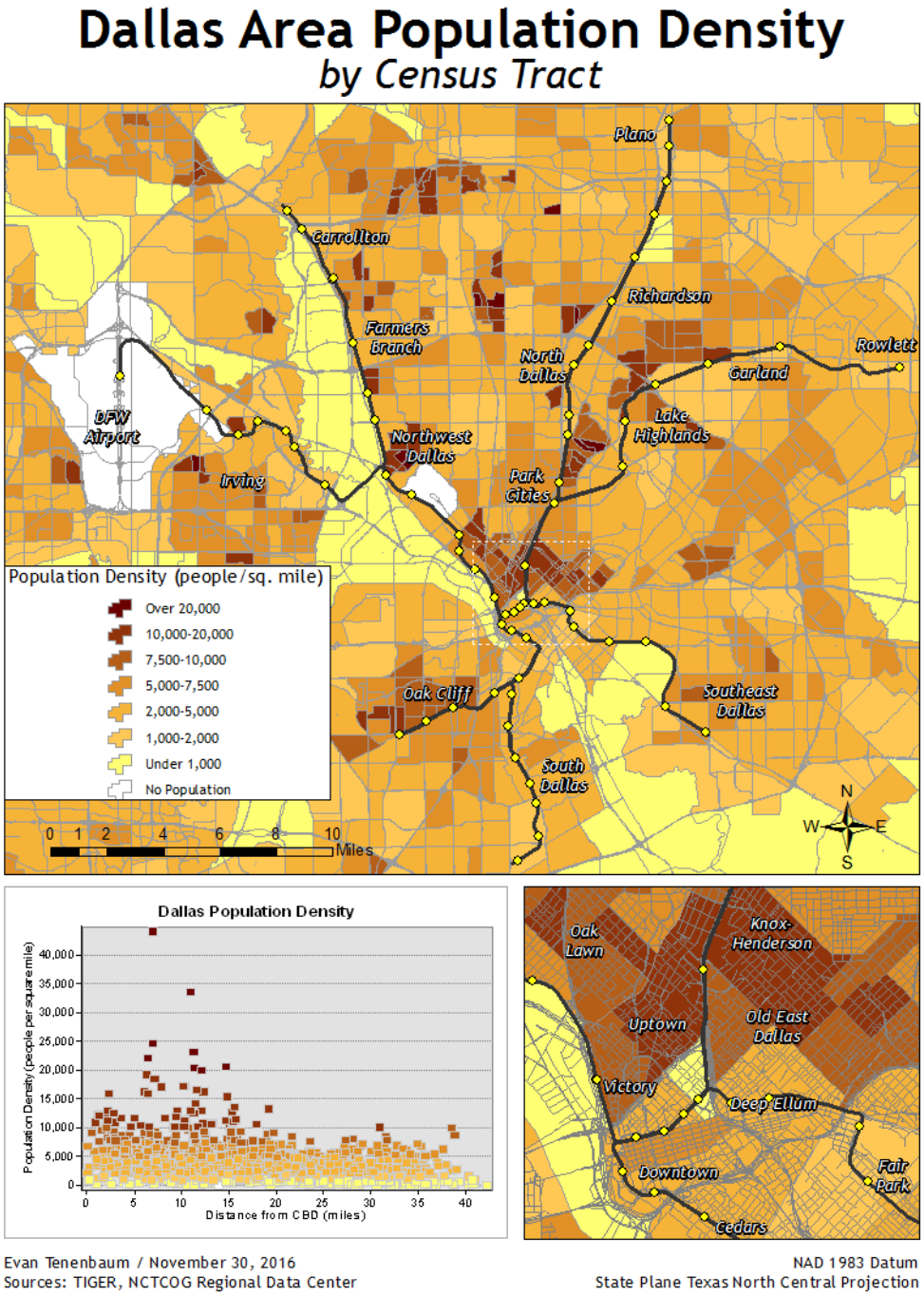
Results for corridor density are within the *Table 6.7* and *Table 6.8*. While the potential infill station Carpenter Ranch was included in the data set, the two new stations were omitted due to unavailability of data.

	Number of stations	Population Density (people/acre)		Block Density (blocks/sq.mile)		Block Size (acres)	
		Mean	SD	Mean	SD	Average Block Size	SD
Entire System	65	5.20	3.35	109.03	63.94	7.927	5.192
Red Line	25	6.32	3.47	138.60	68.06	5.541	2.062
Blue Line	23	6.03	3.06	141.91	77.07	6.966	1.333
Green Line	24	5.21	2.80	132.42	84.87	5.328	0.948
Orange Line	30 (24 off-peak)	5.39	3.63	106.20	73.52	6.021	3.166
Red - Richardson-Plano	13	5.94	4.01	95.14	19.33	8.308	2.856
Red - Oak Cliff	6	7.28	3.10	123.71	22.20	6.283	2.198
Blue - Garland-Rowlett	8	6.83	4.11	86.76	30.70	7.095	4.102
Blue - South Dallas	9	4.97	1.77	114.32	37.20	9.138	2.806
Green - Carrollton	12	4.56	3.26	78.42	33.73	6.424	4.530
Green - Southeast Dallas	8	5.19	2.21	141.16	70.43	8.752	6.473
Orange - Irving	13	4.28	3.42	64.72	35.44	12.522	8.046
Orange - Richardson-Plano	13 (7 off-peak)	5.94	4.01	95.14	19.33	6.966	1.333

Table 6.7 – Corridor Population and Block Density.

Population Density

The population density of the entire Metroplex is 1.12 people per acre, much lower than populations adjacent to the DART rail system. *Map 6.9,* shows the concentration of population within the Metroplex, along with comparing the density to the tract's distance from the CBD.



Map 6.9 – 2010 Population Density in the Metroplex.

Across the DART rail system, there is not a statistically significant difference between each line, as well as between corridors and the whole system. Nevertheless, a division can be found at the corridor level. The Oak Cliff corridor goes through a fairly dense neighborhood of Dallas, as does the White Rock sub-corridor of the Garland-Rowlett corridor, and the Park Cities sub-corridor of the Orange and Red Lines, that increases the overall population density of the respective corridor. Meanwhile, the Irving corridor passes through a signficant amount of undeveloped land in North Irving and outside of Las Colinas. Desnity trails off for all lines the further away from the center of the city, as expected, with very few exceptions (i.e Downtown Plano spiking slightly). Nevertheless, 57 of the 65 stations tested had population densities higher than the Metroplex avereage.

Blocks

The average block size for the Metroplex is a wide 40.05 acres, but every station along the line averages much lower than that (7.9 acres per block). Both the Red and Green Lines test significant at 95% confidence for a lower average block size (t=2.22 and t=2.43, respectively), helped by downtown stations and passing through the denser Oak Cliff corridor (Red Line), and Deep Ellum, and Fair Park sub-corridors (Green Line). Other corridors test slightly higher than the system average. The Irving Corridor goes through relatively new development, large office parks, and the DFW airport, and would yield higher block sizes. The South Dallas corridor, while going through a relatively dense part of South Dallas, is hampered by its extension to UNT Dallas, serving an underdeveloped area with very little roads.

Block density within a station area tends to mirror the average block size within a station area. Across the whole system, the average is about 109 blocks per square mile. Most lines average higher than the whole system, helped by their very dense downtown stations. The exception is the Orange Line, which is hurt by its severe lack of block density within the Irving Corridor. Despite three lines averaging higher than the whole system, only the Blue Line tests statistically significant at 95% confidence (t=2.01), serving the denser neighborhoods just south of Downtown on the South Dallas corridor, along with the

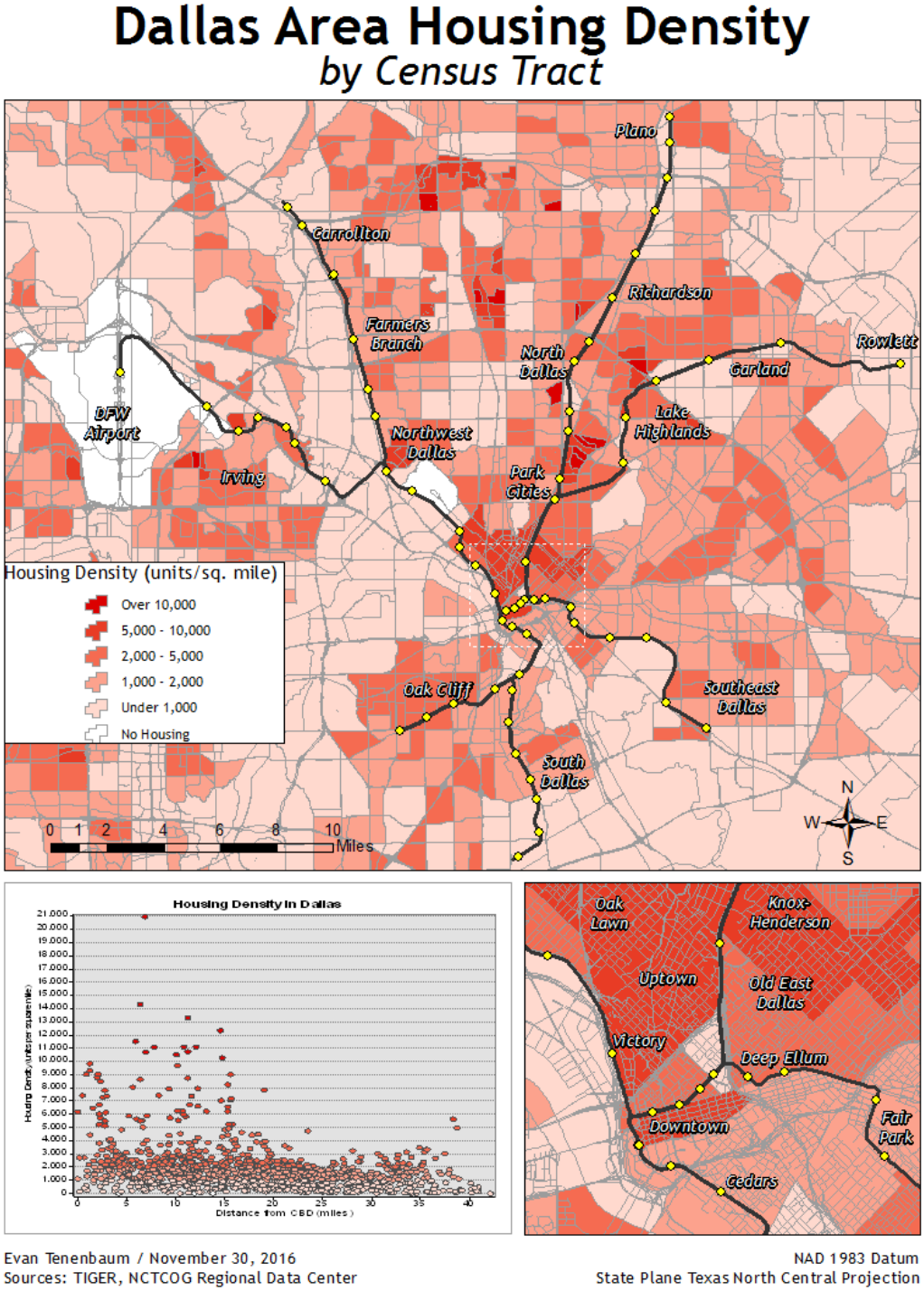
Uptown neighborhood and White Rock neighborhood along the Garland-Rowlett corridor. Other corridors stand out at having high block density. The Southeast Dallas corridor is greatly impacted by the Deep Ellum and Fair Park areas, and the Oak Cliff corridor is impacted by the areas it serves.

	Number of stations	HH Residential Density (HH/residential acre)		Job Density (jobs/acre)		Job/Housing Ratio
		Mean	SD	Mean	SD	
Entire System	65	9.27	11.10	18.26	33.86	1.97
Red Line	25	14.17	14.97	32.81	47.88	2.32
Blue Line	23	15.24	16.26	32.39	52.92	2.13
Green Line	24	12.59	13.28	33.54	49.12	2.66
Orange Line	30 (24 off-peak)	12.23	11.67	29.7	44.15	2.43
Richardson-Plano	13	6.91	3.23	15.11	9.17	2.19
Oak Cliff	6	4.51	2.29	1.62	1.22	0.36
Garland-Rowlett	8	7.14	4.71	7.26	5.63	1.02
South Dallas	9	3.66	2.41	1.13	1.1	0.31
Carrollton	12	6.98	5.18	14.07	14.29	2.02
Southeast Dallas	8	8.04	8.03	12.07	18.02	1.50
Irving	13	8.94	4.85	11.93	14.48	1.33
Richardson-Plano	13 (7 off-peak)	6.91	3.233	15.11	9.17	2.19

Table 6.8 – Corridor Household and Job Density.

Households

Household residential density across the Metroplex is about 3.5 households per residential acre. *Map 6.10* shows the concentration of households within the Metroplex, along with comparing the density to the tract's distance from the CBD.

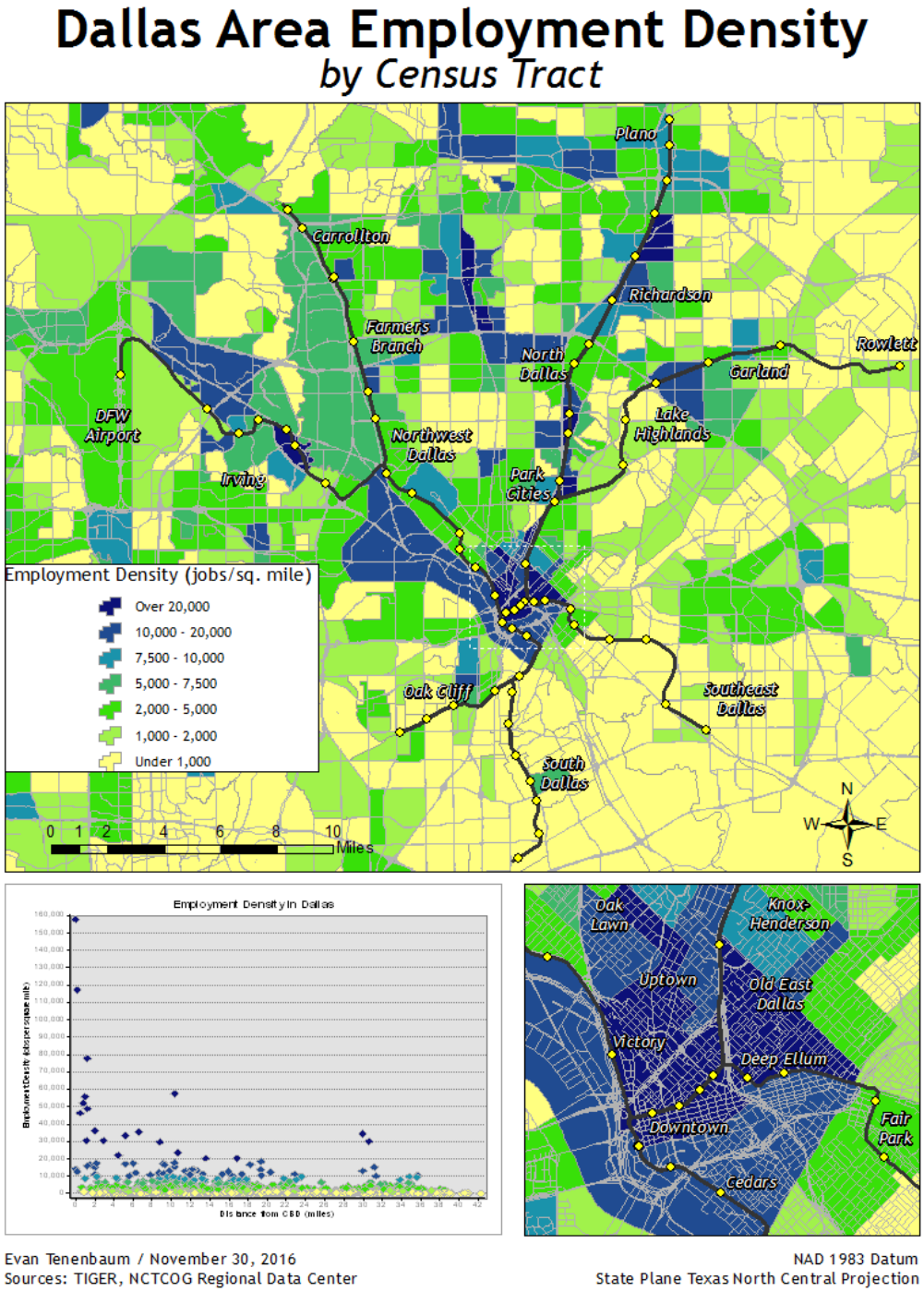


Map 6.10 – 2010 Household Density in the Metroplex.

Neighborhoods near DART stations have much higher density (12.2 households per residential acre) then the Metroplex average. There is not a statistically significant differnce in household density between any line, the closest being the Blue Line (t=1.95). All corridors average lower than the whole system, due to exclusion of all downtown stations, which have the densest residencies of the entire system. Some corridors' residential density are of note. The Oak Cliff and South Dallas corridors, depsite being fairly in terms of block density (and population within Oak Cliff), have a larger amount of people per household, along with several vacancies, that lower the redisential density around those stations. The highest is the Irving corridor due to a larger amount of multfamily housing units near Las Colinas, Victory, and the Southwestern Medical District.

Jobs

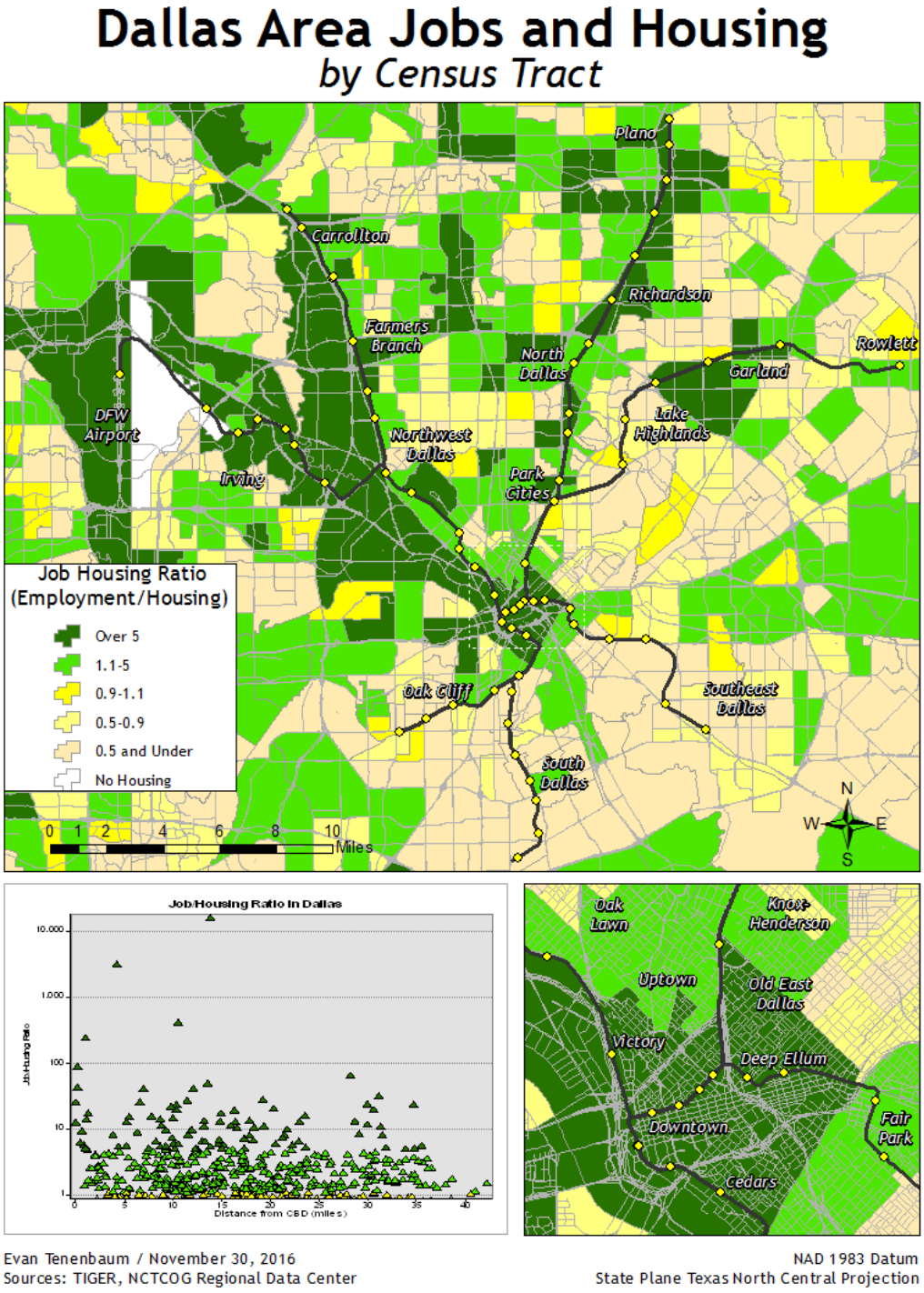
The employment density of the entire Metroplex is about .5 jobs per acre, much lower than areas adjacent to the DART rail system (18.26 jobs per acre). *Map 6.11* shows the concentration of employment within the Metroplex, along with comparing the density to the tract's distance from the CBD.



Map 6.11 – 2010 Employment Density in the Metroplex.

Though all rail lines perform better than the whole system in regards to employment density, none are statistically significant, the closest being the Green Line (t=1.66). Similarly, no corridor performs significantly different in comparison to the whole system. However there is a noticeable difference when comparing corridors. The Garland-Rowlett had a relatively low employment density, but this is mainly due to serving major residential neighborhoods in Dallas, Garland, and Rowlett. In South Dallas and Oak Cliff, the employment density is even lower due to a significant lack of employment in these corridors. While some corridors are over abundant in employment like the Irving Corridor and the Northwest Dallas sub-corridor of the Green and Orange Lines, the two southern corridors of the Red and Blue Lines have very little. Most employment opportunities for populations in these corridors are either downtown or further.

This is further seen in job-housing ratios across the DART rail system. Overall, areas around DART are plentiful in jobs, especially at downtown stations. The large amount of employment opportunities in the Carrolton and Richardson-Plano corridors (Green and Red Lines) in comparison to their amount of housing is due to significant employment centers within Northwest Dallas, the Southwestern Medical District, the Richardson Telecomm area, and Cityplace/Uptown neighborhoods, meaning their job-housing ratios are larger than the whole of the system.. The corridors that suffer the most are those that have very few employment opportunities: the Garland-Rowlett corridor, which has a well-off balance of housing and employment (1.01 ratio), and the South Dallas and Oak Cliff corridors, which have very little housing, but an even less amount of employment opportunities. The distribution of Job-Housing Ratios across the Metroplex are displayed in *Map 6.12*, along with comparing the ratios to the tract's distance from the CBD.



Map 6.12 – Job-Housing Ratios in the Metroplex.

BIKE AND PEDESTRIAN

As these metrics were from various city Comprehensive Plans and site Plans, this will be included separate from the other indicators.

Dallas Stations

The Comprehensive Plan for the City of Dallas was adopted in 2006. The city's master trail plan (2008) depicts a broken set of trails and bike routes, concentrated mainly along White Rock Creek near the northern parts of the Red and Blue Lines, Katy Trail in Central Dallas, and scattered broken pieces of trail in South Dallas. The proposed number of complete, gap fills, and small connections would double the existing amount of bike trails (Dallas Trails Master Plan, 2008, 7). Most notable are the White Rock Trail (northeast), Katy Trail (north), Elm Fork Trail (northwest), and Cedar Crest (south) Trail. The main trails at all of the northern corridors of the DART rail (Carrolton, Richardson-Plano, Garland-Rowlett) are designated with rail-parallel routes, acting as a bicycle-oriented spine across the city, which feeds into other local neighborhood trails, directly into rail stations (or connected by a separate sidewalk component), and funnels directly into Downtown (via the Katy Trail). Other trail elements are proposed around the southern stations (Oak Cliff, South Dallas, and Southeast Dallas), but are not planned to be connected to each other crosstown. Trails at the stations in the South Dallas and Southeast Dallas corridors are connected to the massive Great Trinity Forest Trail that parallels the Trinity River southeast of downtown. These two corridors will have direct trail access downtown, however the Oak Cliff Corridor will not be connected.

Additionally, due to the city's extensive road network, the comprehensive plan creates different street types with different levels of priority for bicycle infrastructure (Forward Dallas!, 2006, 11.4.16). The Mixed-use Street and the residential street have a high priority for bicycle interface, while the Transit Street, Downtown Street, and Main Street have a medium priority. High priority is also given to multimodal intersection design

and urban design features along those street types, along with the Mixed-Use Street. For pedestrian facilitation and movement, the plan calls for "Context Sensitive Design" (11.4.18), and suggests incorporation of amenities such as wider sidewalks, trees, pedestrian lights, signs with reflective materials, and bike racks, along with the creation of zoning districts and revised plat regulations to provide enhanced pedestrian infrastructure.

Richardson Stations

Richardson's Comprehensive Plan was adopted in 2009 and included a bike trail and facility plan. Two of the four stations are served by on-street bike routes, part of a large network throughout the city (City of Richardson, 2009, 8A). Additionally all four stations are served by a regional bike network that parallels the DART line, connecting each station. While marked as a future trail (4B), it was complete after the adoption of this plan. Trail connections are planned crossing US 75 on two thoroughfares between the Galatyn Park, Arapaho, and Spring Valley Stations, and underneath the highway to connect to a similarly planned rail-parallel trail on the Cotton Belt (4B). As part of NCTCOG's (Veloweb Johnson, personal communication, October 20, 2016), the trails will also interface with similar Dallas, Garland, and Plano trails.

No specific plans for overall pedestrian infrastructure are discussed in Richardson's comp plan. However improvement for pedestrian infrastructure are varied for each of the stations. Spring Valley and Arapaho, the closest to downtown, are redevelopment sites that require streetscape improvements in fixed sidewalks, short blocks, crosswalks, and a pedestrian tunnel under Greenville Avenue at Arapaho, Galatyn Park and Cityline were previous greenfields, so improvements are factored into potential development stipulations coming from TOD guidelines for the city (City of Richardson, 2009, 5.6-5.8). Improvements at all stations include individualized art elements, removing barriers of pedestrian and bicycle pathways, shading and vegetation, and streetscape furnishings (5.7-5.8).

Plano Stations

Within the City of Plano's Comprehensive Plan, adopted in 2015, results for bicycle infrastructure are mixed. At Parker Road station there exists no trail infrastructure, shared use, or on-street bicycle routes. On the contrary, at Downtown Plano station, four different on-street bicycle routes are within the half-mile station area, which connect to other on-street bike routes within the city. The plan does depict additional infrastructure to be built at all rail stations within the city, including the two future Cotton Belt stations (12th Street and Shiloh). This includes an extension of the existing Chisolm Trail (outside of the station area) and various connections at Downtown Plano and Parker Road, along with a planned regional bicycle network that will parallel the length of the light rail, from the city's southern borders, through Downtown Plano and Parker Stations, and past to the north (City of Plano, 2015). The network will also include a branch aligning the right-of-way for the Cotton Belt. Both branches will connect to partner cities in the regional Veloweb (Braster & Day, personal communication, October 21, 2016). On the policy side, the city is pending an adoption a bike plan with a specific target for biking mode share and safety and in progress of creating guidelines for "end of trip amenities" such as bicycle parking and shower facilities (City of Plano, 2015).

Plano's pedestrian network is in its very early phases. While many of the subdivision built in the city in the last few decades have included sidewalks as a requirement, there are still gaps in the system, and the plan does not show where these gaps are. The city does have a desire to develop a plan that "provides for an accessible, safe system to promote walkability". Within station areas this is no different, despite being more integral to adjacent developments. Plans in the city include developing street design that includes tree planters, lighting, street furniture, and wayfinding, potentially narrowing intersections to reduce pedestrian crossing distances, promote pedestrian awareness in the community, and a creation of safe routes to schools, While the city does have designated school zones across the city for safer pedestrian crossings for children, none are within any current or future station areas (City of Plano, 2015).

Carrolton and Farmers Branch Stations

Carrollton's Comprehensive Plan was adopted in 2003. The plan includes a Tail Master Plan and map. All three stations in the city are served by an existing hike and, none of which are connected. Their master plan designates that these trails will connect via a bike-friendly route that parallels the existing DART rail, along with connecting to a regional trail along the Elm Fork to the west of the city, but no plans for a network of on-street and shared routes (City of Carrolton, 2003, TMP). Meanwhile, the Farmers Branch Comprehensive Plan was adopted in 2012, and a Bicycle Facilities Plan in November 2010. On-street routes are planned for all over downtown and will connect to other on-street lanes, separate grade trails, and shared-lane routes on thoroughfares (City of Farmers Branch, 2012, 79-81). There is also a plan to connect to the rail-parallel trail built through Carrolton, and to extend down into Dallas (80).

Carrollton's pedestrian infrastructure goals are structured as urban design improvements. They recognize improvements to be made through prioritization of pedestrian movement, landscaping streets, water feature provision downtown, and consolidation of parking with no visual impact. These improvements are mainly focused around their downtown, and not on the Trinity Mills and Frankford stations (City of Carrollton, 2003, 46). In Farmers Branch, a walkability index score was made for the central city neighborhoods. The area around Farmers Branch station scored a 4 (out of 5), but was not the most walkable in the city (City of Farmers Branch, 2012, 33). The city has plans for pedestrian and bike linkages and other various streetscape improvements, including street furniture, crosswalk enhancements, and possible roundabout construction to slow down street speeds downtown (84-85).

Irving Stations

Irving's newest Comprehensive Plan is in its final draft stages, and will be adopted at the end of the year. It recognizes that the city has a lot of catching up to do in bicycle and pedestrian infrastructure. Only sections of the Trinity Skyline Trail, that parallels the Elm Fork of the Trinity River, have been completed, and one bike lane exists near a DART

station (University of Dallas) but doesn't connect to it (City of Irving, 2016, 112). These bike facilities were previously limited to sidewalks that developers would put in a subdivision, but now the city is starting to expand that to a network of on-street shared and protected lanes that checker the city. This network will serve every station in Irving, including the two Trinity Railway Express commuter stations, with the exception of Beltline Station in the west. Unlike Plano or Richardson, there are no rail-parallel trail plans save for in Las Colinas (122).

The comprehensive plan does not talk about pedestrian infrastructure specifically. Most discussion is had to improve connectivity between open spaces, and to extend trails aside the Elm Fork and Trinity River. Additionally, the concept of "Green Corridors" are mentioned, (City of Irving, 2016, 169) landscaping existing arterials for beautification, street trees, and visible crosswalks. Within the Las Colinas Urban Center, a Master Plan was adopted in 2013, including limiting block dimensions to allocate shared pedestrian/vehicular streets, on street parking and bike lanes along key streets, and to configure pedestrian circulation within the development toward the DART stations (Irving Convention Center and Las Colinas Stations) that are there (City of Irving, 2013, 32-35). The remaining stations have no specific pedestrian connection plans.

Garland and Rowlett Stations

Garland's Comprehensive Plan was adopted in 2012. A north-south Bikeway is planned on connecting the city to Richardson (north) and Mesquite (south) (City of Garland, 2012, 8.9). Other plans include a rail-parallel trail to connect both DART stations in Garland to the Katy Trail in Dallas, and conceptual sections of Veloweb trails that would connect the Garland stations to Richardson. Meanwhile, Rowlett's Strategic Downtown Plan was completed in 2012 as part of their Realize Rowlett 2020 plan. While it established pedestrian improvement plans (City of Rowlett, 2012, 43-44), it does not specifically suggest any bicycle infrastructure improvements.

Garland recognizes a lack of pedestrian connectivity, especially at the Forest-Jupiter station. Both station plans include streetscape design improvements, including

pedestrian pole lights, benches, bike racks, planter pots, street tress, on-street parking and screened off-street parking, and painted crosswalks (City of Garland, 2012, 6.6-6.7). The Rowlett Strategic Downtown Plan recognizes few streetscape amenities available, sidewalk gaps, inconsistent crosswalks, a lack of crossing signals near the city's only station, and plans to implement visual continuity components and wayfinding into streetscape improvements (City of Rowlett, 2012, 44). The city envisions local streets to "be established to created pedestrian scale blocks for development" (68), and that are oriented toward the DART station.

INTERVIEWS

Information provided by the three major actors of TOD planning within the Dallas region helps bridge the gap between the current statistical indicators current station areas along corridors and transit-oriented plans within cities along corridors. The interviews were conducted in a fairly freeform process, but rooted on select questions pertaining to the interviewees' position. For instance, the developers was not asked all the same questions as the city planner, but similar topics were addressed for each, though from different point of view.

Actors' Goals

When planning for TOD, it seems obvious that each of the three actors have separate goals they want to obtain in the process, but their objectives are more alike than was expected. Jack Wierzenski, representing the transit agency, exclaimed the DART's missions in TOD policy are on an ever-changing spectrum ranging from community benefit, ridership, and revenue, "but the top of the pyramid right now is revenue…in the past, ridership has been the driver." (Wierzenski, personal communication, November 3, 2016). Within TOD projects, DART's goals are to capitalize on the sales tax base it receives from the city where the project is located. More TOD projects that can be implemented with retail and service components can only be beneficial to the agency.

The various cities' goals do not differ that much either. Carrollton is focused on redevelopment through TOD, specifically for its downtown, and less focused on the expansion of service (Nelinson, personal communication, October 20, 2016). Plano is open to TOD as economic development tool, but warns that the current marketplace doesn't allow or makes that difficult to be used in the suburbs, that it doesn't match up with DART's specific goals for TOD, and that a suburban market is a low priority (Braster & Day, personal communication, October 21, 2016). Richardson, on the other hand, is very embracive of TOD on both greenfield and redevelopment sites (both available for the stations within their city), and that their policies and goals are very attune to DART's (Johnson, personal communication, October 20, 2016).

Scott Rohrman (the developer), on the other hand, isn't necessarily involved with development specifically designed for transit-orientation. His main concern is building for community character, along with clearing a financial bar, and claims to be a "fixer", rather than a "creator" (Rohrman, personal communication, October 20, 2016). He lambasted several developments downtown that may be transit-adjacent, but do not interface well with the surrounding community because they were concerned with heightening profits. He also warns that "thinking transit-oriented development by definition [will] create value" has to be understood with caution regarding design and the interface with the community.

Inter-Relationship

The relationship dynamics between the transit agency, the developer, and the city are essential to the creation of Transit-Oriented Development. Jack sees the cities that he works with as on the same page as DART, and crucial to work with considering they have land use powers that DART doesn't. For stations at which both cities and DART have property, Jack works with them on a joint-RFP to develop individual sites, and supports in other city-oriented goals such as affordable housing. He also discusses a struggled relationship with developers, claiming they are not altruistic in their development purpose. He claims the main issue is stemming from a tenuous understanding of each side's roles, especially in RFP processes:

> "No, we don't donate anything. We're required to get fair-market value. Developers have a hard time understanding that. Because we're a public agency, they think we can…a lot of them don't understand the transit agency side of things. I've had a number of them come up and say we should donate the land, because they pay sales tax too." (Wierzenski, personal communication, November 3, 2016).

Due to state or federal mandates, DART has to acquire fair market value for land they own in RFPs, and developers may not understand that. So while he gets the opportunity to seek and choose well-minded developers akin to Transit-Oriented Development, he's cautious to ensure that they understand the process, requirements by higher governance, and what the agency plans to accomplish through a project.

Similarly, cities share a more amiable relationship with DART than with developers. Dan Johnson at Richardson boasted that the city's cordial relationship was rooted in the earliest stages of the Red Line extension, exclaiming the two went "around the country and looking at best practices of TOD to figure out what might be tools we need to bring back to modify in our comp plan and zoning processes." Dan proclaimed it was only natural due to Richardson's already developed employment center in the Telecomm Corridor, and the two work in TOD projects to expand upon that (Johnson, personal communication, October 20, 2016). Peter Braster in Plano also speaks of a friendly relationship, but not as strong, considering they recognize DART's low priority to the suburban market and that they have only worked on one development at one station with DART so far. Krystle Nelinson in Carrollton also claims great experiences with DART, saying that their TOD plans are "acquiesced to what Carrollton wants." The city is working on a joint-RFP at Trinity Mills Station for shared property at the site, and Krystle reports having no qualms working with the transit agency at that site. Both Plano and Richardson discuss having a better relationship with developers because they are more forward-thinking in announcing ahead of time what they want to accomplish for TOD projects. Carrollton is not as amiable with developers, especially at the Trinity Mills site. Krystle spoke about a developer with land right next to the Trinity Mills Station that requested to

develop the entire station in exchange for a donation of his land. Because Carrollton is required to go through an RPQ process, they cannot immediately go with this developer legally. If the city chooses to pass, the developer would not donate the land, leaving a "really great blight next to this really great development" (Nelinson, personal communication, October 20, 2016).

Scott, on the other hand, was very critical of both the city and the transit agency. Scott was a major figure head of the group advocating for D2 to be built underground, and his primary reason was for his distaste of DART's decision to build a surface line downtown in the first place. He contends that street-level retail development is hindered on a visibility factor when adjacent to the station, and therefore not as profitable. He also lambasts DART's station platform extension project, as the short blocks of downtown and neighboring Deep Ellum are not conducive to it. While the extensions will allow for longer trains that can carry more riders, it will also force trains to actually obstruct city blocks. He claims there's not forward-thinking in that project that, "they're taking what works down in Plano and putting it down here. It doesn't work." Scott also believes the agency was not thinking long term enough in their service planning, and for the city to imagine the city 100 years from now, and to plan service for that, specifically through density. With the city, he describes the process of going back and forth regarding building and development regulations as "blow-your-brains-out", but also admires the tension that comes from it because it leads to discussion and learning from each other (Rohrman, personal communication, October 20, 2016).

Transit Oriented Development

The TOD process for each side is fairly similar, but it's noticeable the attention some areas of TOD get in comparison to others. DART has an inventory of TOD properties, the majority of which is parking lots, and assessed based on access, unused parking spaces, and the market, areas of potential developability. To Jack, priority would be on a case-by-case basis. (Wierzenski, personal communication, November 3, 2016). A majority of his successful projects, in the sense of a developer actually going through with an RFP, are in

the northern stations, including Downtown Carrolton, Mockingbird, Cityline, and Spring Valley Stations. He recognizes a need for more projects in the southern stations, especially with great political support for that. He foresees projects at Buckner and Westmoreland stations, but recognizes the market hasn't been good for developers, especially at Westmoreland (where he had a developer pull out in the middle of the process).

The three cities, Carrollton, Richardson, and Plano each have a different level of TOD planning at each of their stations. In Carrolton, Krystle focuses on redevelopment and economic development projects especially at the Downtown Carrolton Station, and is preparing a joint-RFP for an entertainment and office center at Trinity Mills, but has no plans for the terminus station North Carrollton-Frankford (Nelinson, personal communication, October 20, 2016). The city of Richardson has two stations (Cityline and Galatyn Park) on previous greenfields and two (Arapaho and Spring Valley) as redevelopment sites. The greenfield sites are being developed in phases as massive residential and office parks concurrently with developers, based on the city's TOD guidelines. The redevelopment sites are where Dan is aggressive in reinvestment, focused on business retention and recruitment, allocation of live-work units and crafts-units, and adaptive reuse. He also hopes to create an urban village setting for the city's downtown, in between the two stations, and apply the same economic development principles within (Johnson, personal communication, October 20, 2016). Plano has only a few TOD projects scattered at its Downtown Station, with interest at Parker Road Station once the platform extension is complete, and they can determine a way to configure DART parking into a garage, and then use that land for an RFP process (Braster & Day, personal communication, October 21, 2016).

Scott, while interested in the profitability and in favor for Transit-Oriented Development, is not himself invested in TOD projects. He recognizes his fellow developers are active in cities' RFP processes, but warns that they will fail unless they capture the community character in the design of the project.

> "You have to take in human-scale, and all of these other things. You have to have security. You have to have cleanliness….what makes a community is diversity. A great city is organic and chaotic. It's what gives it life and energy." (Rohrman, personal communication, October 20, 2016)

First and Last Mile

The first and last mile solution is key to extending the commutershed of a passenger within a rail corridor. DART's stake in this that it can only provide facilities for stations, including bus lanes and an overabundance of parking and Park and Ride Stations. Jack Wierzenski wants to do a study to locate underused parking at several stations across the system for redevelopment. For motorized last mile solutions, Jack looks to privatized vehicles like Uber and Lyft, and rent vehicles like ZipCar. For non-motorized solutions, Jack hopes to emphasize hike and bike trail connections to stations and support of Dallas slow-rolling bikeshare program. Jack emphasized that the overall goal is to provide accessibility to their infrastructure, and believes that provision of the above services at stations can do that (Wierzenski, personal communication, November 3, 2016).

Richardson emphasizes shuttle service for last mile problems, recognizing that connectivity devices around stations would "stretch the last mile and the impact of the station", and that coupled with an efficient transit trip, would induce an inclination to infuse transit into a potential passenger's lifestyle. Dan was frustrated with the city's last mile efforts in comparison to the many shuttle opportunities around Dallas, but discloses two unique shuttle opportunities in Richardson that link the Galatyn Park Campus to its station and the UTD campus to the Cityline Station (Johnson, personal communication, October 20, 2016). However, the implementation of the city's rail-parallel trail and participation in NCTCOG's Veloweb project are good starts for pedestrian and bicycle connectivity. Similarly, Plano is looking into trail-parallel rail opportunities and is part of the Veloweb. Carrolton is part of neither, though emphasizes trail connecting rails to surrounding neighborhoods, wayfinding for agglomerated parking (especially Downtown), and requires

pedestrian infrastructure components and improvements doe developers in their RFPs (Nelinson, personal communication, October 20, 2016).

Scott Rohrman had no opinion on first and last mile connections. However he did complain about the placement of the Love Field Station, which is not in Love Field, but a mile away, and requires a passenger to get off the station, go down stairs and wait for a shuttle. He says the rigmarole of the process, along with the infrequency of the shuttle renders the interface ineffective. This phenomenon only emphasizes the need for higher-quality shuttle service or non-motorized transport for the first or last mile service to or from a station (Rohrman, personal communication, October 20, 2016).

Affordable Housing

To combat the flight of poverty that can result from gentrification, affordable housing needs to be an opportunity at TOD projects. DART recognizes affordable housing as an extremely important issue that's left better suited for the city and collaborative non-profit groups, but still supports their efforts. Within DART TOD projects, it's complicated to include that component, Jack says, because he has to balance both city and developer interests in the project. Affordable housing severely limits developer's financial opportunity in a project, and many of DART's board member s agree on maximizing revenue at a TOD property. So Jack recognizes that DART is caught in between being a business and a public entity (Wierzenski, personal communication, November 3, 2016).

The cities interviewed are mixed in their views on affordable housing. Carrollton has no affordable housing requirements in any of their TOD projects, and while are welcome to multifamily projects that add value to an area, are looking for "the right kind" (Nelinson, personal communication, October 20, 2016). Plano has affordable housing opportunities near their downtown station, including an 80% affordable product. Plano emphasizes the affordability factor within the east side of the city, asserting that they "understand the need for all levels for housing…both affordable and market-rate", and marketing first-time buyers, young homeowners, and historic communities. The city also has a myriad of neighborhood and homeowners' association support (Braster & Day,

personal communication, October 21, 2016). Richardson, like Carrolton, has no affordability components. Dan Johnson recognizes the city hasn't done a comfortable job tackling the issue, but is willing to learn more to recognize what he can do in his seat as City Manager to influence affordability (Johnson, personal communication, October 20, 2016)..

Scott has a mixed reaction to affordability, similar to the city and the transit agency. He does not have the answer to affordability, and while he is not necessarily opposed to a mandate of it, he is critical of the concept. He is very merit-based in search of tenants, and claims he wouldn't just give housing away; his tenants, along with society have to put in effort, and it has to be to his worthwhile. He is also heavily critical of the tax instrument that forces affordable housing in projects, though not the mandate of it. However, he is most upset that developers would go out of their way to either include it as a completely separate component of their development instead of mixing with market-rate, or not include it at all. Scott, while unsure of how to manage the crisis of affordable housing, believes there are better ways to solve an affordability crisis than to burden developers or to put it into government hands, and suggests religious institutions as an alternative (Rohrman, personal communication, October 20, 2016).

Chapter 7: Conclusion and Discussion

Corridor TOD as a physical structure allows municipalities and entities with land use power to regulate land uses in a linear pattern adjacent to a major transit line within the city. Provision of infill density, commerce and services activities, public facilities, pedestrian and bike infrastructure, and housing along transport corridors, can occur at an even distribution across an entire corridor, and even including development that can transition to surrounding neighborhoods. When Dallas focused on providing development for its new light rail line in the 1990s, it relied on wealthy developers that wanted to implement their own aesthetic but not practicality into station-adjacent development, rather than setting its own precedents for development like today. This led to only a few TOD projects that grew chaotically and artificially at individual stations able to be built outside of downtown, with only mixed success.

According to the results of the indicator analysis and information provided with the interview analyses, the current DART system was not built with Corridor-oriented TOD in mind. Station to station, factors such as land use mixes, population and block densities, service areas, and job provision, are too different to form a cohesive continuous linear form longer than one station. The decision to serve suburban corridors prioritized spacing out of stations to conserve travel times towards the city, and therefore isolate station areas from each other. Any stations built in corridors with adequate density, service area, or station spacing, have some other indicator that negates the ability to have successful development around it. Without an ease of connection to a corridor, or even a practical reason to go to a station area other than niche shops or restaurants, the interface between the commuter resident outside of the station is limited to only the Park and Ride facilities. For a station, reliance on the residency within a half mile as transit support is tenuous within the low-density Metroplex, and reliance only on commuter ridership only seeks to isolate the station area from the rest of the built environment. This does, however, provide many opportunities for the City of Dallas to work with DART, developers, and the other member cities, to provide infill to activate neglected sections of corridors.

CORRIDOR OVERVIEWS

The Richardson-Plano Corridor most resembles a delineation of a Commuter Corridor with traces of the "middle income mixed-use" class coined by Atkinson-Palombo and Kuby (2010, 194). Nevertheless, the station areas in this corridor are some of the most prone to isolation from commuters. The heavy amount of employment centers along the corridor, but low-level of ridership interaction during non-peak hours indicates that this employment is not interfaced well with the rail system. Much more housing elements at different densities and typologies are needed to complement the employment centers across the corridor and the two cities' efforts in cohesive pedestrian and bike facilities from surrounding neighborhoods. For stations abutting US 75 and major arterials, extra focus will need to be on pedestrian safety to the station, including lowering speed limits, pedestrian crossings, and way finding. Additionally, as neighborhood opinion has shifted since the 1990s, DART should open up discussion once more to re-commission Knox-Henderson Station. A very compatible neighborhood, demography, and building structure already exists to complement the potential station. Jack Wierzenski does warn that according to last estimates made by the agency, to re-commission the station and complete the tunneling needed for it would cost $100 million. Therefore, any chance of a Knox-Henderson station would have to wait until commitments to D2 and the Cotton Belt are complete, which may be until the next decade.

The Garland-Rowlett corridor can also be delineated as Commuter Corridor, with stations representing "middle income mixed use" (Atkinson-Palombo & Kuby, 2010, 194) on the south side of the corridor and "Transportation Nodal" (195) in the suburban sub-corridors. Due to heavy prevalence of parking accessibility and low redevelopment potential limited to parking facilities and a few industrial parcels near Forest/Jupiter, it will be difficult to implement any small-scale improvements to the corridor. This is especially true through the established White Rock and Lake Highlands neighborhoods. Continued housing and density will be the main focus, within the section from LBJ/Skillman to Downtown Garland stations. Extending the Katy Trail connection that's parallel to the rail line, through the White Rock neighborhood, and up to Garland, will also provide a

pedestrian and bike path straight to Dallas and orientation for residents of those neighborhoods.

The Southeast Dallas corridor is characterized slightly by a Destination Connector, with stations that closely represent the "Urban Poverty" (Atkinson-Palombo & Kuby, 2010, 195) and "employment and amenity center" (194) typology. This corridor is connecting poorer, low-dense, family housing in Pleasant Grove, with a gentrifying and dense neighborhood of Deep Ellum, and several activity centers at Baylor Medical Station, Fair Park, and downtown. Priorities in this corridor will be to provide trail connections from stations to the Trinity Greenbelt (to the southwest of the line), and provide employment opportunities within the middle of the corridor (Pleasant Grove and MLK neighborhoods), areas of great transit and pedestrian connectivity but poorer land use mix.

Similarly, the South Dallas and Oak Cliff corridors require similar infusion. These two lean toward Commuter Corridors, closer to the "Urban Poverty" (Atkinson-Palombo & Kuby, 2010, 195) typology. This was determined from low ridership at both peak and non-peak hours, severe lack of employment opportunities, and the amount of small parcel-vacant land scattered throughout various station areas, all of which contrasts a stronger demography for transit use (high % of users with 1 or less vehicle, large household sizes, % of population with a High School Diploma or less, etc.). The contrasting metrics indicate an opportunity for establishing employment and educational opportunities for these well-established neighborhoods. The new UNT Dallas and Camp Wisdom stations provide a great opportunity to fulfill these. Additionally, affordable housing elements need to be pursued, like Scott Rohrman is experimenting with, on the condition that they're paired with much better facilitation to public transit.

The Irving Corridor has the greatest potential for infill, considering its recentness, large amount of undeveloped land, and demography. As a Destination Connector, it has pockets of employment and dense housing scattered throughout stations, between the Victory area, Southwestern Medical District, and Las Colinas, all close to the "employment and amenity center" (Atkinson-Palombo & Kuby, 2010, 195) typology. The key in this corridor is to provide pedestrian, bike, and alternative transit connections from station to

an area devoid of it (especially the city of Irving), and to parcelize large undeveloped swaths of land surrounding the airport and land around Las Colinas that's not within the Elm Fork floodplain.

Finally, the Carrolton Corridor, a Destination Connector with stations with "middle income mixed-use" (Atkinson-Palombo & Kuby, 2010, 194) and "employment and amenity center" (194) qualities. This dichotomy provides a challenge within the corridor. The Carrollton and Farmers branch areas have opportunities available for housing, employment, and commercial redevelopment, along with great opportunities to densify at non-suburban downtown stations (Trinity Mills, N. Carrollton-Frankford, Royal, Walnut Hill-Denton). The Northwest Dallas sub-corridor actually seems to be a well-established Destination Connector, linking the Market and Design District, the Southwestern Medical District, access to Dallas Love field, and the up and coming Victory mixed-use neighborhood. However, opportunities for redevelopment are very low outside of already-established TOD projects. Small-scale improvements include upgrading the shuttle service to Love Field (that connects at Inwood Station), densifying the Burbank and Bachman neighborhoods, and ensuring pedestrian connections to the Katy Trail and Trinity River Greenbelt.

To implement these suggestions, the municipalities in question should set up or expand existing TIF districts or the equivalent, designating the half mile area around the rail line within their borders as areas of priority for housing density, trail connections, bike and pedestrian infrastructure. For undeveloped and unestablished areas like UNT Dallas or Beltline, TOD developers with more independent capital should be sought within the RFP process. For DART and for member cities, prioritizing TOD projects needs to be implemented for each corridor, rather than the whole system. This is to continue to keep TOD plans cohesive and collaborative with member cities, and equitable across the system, with the caution that the market may push for development in one corridor over another.

DISCUSSION AND LIMITATIONS

This study was conducted and written to explore DART's efforts in TOD planning, in collaboration with member cities and local developers. While within certain aspects of the process the parties seemed to be in synch, there are a few communication and transparency issues that need to be addressed, especially between the transit agency and developers. Being straight-forward with one another, along with communication of intentions far in advance of projects, will be necessary so all parties can plan efficient TOD for a metropolitan area that desperately needs it. These can be accomplished and easier to be facilitated through a corridor context, as presented in this report. Through statistical study of the current environment of the local station area, and its context within a corridor, prioritization can be made for the infusion of TOD investment to address the Metroplex's region-wide issues.

One of the greatest limitations for this project was the recency of data. The Center for CTOD TOD database was constructed in the early 2010s and has not been updated since. This meant that the entire Orange Line, which was opened in 2012 and completed in 2014, and the Blue Line extension to Rowlett (completed in 2012) were rough projections for station areas that did not even exist at the time. Additionally, the database did not provide any information regarding stations that had not been on DART's official plan at the time, meaning UNT Dallas and Camp Wisdom stations (which started construction in 2014 and completed in 2016) had no data and had to be left out of the demography and density categories of the results. Any information for those stations (connectivity, land use mix, station performance) was calculated directly in ArcGIS. To provide information for all existing 64 stations (plus the 4 potential infill stations), extensive calculations would had to have been made that the data on hand was insufficient to provide.

Data cohesion was also another challenge in this project. Different metrics provided by DART and the Center for TOD did not cover the same years and may not be directly comparable. For instance, population, age, and education information for a station would be covered from the 2010 Census, but employment and median income for the same station

would be from 2009. The cohesiveness of the metrics, especially with the year of their measurement, may have limited the analysis and hidden some possible correlations.

A problem specifically with land use was the designation of categories within the Land Use file provided by NCTCOG. Three land uses made up the RCO category, designating buildings and uses that provide goods and services for the region: retail, commercial, and office. However, the definition of the "commercial" use category included parcels that were most likely mislabeled as such, upon aerial confirmation. This left several buildings that should be designated as retail or office (each having minimal dispersion throughout the Metroplex) as a blank "commercial" use. For instance, parcels that signified warehousing for service firms were still designated as commercial, a completely different use than a potential office building also designated as commercial. Redistributing these land uses can help better differentiate them and provide a better idea of the land use mix around a station.

Finally, other metrics were omitted because they were not available or decipherable with the available dataset. This included physical building footprints, sidewalk data, land and property valuation, and FAR and density guidelines. Additionally, the trail and park data within the dataset was incomplete and could only be analyzed at a qualitative level based on inclusion and detailed account within city comprehensive plans or special district master plans. Any available GIS data was for only the City of Dallas proper, while the remaining 12 member cities were absent of it. The hope is that NCTCO's Veloweb project would bring together the various city's GIS assets to create a regional-wide dataset cataloging the network of trails, bike networks, and park and recreation plans. Additionally, the hope is Veloweb can eventually catalyze the collaborative effort to implement transit-oriented design within the Dallas Area.

Chapter 8: Appendices

Appendix A – Transcript with Scott Rohrman

Date – October 20, 2016
Interviewee: Scott Rohrman, 42 Real Estate (S)
Interviewer: Evan Tenenbaum, University of Texas at Austin (E)

Interview Started with Explaining the Purpose of the Report

S: Can I ask you a question?

E: Sure.

S: I agree with you on your assumption. Except I would take the word "corridor" out, and I would put in "matrix", I would put in "tapestry"…I would put in "neighborhood". Because I think that what my biggest issues is the United States thinks linearly, and I think that neighborhoods are better off when there's multiple ways of getting around, and exploration and adventure. Does that make sense? To me, corridor is a linear term. I think it's great you're looking at not just a node, but a broader context. There's a beautiful building in Dallas, McKinney Olive. I think the architect created a wonderful building, the developers spent a lot of money and did a great job. But I don't think that they looked at the context of the area they are. Three sides are a horrible pedestrian experience. One side, they said would be their "statement". That side is really good. But they didn't do anything for the overall neighborhood. That's nodal thinking, property-specific thinking. So the concept of expanding a node is really good.

E: Yeah, I see. But I don't want to get rid of the "corridor" name, in the context, we're talking about a transit line in a low-density city. Dallas wants to increase employment. And have more residents within the city to lower the distance between living somewhere and working somewhere, you have to bring those elements together. You can do that through TOD. I do like that you said "neighborhood", because I envision that neighborhood as walkable to a station. At corridor level, you're thinking about how to connect that neighborhood to a station.

S: I'm just saying, as you go through your thought process, I would challenge you to think of things in a matrix versus linear.

E: The corridor shape comes from the density. That would be more linear. A gradient that they city would set for density. There are other elements in corridor TOD that aren't linear.

S: That's fine, I don't…so I'm a libertarian. I don't think there's ever been a tax policy I've seen that worked like it was designed. I really like Houston from that standpoint. Let

the capital market decide. I think that when city planners get involved with planning a city, you end up getting a city that the city planners want rather than getting a city that the citizens want. I think that's poor. I would challenge the thought process for density. I'd say let the market decide. Zoning shouldn't restrict that. Does that make sense?

E: Yeah, perhaps.

S: What I'm trying to do is I'm trying to bust everybody's thinking up. Standard practice to say that the closer you are to a transit station, the denser you can be. I don't disagree with that. But I'm also saying let's don't limit the zoning as you go away. If the market wants density, then that's wonderful, because density is awesome. What I'm trying to push Dallas to in multiple fronts is to let us have 100-year thinking.

E: See that's where disagreements come in. Because you have city officials that think about the next election cycle, and staff are thinking sort of generationally. Now you're thinking about 100 years…

S: That's right, 100 years. You ever hear of CityMAP? Wonderful project. They're sitting there going, "let's gather every planner and engineer and architect together and listen to everything. What does the city want? What does transportation want? I don't know if the outcome will be something I agree with, but I sure appreciate the process. It's causing us to talk about things. They're farther in the future that what we would normally talk about. We have got to look to the future. There's plenty of land, everywhere around. But people want to live where there's people, where there's parks, where there's interaction.

E: Exactly.

S: My goal is to not think too small.

E: I like that idea. I just know there are so many actors that would dissent that far-reaching thinking. In real estate, isn't there a point in density construction where it's the most lucrative, where it just gets more expensive to build higher or denser? Based on models…

S: Yeah I disagree with the concept. I own property in Deep Ellum, and I have 25 apartment developers trying to buy my property. I said to them that I didn't want to sell. They asked why. I said, "because you are going to build the most lucrative project you can build, and I want you to build a less lucrative product that helps the community, not one that helps *you*." It can help you, but I want it to help you less so you can help the community more. I'm doing it by putting money where my mouth is. I'm buying the property, and I'm saying to do it this way. 24 of them have run away. One of them is in agreement. That's what I'm driving.

E: Awesome. Okay, we gone through a couple of these questions without asking them, I don't want to go through all of them step by step…

S: You can do whatever you want.

E: Can you describe your process when you have a site that could be considered transit-oriented?

S: Well I can't say I've bought a site for the transit orientated site, or one that's dependent up [on that.

E: But you have interests, like in the whole D2 thing.

S: Yeah, we own a property on Mockingbird close to Love Field…

E: Near the Green Line station?

S: That's the craziest thing. DART spent $150 million to put a DART line right next to Love field, and you can't get off the line to go right to Love Field. It's an elevated station, you've got to get your suitcase, go downstairs, and wait 15 minutes for a bus to come to take you to the station. Why didn't they build it right under the airport and have an escalator that comes right up under it. You've ever been to Chicago Midway? Fly there, get right on the train, you're downtown in like 30 minutes!

E: My sister used to live in Chicago, so I *have* done that…

S: There you go. So my property at Love Field *should* be transit-oriented, but it's not because DART's "got its head up their ass". Also…in Dallas…the stations are on Pacific and Bryan... Trammel Crow's first building downtown was built right there on Bryan Street. I've been buying stuff downtown. I've had a broker call me and say the Trammel Crow building was available. If it's priced right, I want that. We walked to it, and suddenly I wasn't interested. He asked why. I said, it's right next to the transit station. The stations are built the same way in Downtown Dallas as they are built in the prairie fields of Plano. They have these big covers that protect you from the rain. They try to make one size fits all. They have these raised platforms so you can't cross the street. I don't walk to the corner to cross the street. Then you can't have retail on those building. Those covers block the view of the storefront. You can sell more when more people can see it.

E: That is true.

S: It is. We have two buildings in Deep Ellum. The one on the north side, the sidewalk is 22 feet wide and a 25-foot setback. On the south side we have a 20-foot sidewalk and no setback whatsoever. Guess which one has the higher retail sales? The one with more setback. Because people can see it. There's an extra 25 feet of visibility to see it. On the south side you have trees and shade, but you can never see the storefront until you're right in front of it. SO how do you bridge visibility as a sales tool with walkability? It's a very interesting kind of deal. We have to increase visibility. Blade signs, lighting, way finding. We have to do some articulation of the store front. We need different setbacks

for different stores. City zoning takes away points if you're not on the property line. It's artificial. In Deep Ellum we have points-based zoning. So Transit-Oriented Development can be negative. Let's take Mockingbird Station. You know it.

E: Of course.

S: It's on its third owner. None of them have made money. Mockingbird Station is a failure commercially. I don't like going to it because it's down in a canyon. Going into the retail development. There's this theory that if you're near a station, you can build anything you want and it will work. And that's not true. You have to take in human-scale, and all of these other things. You have to have security. You have to have cleanliness. Is TOD something I think we should be doing? Absolutely. But you better make sure that DART understand what they're doing. You can't out-engineer something that's already built. So, for us…we have not made decisions to buy property because they're near transit. Transit here is screwed up. We have the largest number of miles of track, and we have the lowest ridership...

E: You sure about that? Maybe per mile, but I know other rails that are way worse.

S: Plano gives money to DART every year. You take the number of riders that ride DART and divide the money that they give them, Plano is spending $250,000 a year per rider. It's a lot of money. DART made a decision early on that they're focused on coverage. They decided that they would be successful based on how many square miles they could cover. There's a different way to do it. I don't know which one is right. I know which one I like. Go through density. But instead they had to have miles. So they bought all of the old train tracks, and then instantly they'd be the biggest in the nation. Where were the freight train tracks? In industrial areas. Do people want to go to industrial areas?

E: Those are prime for redevelopment, at least in the suburbs.

S: They are, but we've been doing that for 25 years…also…the city is saying you have to have parking. Alright, for me to have parking for that building, I have to tear down these other two buildings for surface parking. What does that do to the pedestrian experience?

E: Deters it.

S: It ruins it. In academia they're right in saying developers have to work with all of the stakeholders, but to do so it's…

E: Slow rolling?

S: It's "blow-your-brains-out". There are some wonderful people at the City of Dallas. But there's that tension at what's right. I like that tension.

E: It keeps the discussion going.

S: It makes me better. You make me better. Challenge my assumptions, challenge my opinions. Push me and I'll push you. But people don't typically like being pushed. Anyway…so what we look for in property, when we're buying is something we can add value to, for neighborhoods that are underperforming, and we look for neighborhoods with infrastructure that we don't have to create, we just have to fix. Deep Ellum, I'm not creating anything, I'm fixing what's there. I look for things that I can fix. Things with good underlying bones. There aren't many places like that in Dallas near transit stations that I'm interested in. DART has an RFP on the east side of Mockingbird Station. They want developers to come in for a 99-year lease and build this big transit-oriented development. Somebody will do it, and it will make the station better. But not me, I don't know. Cityline will be good… You just have to be careful thinking transit-oriented development by definition create value. It's the whole context of things.

E: How do you quantify "underperforming" as you said before? How do you measure it?

S: The most important is gut-feeling. Does this feel like an area I'd really like if things were fixed up and painted or something like that? Quantifiable things…in Deep Ellum rents were $6 net. Now we're at $30 net, 5 times than what they were before. That was underperforming. There was a fragmentation of ownership. We bought 50 properties from 30 owners. There's two other major owners in Deep Ellum that have bought 15 properties. 57 owners that are now gone. Getting an area where you can consolidate ownership from fragmentation, that's an underperforming area. The interesting thing is over time, the neighborhood will be better if you fragment it again. What makes a community is diversity. A great city is organic and chaotic. It's what gives it life and energy.

E: Okay…you obviously don't have a great opinion on how transit has affected the market.

S: I don't think it should have affected the market. I don't think it has that much. I think it has negatively affected downtown. The UNT report says the transit has built $5 billion worth of value. Bullshit. Maybe $100 million. DART paid for the UNT report, it's not very reliable.

E: These reports don't include every individual stations, they just include downtown as a whole.

S: That's right. These downtown stations…they don't feel safe. Safety is key.

E: Alright well…can you tell me the process of working with the transit agency or city, even though you don't have many properties near the transit lines?

S: Well the transit agency "hates me". A year ago the City of Dallas voted 14-1 for a surface line for D2.

E: Well now they just recommended subway.

S: Yeah, and *I* started the whole subway process for D2. I stood up at a meeting 11 months ago for it. Twice as expensive? Whatever. Decide. A Mercedes is twice as expensive as a Hyundai. Which one do you want to drive? They start saying the government is giving us this money. If we don't take it we may lose it down the line. Don't use money as a deal breaker. Let's figure out what's best for Dallas. And guess what? If we increase downtown's value, that $600 million would be paid back for that quick.

E: So you were under the opinion that surface rail would not do that?

S: Yes it divides. I've asked DART to sit down with me three times to figure out a way to get what they want and get what other stakeholders what they want. They want the Cotton Belt. Let's sit down and figure out a way to get the Cotton Belt. We're a big city, a big region. Then, they're also tiring to extend the length of trains to 391 feet. In Deep Ellum, blocks are 200 feet. By definition, every time there's a stop light, they're blocking two streets. They just got through platform extensions. They're taking what works down in Plano and putting it down here. It doesn't work. I said to DART, "Let's figure out how to let trains be in the same right-of-way as cars, bicycles, pedestrians." But they said that would take different technology. Okay... They're staying with what was maybe good 25 years ago. They're staying focused on maximizing the number of miles…I think that DART has a lot of good people. They have a desire to do the right thing, but the mission is different than how I think. I think, what is the best thing 100 years from now? You'll never reach a goal you never set. We have to decide what are we going to be, and what we are going to do. And I've got a lot of real estate developers that are pissed at me too. I could care less if you made $100 million on a project. I'm not in it for the money. I've got to *make* money because I need to pay investors, and I tell them we're not making as much money in Deep Ellum as we could.

E: How would you rank financial success in projects?

S: I have to clear bar. Clearing the bar financially is number one. Getting way above the bar is a pretty low priority. What *is* the bar is something I'll keep to myself. But getting investors money back, plus a return, would cause them to invest with me next time. I have to clear that. I'm not interested in anything more if I'm not paying attention to the community.

E: So community character is the next most important?

S: Yes.

E: Fair enough.

S: In South Dallas, I have three houses I'm trying to buy. I've got three white couples, all college-educated, who I will sell to at 80% of what I bought it for. I'm trying to get college-educated people into South Dallas. The one setback is they can't get to their job in under an hour and a half with transit. If they drove their car, they could get there in 15 minutes. Tell me if mass transit is working in Dallas for the people who need it the most. There's ways the government can tweak it…raise taxes on surface lots, and that would force people to ride DART.

E: Raise the gas tax…

S: That too. You can artificially force them there. Maybe that's good. But I tend to not be a taxation guy. The point is the market is going to drive it. I'm for mass transit. I'm not for broad coverage. To Addison, yes…let's just build a line right up the toll road [Dallas North Tollway]. Build a tunnel right under to Addison. It's about density. Serve the most number of people with the fewest number of miles. DART's attitude was serve the broadest geographic area possible.

E: The way I understand that is, their service aspects are towards commuters who are already outside the city to bring them into the city.

S: The Cotton Belt is commuters to commuters. The numbers show that it would be a heavily subsidized line. I don't think there's a single mass transit system that's not subsidized, but there are systems that subsidized much less. Dallas is 90%. 10% of their money is from fares, and 90% from sales taxes form cities. That may be okay too, but what I'm saying is we're not serving the people who need mass transit the most. The Plano argument is convenience. The mass transit argument is to help poor people…so I'm all for mass transit. I think where the stations are should have wonderful Transit-Oriented Development, and we need to focus on that. We need to try to build a transit system that makes that work well. Then the market will want that. Near an entry and exit point. Dallas is going through its first phase, really, of people moving out who want to come back in.

E: I wanted to ask about affordability issues. Because, you now, moving back into the core city, providing developments, also pushes out those who can't afford it. In your developments do you allocate for that?

S: Well, I don't do residential. But I do give artists free space in some of our building now, but because they are not leased. People are bugging me already about it. "What are you doing for artists, what are you doing for affordable housing?" What do you want me do to? I can't buy every single house and kick the artist out. As long as there is product somewhere…in the Metroplex… What do you want me to do? I can't give you something for free just because you're an artist. I don't get it. Why would I give you something? America is an open society to work hard and make money. It's the American right to have the opportunity *to work hard enough* to get a living wage. I know a lot of people…

they work hard. Is it rigged? It may be rigged for the rich guy to get richer. But it's not rigged for the poor guy to never make more money.

E: So regarding affordable housing…

S: You know, I don't have a good answer except to say, let's get involved to do it. I'll put in whatever I can afford, but we all have to contribute to that. But we have to be given something back. For people to look at a developer and say they need to give affordable housing…it's a question I have of, how do we do this? There's a theory that says because I make so much on a development, that I should just let 20% of my units go for affordable. That's fine, but that's a tax, and that affects the profitability of the project and the desire of people to do a project. It affects everything. It's a cost that you have to add in. If there's a law in Texas that would ever be made, that says whatever percentage of units would go to affordable housing…I'm not necessarily opposed to that. But I think there's better ways to do it, but also give me better ways to do it….how do you it? I don't know about affordable housing, but what I can tell you is when you give people something that they didn't earn, it rarely turns out well. Put in effort. I know diversity is good. I know we need to live amidst each other, among different socioeconomic factors, different education, occupation, political persuasions, religious persuasions…we're a better community if we do that. That's hard because the human condition goes to the people we agree with and are alike us. It's not until we're forced together until we realize that people are people.

E: Right.

S: To have diversity, in some ways that means some people have to give more than someone else. That's hard. What I think is, if you want to take the 100-year view, the broad view, the deal is the churches have failed society. We're not reaching out to our neighbors.

E: Churches and religious institutions aren't taxed.

S: Right. Another reason why they fail. What we've done as a culture, is say we really don't want to get involved personally, so tax me more and then let get the government take care of taking care of these people so I don't have to get involved. So how do you affordable housing? I don't know. I have an answer for almost everything, but that one I'm still struggling with.

E: You don't think the answer is to set aside this amount of land or money?

S: I can tell you this. Every apartment developer in Dallas disagrees with me, but there's no reason to do affordable housing if it's all one project. You've got to put both affordable and market rate in the same project. Street Lights just built an apartment complex in Deep Ellum. They got an $8.5 million TIF grant with the attachment of 20% affordable units. They said it would cost them money, and that they'd rather go buy

another piece of land to build a project just for affordable. They didn't want affordable to interact with market. The city said no, and they built the apartment anyway without the TIF grant. One of the Street Lights guys told me if they had gotten the affordable housing component waived for the grant, it would have gone straight to the bottom line. That's not the purpose of TIF money. It's to get you to do a project you otherwise wouldn't do if it weren't for the grant. They just wanted the extra $8.5 million. That pisses me off.

E: I completely agree.

S: That's the problem with taxation…so what I say is let the churches do their job. If the churches would recognize people within the community that can't afford to live…from a spiritual standpoint, we've lost our way and asking the government to do things. I think the church, the institution of religion, needs to take care of people. That's utopia, right?

E: **laughs** Yeah.

S: But that's something to shoot for. We can do it little-by-little. That's what I'm trying to do in South Dallas. I've got a block identified where I'm trying to buy both sides of the street and put federal standards of affordable housing in this house, then a college-educated couple in the next, then back and forth. Every other house. Then, I'll sell those college-educated houses at 80% of fair market value after they're fixed up. They get the 20% at the end of the third year. On the affordable housing side, we'll charge whatever the federal government says we should charge them. I don't agree with those, but I'll need a third party to make that decision.

E: I guess a really hard question to answer.

S: Right, I don't know the answer to affordable housing.

E: Alright…I think I'm finished with my questions.

S: Well okay, then.

E: Thank you very much.

Appendix B – Transcript with City of Carrolton

Date – October 20, 2016
Interviewee: Krystle Nelinson, City of Carrollton (K)
Interviewer: Evan Tenenbaum, University of Texas at Austin (E)

Interview Started with Explaining the Purpose of the Report

E: Typically, when you're looking at Corridor TOD, it's when the new transit investment is proposed. Obviously we're kind of past that phase since the light rail [in Carrollton] has come in, what, 2009? 2010?

K: 2009.

E: Okay…so you got to look at an adaptive reuse – sort of, TOD, at least in Carrollton.

K: Right.

E: I'm looking at all corridors in broad context. So, we're looking at the Northwest Corridor [in this case]. Green Line: Carrollton, Farmers Branch, Northwest Dallas.

K: So when you talk about "Corridor", are you talking about a certain radius from each station or are you talking about like an entire city-wide corridor? Like, would the Carrollton Corridor be from…our first station at Frankford down to Downtown Carrollton, or are you just talking about a certain radius from each?

E: So it is a radius…but not just the radius of the station area.

K: Okay

E: We're talking about the connections that are made between stations and the facilitation of development around them.

K: I see.

E: I could say the North Carrollton/Frankford all the way down to even Farmers Branch and further. The pedestrian [infrastructure], the land use connections, the market around that half-mile corridor that stretches from the rail line itself.

K: Okay, great.

E: So, that's what I'm pretty much looking at. I kind of want to get a context within the city [Carrollton] on that kind of thing. Looking a little bit broader than the nodal view of Transit-Oriented Development strategies. So…we can be freeform here, but I'm just going to start going down a few of these questions.

K: Okay. Sure. It's an interesting perspective to think of it as an entire corridor as opposed to each individual station. I mean, I can tell you, just right off the bat, that in Carrollton, we treat each station individually as its own separate personality without a whole lot of thought about how the three [stations] play off of each other. So it's interesting. And even outside of Carrollton…we're a little bit different than some of the other cities that you're going to talk to in your coming days, in the sense that we only border one city that extends the Green Line. Farmers Branch. Until the Cotton Belt comes through, and then we'll have more neighbors. And the collaboration between Carrollton and Farmers Branch as to how our stations fit into theirs is non-existent. So it's an interesting perspective.

E: That was actually one of my questions [regarding collaboration].

K: **laughs** Is it? Well, okay I'll save my comments for when you're there. Yeah.

E: **laughs** It's down the way…okay…So, first, these are kind of general. Can you describe your general role in the process of developing TOD within the city?

K: Right. I have a…so my position title is Development Program Manager, and I really facilitate three different kinds of development within the city. One of which is being Transit-Oriented Development. The other two have to do with multifamily rehab and reuse, and the other being general redevelopment in the city. Again, we're a little bit different than some of our…some of the *outer* ring cities, being that we're *inner* ring, so we don't have greenfields that are ready for new development. So when there's somebody that wants to locate to Carrollton because we have the correct demographics or the current market that they are looking for, they're going to have to look at a site that "has some hair" on it. That has some age to it. When that happens, there's going to be problems that you don't experience when you have a greenfield. It's my job to help them work through those issues. As far as Transit-Oriented Development, each of the stations [within Carrollton] has got a redevelopment priority attached to it because when the rail line was delivered to Carrollton, it was already developed. And so, those redevelopment priorities work with Transit-Oriented Development just by nature of where the stations are.

E: More of a facilitation of that area, basically?

K: Right…at least for my role, now…it's less about the transit, the transportation, and more about the capitalizing on the development happening at each station. That's where my role is at now.

E: Okay.

K: Now, with Cotton Belt in its development stages, Carrollton does play a role in that. I'll be more involved with that project once it's something you can see and touch and experience and less a conceptual thing that we're still trying to figure out.

E: I saw that report that Plano…I don't how much it was [that they contributed to funding], but they basically estimated to set the project forward by about a decade.

K: Yeah. The Cotton Belt is at an interesting place at the moment. Because each member city is trying to figure out how much funding they can put towards the project. That will determine when the project can actually be built. As I'm sure that you know, it ain't cheap. It's going to take considerable amount of funding. Richardson and Plano they got a great funding strategy. They created TIF zones around certain development that they know is going to happen, so that incremental value over the base will be used to invest in the rail. Our neighbors in Coppell and Addison have committed dollar values. Carrollton…we're in an interesting situation, where we have committed no funding to the project.

E: Mm hmm…

K: We're DART's fourth largest member financially. They get about $25 million a year from our sales tax revenue. So it's difficult to want to find the funding to put towards the project. Especially because our mayor has been a vocal supporter of bus rapid transit in lieu of rail. If you Google his name, along with "bus rapid transit", it will lead you to some articles in the Dallas Morning News, some opinion pieces where he states why he feels that way. Of course he terms out in May. So we'll see what our next ring of leadership brings when it comes to Cotton Belt Rail project.

E: Definitely….so…one of the things I said before was the facilitation of sprawl through TOD planning. What steps does the city take to combat regional sprawl?

K: I think we…there aren't really any steps we do take to combat regional sprawl. From a development standpoint we are sprawled. We're wall-to-wall. Any land that can be redeveloped is redeveloped. We're less about combating regional sprawl, and more about combating blight. Just because we're an older city, inner ring, aging infrastructure, aging buildings. So, a great place where you can see that, a context **pulls up map on projector** is right here, the Downtown Carrollton Station. About a mile and a half away, what we call the Crosby Road redevelopment area. This apartment complex…the city acquired it and bulldozed it, so we own that piece. It was considerably blighted, we bought it and demolished…these apartment complexes were the reddest of thee red on our crime heat map. When it's that bad, when it's a stone's throw from your downtown, which is where we're welcoming visitors that are brought in by transit…so less about sprawl, more about redevelopment priorities and how it can benefit transit and also the surrounding development.

E: Wow, that's harder to do in the suburbs.

K: Yeah, it's quite challenging. I'd be interested to hear how some of the outer-skirt cities, how they're doing that. When Peter [in City of Plano] and I, when we catch up, the

issues that he has in Plano are just not the same issues that we have in Carrollton. Just different priorities.

E: Definitely….so, a big one…you mainly work, when planning for TOD, with the transit agency, DART, and you're working with private developers that may or may not want to come here. Can you describe what working with each side is like, and how your goals may or may not differ?

K: Yeah. I can talk about that in the context of one of our other stations. We're going through it right now. The Trinity Mills Station. DART owns the parking lot, they also own this piece right here. This little structure was a bus depot, it's since been demolished. They own 12 acres right here. We own about 15 acres on this site. Between the two of us we own 25 acres which makes this site the largest publically owned Transit-Oriented Development site in the Metroplex. We have partnered with DART to do a comprehensive plan for the site. DART doesn't want to develop it separately from Carrollton, and we certainly don't want them to either. We'd like to have a nice cohesive development there. What our plan is to release RFQ in the early months of 2017 for a master developer for all of the acreage. And then, after we get an RFQ, there may be a subsequent RFP. Talking about competing priorities…I've had nothing but great experiences with DART. We seem to be in the same page about, at least on this site…I have found that has acquiesced to what Carrollton wants. Our vision for the site is to have some sort of main entertainment or office function and then supporting retail and multifamily. I have found that DART is very happy with that. Since DART is funded from sales tax revenue, the retail component can only help them. So I have found them to be great partners. Where I've found more competing priorities comes from surrounding developers, surrounding land owners and what they would like to see happen. This long piece here is all owned by two different developers. One of the developers is a long-time resident of Carrollton, a staple in our community, very well-respected. But he's a developer, so he has asked to piggyback his acreage onto our acreage. But he's going to want to develop it all. The whole thing.

E: The whole thing? Wow.

K: And that's part of the RFQ process is to solicit developers. Well, what's the point of doing an RFQ process if I've already got a developers selected? Which, by the way, at least our attorney has advised us that that's against state purchasing laws. If we're going to develop the land and enter into a contract of this magnitude, we can't just choose whoever we like, we have to have an open competitive bidding process. But if they're our partners in on this, they got the inside knowledge. You can see where the conflict of interest is. It's pretty apparent, right?

E: So if you're saying, if he doesn't get chosen [in the RFQ], he's not going to allocate the land?

K: Exactly. Then I've got this really great blight next to this really great development. Which is a shame because we really look to this site as being our next big project, where we're putting our mark. That's where I see more competing priorities. In a kind of a different guise, as a transit agency, this piece right here is owned by the North Texas Toll Authority. We approached them and asked them what they'd like to do with their acreage. Do they possibly want to sell it to the city? Would they like to develop it? Would they like to put it in the RFQ? They are very unlike DART, in the sense that they do not want to be in the development business. But they also cannot just sell the land to whoever they want for whatever price they want. So how do we deal with this? Because for all we know, they'll put the land up for sale and a developer will buy it and put a million warehouses on it. Which is fine, there's nothing against warehouses. But is that the development we want next to this premiere entertainment-office destination that we're trying to build.

E: Well, you do got a highway that separates the two [parcels].

K: That's true. But, if it was part of a larger TOD plan. It could mean so much more. DART doesn't benefit from the property tax, they benefits from sales tax, so they'd like to see some sort of retail element over there. The NTTA is a great partner and willing to rezone the site, so we are doing a city-initiated zoning case for the property, where we will guide this property towards what we would like to see.

E: Alright, got some good stuff there. Are there other actors that are integral to the process of TOD?

K: Oh sure. City staff, engineering department is invaluable because they're the ones that can pinpoint the issues before the rail was even in place, when it comes to infrastructure, flooding, right-of-way needs, associated costs we haven't even thought about. Then, elected officials play a heavy hand, and it's all based on policy and what's best for each individual city. That's never more apparent at Regional Transportation Commission meetings throughout the COG where you got mayors and the city managers from each city and each pulling for their own priority. Look at the relationship that Addison has with some of the other member cities. Because Addison is a member of DART, but they don't have any rail.

E: They've been paying into it for so long.

K: Exactly, but they have nothing. They'll have a stop once the Cotton Belt is done, right? But, it's not a done deal. There are some cities, Carrollton being one, that are an advocate for bus rapid transit. So, that does not bode well for Addison who does not want bus rapid transit, they want rail! And they're paying into a system that should give them rail. It's an interesting relationship. Addison is our neighbor and we partner on several things. Not Transit-Oriented Development, things like…we have a consolidated 911 dispatch center. So they're our partners in some things, but not in others.

E: I guess…we'll jump to that question then.

K: Good deal!

E: How do those goals, specifically with public transportation, compare and contrast to your neighboring cities?

K: So our biggest community partners are going to be Addison, Farmers Branch, and Coppell. We do a lot of shared services, things like…for Coppell, when a police officer needs to take somebody to detainment, Coppell doesn't have a jail so they bring them to Carrolton. Dispatch centers, things like that. We have those shared services. But when it comes to public transit, it's like another realm. We may or may not agree on the priorities. Carrollton, talking exclusively about Cotton Belt…our current leadership would like to see bus rapid transit instead. As our mayor put it once, and this is a cute phrase, "rail is like a unicorn, and we're ignoring the horse in front of us…" He feels the benefits from Transit-Oriented Development are not consistent, so it's a lot of investment upfront but maybe not a lot of payout for some cities. We've benefited greatly from the Downtown Carrollton Station, but maybe not so much about the Frankford Station. You can look at the TOD that's happening around it to see why that's the case. But, Carrollton's city motto is "making connections happen", and the reason why it's making connections happen is because once the Cotton Belt is complete, Downtown Carrolton will be the fourth largest transportation hub in the Metroplex. You will be able to get to Denton, Dallas, Plano, the Airport, Arlington…

E: Right, exactly.

K: You can see from all of this, whether or not to have Cotton Belt is a competing priority. I think there are some of us here long-term that would like to see that happen. They would say in my grad school program, that politicians are single-minded seekers of reelection, so they think in political cycles, they don't think long-term. When you have a staff member that's going to be here for twenty years, they think about the effects of today's policy will have. So I think as staff, those of us who I think are deeply committed to Carrolton will like to see rail as opposed to bus rapid transit. We know what that will mean when it's finally here.

E: I think it hits on that regional context again.

K: Certainly.

E: Oh, I forgot to ask, regarding Trinity Mills...the A-Train Station, the terminus there. Is there any coordination that goes there? I know DCTA runs that.

K: Not too much. So the A-train, in my humble opinion, has an odd business hour model where they run, like, 7-6, Monday through Friday. So if you're riding the A-Train, it's because you are going to and from work. Which is fine, there are people who do it.

However, having lived by an A-Train station in my 20s, I would've loved to have taken the A-Train on a Saturday or Sunday up to Denton for the weekend. But that's not an option.

E: So is it a matter of it they get more riders…the frequency is just too low to have anything happen there development wise?

K: Yeah I think so. You really don't see TOD around those stations the way you see them around DART stations. A lot of that I think has to do with ridership.

E: And Frequencies?

K: Yeah, frequency and service…

E: Well, Denton is growing…like, if we are talking about sprawl, Denton's the king of that right now…

K: You bet. When it comes to their TOD, they're on a completely different conversation. They have the stations, and thy have great development. But how do you get people from the stations to the development?

E: That kind of last mile idea...so what I'm hearing is there's not much coordination with A-Train then?

K: Nope

E: Okay, that's fine…next…so the Carrollton comprehensive plan was adopted in 2003. What steps in the public transportation goals of the plan have you been meeting or working on since its adoption? Has the idea changed then, because 13 years is a while…enough to sway opinion?

K: Yeah, that's a good question, I'm not sure I'm the best person suited to answer that one. The transportation component came out of engineering. When it comes to public transportation, Carrolton was just in the right place at the right time. I think a lot of public transportation goals are less about capitalizing on expansion of service, but more about redevelopment.

E: Facilitation for economic development?

K: Right, exactly. And sustaining infrastructure. We're in a constant state of rejuvenation of everything. Of roads, of sewer, of water, of sidewalks, and eventually public transportation facilities.

E: Is there a special you take within those areas near stations?

K: They're graded on the same level as everywhere else. It's a cycle. I think, from a political standpoint, it has to be that way. If we were to put priority on public

transportation areas over certain suburbs or certain school districts, you could see how that would get very sticky politically. All of them need to feel like they've been treated fairly.

E: Okay…similarly, regarding last mile again…what steps within the TOD planning process regarding connecting pedestrian orientation, bicycle orientation, non-vehicular orientation to stations…what kinds of steps have you taken?

K: Yeah…two things. With redevelopment mode, every time we see a conceptual site plan for redevelopment, it's got to have some sort of pedestrian activity. You have to show us how to get from Part A to Part B. And part of your landscape plan. A lot of the development we've done that's outside of that mile [of Downtown] will have a pedestrian connectivity component to it. It's required. As a part of the response to an RFP, we'll specify that the concept plan that's submitted and approved will ultimately have to connect into this trail that's right here that ultimately leads to Downtown Carrollton. It's all got to go back to the station.

E: Is there a trail that…is there a rail-trail?

K: Not specifically for each rail station, but the plan is to have a trail that leads to each station. I think it's the Blue Trail that connects to Downtown Carrollton, the Red Trail connects to Trinity Mills.

E: but there's not a trail that connects the two?

K: No, at least not yet.

E: One thing I was looking at corridor is, is having more than just a transit connection that connects station areas.

K: We would do well to do that. We also, regarding our trail plan, have to compete with structures that are already built, when it comes to trails to get from station to station.

E: Well, at least, in the corridor context, we're talking about the neighborhood in between. How are they going to get to the station if they don't have a car?

K: On that same thought train, with the basic principle of TOD being no surface parking, a foreign concept to Dallas…there's a public parking garage as a part of Downtown. The tough thing is, when you drive down there but realize it's not made for cars, that deters some people in Dallas because they're used to being able to find surface parking. When you talk about pedestrian connectivity, that's something we struggle with.

E: So I guess, priority on wayfinding, signs?

K: Yeah, exactly. Signage has its own challenges, you know? Making things consistent, making things so you can easily find them. When you're trying to drive in a pedestrian-

friendly place, not hitting a pedestrian. **laughs** So there's a lot of challenges that come along with that.

E: Awesome…okay a few more questions…one of the components of Corridor TOD is to manage a suburbanization of poverty problem. Fighting for affordable housing which can be achieved through different housing types. Do you have a specific residential density plan that you look at?

K: Not exactly. A lot of that just has to do with redevelopment. You can look at our zoning ordinance for "Transit Center" which would encompass the areas around the three stations. What you'll find is that there's four sub-districts with the most intense density being allowed in the middle, and the least dense allowed on the outskirts. We will ultimately end up rewriting our "Transit Center" zoning ordinance before any development happens here [at Trinity Mills] before…then Frankford…there's no residential…

E: Yeah the 50% industrial threw me off…" Why's this the end of the line?"

K: **laughs** We think that as well. Any staff member would tell you that this is a regret of ours, that Frankford is where it is, because it's so heavy industrial. The only saving grace is that we have Indian Creek up here, and it's all park land. So when you talk about recreational uses, we got that.

E: Yeah, that'd be fine.

K: yeah, when you talk about TOD…we've missed the boat on that one. It's a station where it is and I think since it has so much surface parking, that that's why it's the start of the line. Park and Ride, down into Dallas. But, you can kind of see this, the Elm Fork. They [city of Lewisville] has all of this land up here [near an A-Train station]. They made it into a nature center. When you talk about working collaboratively, Lewisville and Carrollton could do some sort of collaboration making this [Elm Fork] a recreation connection, which would give Frankford a reason for people to get off and on.

E: I like that.

K: Has that been breached? Not really. Not a priority at the moment.

E: Okay…going back to housing. Again regarding affordable housing, do you have affordable housing components through TOD?

K: Not at Frankford. Not at Trinity Mills. Downtown, I think that the residential components are not affordable in the context of federal housing plans.

E: Are there any plans to allocate that then?

K: From the DFW Metroplex as a whole, I think you're going to find a lot of cities that are very turned off by things like affordable housing and also multifamily as a whole. Carrolton is the first city that I worked for that doesn't think "apartments" is a curse word. They see value in having multifamily, but it's the right kind of multifamily.

E: So they're not okay with applying for the housing credits that makes 10% of those units affordable?

K: Not yet, I'm hopeful for the future. We have worked with a developer…we have a developer who's interested in doing an affordable tax credit-type housing development on half of a site. And that's favorable to at least the current city council. So I'm hopeful that we'll be able to diversify with some of the redevelopment priorities that we have coming down the pipe.

E: That's good.

K: I talk about Crosby Road and buying blighted apartments before…

E: **laughs** Yeah that shot a warning sign. And I thought, "Well what about those people?"

K: Exactly. I mean, we were more than generous on our time and tenant allowance, and we paid incentives to help them find new places and all of that. But find new places in Carrollton? I can't say that was a priority.

E: I think it should be a priority, because I think there's a unique opportunity to manage displacement [of low-income populations] through the TOD process. But if you're hopeful [in affordable housing], then that's good.

K: Well, I think it's an interesting conundrum of a public servant. Ultimately we work to serve the resident. The resident selects the elected officials that make the priorities. I think that's why it's important for elected official structures to be representative of the entire community as opposed to one segment of population, one demographic, one race, one age, one gender. Again, I hopeful because there's good education. There's opportunity to educate our elected officials to do that through the facilitation of TOD, but also do right by the citizens of Carrolton by providing different opportunities for housing.

E: Awesome. To end on that topic…are there any other equity issues you see within the city?

K: That's a big one. I'd say that's our forefront. From an economic development standpoint, when you talk about incentives, there can be a perceived inequality. We have redevelopment programs, grant programs for different commercial facilities, but Downtown Carrollton gets a huge chunk of that, so if you're fortunate enough to have a business on the square, you automatically become more desirable for public investment. That could be a perceived inequity. We do our best to not do that. But Downtown

Carrollton is our bread and butter. But I would say the bigger inequality issue is probably housing.

E: You've been talking about economic development. The number one priority when dealing with TOD planning. What goals are you specifically looking to obtain? What policies can you make to achieve that?

K: I don't know if we have substantial goal, not quantitative, anyway. From a qualitative standpoint, Carrollton is doing real well, sales tax wise. We look to TOD as a reason why. When you got a $10 million budget surplus it's sweet. It's easy to do things like reinvest in different priorities. Now it's more about how do we sustain it? And can you? Sales tax is volatile. We're having a great year this year, but we could have a terrible year next year. So while we don't have any specific economic development goals, per se, the large goal is continue to bring in $10 million budget surpluses. Do what we can to sustain that kind of momentum.

E: Awesome…okay, so zoning districts, overlay centers?

K: Not for us. We do have overlay districts, but not in our transit centers, no yet. We have one at Josey and Beltline, which is a major corridor in the city. I guess you can argue is kind of close to a station. There's a definite shift as you come from North Carrollton down into Dallas, a shift in development standards, upkeep of residences, whatever. This overlay district is more about making a distinguishing determination between us and our next city.

E: That's all I had written. So you've heard about my topic. Do you think you can fit within a corridor context what the city's TOD planning process is like?

K: I think, speaking exclusively to the Green Line, I think the ship has sailed, only because Farmers branch is our only neighbor. So talking regionally, there was no collaboration. However, there's still plenty of corridor development that could happen with the Cotton Belt. We'll have a lot of new neighbors. My question would be, talking about the region as a whole, how would you make it so everyone felt equitable, so everyone would be getting a share? There's some benefit to having each station have its own personality. When you bring them all in, it's like, how would they be benefiting from being a part of the corridor as opposed to having an individual brand?

E: They way my research has been going is that it's more of a context. Not every single station has to be the exact same and equitable. When looking at the three stations that are here, we have one that's a downtown transit center district, one that's mainly undeveloped so you're figuring out what you want to do there, and then you have one that's industrial complex with Park and Ride. Those are three distinct personalities you have there. You look at that on the corridor context. You look at Farmers Branch, another downtown transit center. You look at Royal and Walnut Hill/Denton, which are hard to

categorize at this moment. Then you go further, at Bachman you have an urban village forming, Inwood/Love Field, Medical and Market, that's an entire employment center, then Downtown, which is its own thing.

K: Right.

E: So when you're looking at corridor context, you're looking at both the origin, where people are getting on, like the Park and Ride, and your destinations, where your trip purpose is, and everything in between. Look at your specific station's role in the grand context. It doesn't have to be the same across, it has to have provisions for people not adjacent to the corridor to be able to access it.

K: I see. That's interesting.

E: That's pretty much all I had. If you have any questions for me

K: Oh no, I think we had a great discussion!

E: Thank you so much.

Appendix C – Transcript with City of Richardson

Date – October 20, 2016
Interviewee: Dan Johnson, City of Richardson (D)
Interviewer: Evan Tenenbaum, University of Texas at Austin (E)

Interview Started with Explaining the Purpose of the Report

E: The corridor is not just looking at the 4 stations within Richardson, we're looking at the entire Red Line until the CBD…so do you have any questions before we continue...

D: So do you think it's a different development pattern, or is it a different time spot in the evolution of development? Your proposition here, your focus is now on corridor, it's a different focus. Do you think it is a different approach or is it a likely a different timpeoint in the growing-together of separate nodes into connectivity.

E: It's a little of both. I think the approach is…if you're looking at Arapaho Station and Spring Valley Station, and that area in between, they don't feel very connected. What are the techniques and tools to make that area feel connected? Thinking in a broader context for TOD. I'm not thinking about the 300-unit complex at this station. I'm thinking more about the multifamily housing supply along this corridor.

D: In a multi-station rhythm rather than just one beat?

E: Yes. But, you got to keep the same station context. You have any other questions?

D: I have a lot of thought about it, but I want to stay structured to you…

E: Oh, okay, that's fine…so can you describe to me your general role in the process of TOD?

D: So, as city manager, I'm Chief Executive Officer for the entire city. I'm the lead hired employee of the city council to cause all policies of the city to be administered and enforced. They will compel us to be strategically about transit-based functions and activities. As manager, I then have the need to then cause implementation within our organization to handshake with regional and other provider types, all of this fabric of agencies. That's my responsibility. I do that with a talent of staff, education of community, and cooperation of other agencies to allow that to happen. That translates to a work activity, a calendar of the day, appointments we make to boards, into a variety of implementation devices around those big missions. That's what I do.

E: That's a lot.

D: It's a lot of fun.

E: Alright, then…as a city, through the TOD process, you're mainly working with two main actors. DART, the transit agency, and you're working with the developers that would buy into the process. Just for those two, what is working with each side like, and how their goals may differ from yours?

D: First of all, let's take DART. Richardson was one of the architectural communities to help support the creation of DART. There was a life before DART. I say that, because our relationship has been helping create it, making effective appointments to the board. We've had two appointments since its creation, meaning our steadiness has been able to sustain the continuity, attention, and care.

E: So a strong relationship?

D: A strong relationship. That's what I call a DART-city governance relationship. Through those relationships, when DART was doing its planning, we had a large employment center here already, and the strategy of placing DART stations was a piece of art and science and politics back at that time. Why the stations are where they are is a combination of planning rationale that says you have this much separation between stations, you're trying to get this kind of headway time. But you're also trying to say, how do we, by these points and places, collect and gain ridership and service, both initially and to the future? If you look at employment gathering areas across the Dallas-Fort Worth Area, Downtown Dallas is the largest node. Richardson-Telecomm Corridor, if you throw in TI [Texas Instruments] on LBJ, technically in Dallas, and the T in Plano, is the second largest host of employment. *Then* it's downtown Fort Worth, then it's Las Colinas. So it was appropriate when DART was first figuring how to develop some initial branches out of its core, the most likely commuter relationships to Dallas, but provision of ridership of both directions, we believe, to bring into Richardson, but also to deliver Richardson to Dallas. Our role was to be active in the placement of stations…if I control the land, I'll put in an RFP, and I'll seek developers that will do that [TOD]. It's powerfully different if I'm just praying that a land owner wants to do a TOD. I can mandate by some zoning things. But mandating and encouraging is one thing, but an RFP is powerfully different. Isn't it?

E: Yes it is.

D: DART has had to do the cajoling technique of TOD. Not resistant. DART gets sales tax, but it doesn't get ownership equity on land that it owns unless development happens on top of it, or any cuts of the profits on behalf of that development. Other parts of the country the transit agency is actually part of the development business. Our work with DART picks up from the point that, they're bringing us a rail station, we got to work on a developer to put in land. We were able to do that at Galatyn Park, and at the 190 [Cityline] Station. Those properties, where the DART station platform is right now were donated by the developers. There's a rationale, a payoff for them to do that. Part of our

relationship with DART was to be very active initially, very in tune to their agenda. We were all over it. In the early days we also worked with DART, going around the country and looking at best practices of TOD to figure out what might be tools we need to bring back to modify in our comp plan and zoning processes. That was a new phenomenon for North Texas, and especially for suburban planning departments. We went through an incredible learning curve to try to pick this stuff up. We did that so we could be effective with developers. Two stations here were greenfields, two were already in incumbent and already obligated areas that will go through some change or modification. The other thing is the Cotton Belt.

E: Yeah, we're going to talk about that. **laughs**

D: You see the station at UTD? And the intermodal station at Cityline…

E: Did they decide on deferring that?

D: Next Tuesday [October 25], the DART board will make a decision in their financial plan, yes or no, to start Cotton Belt. It will be coming through Richardson. We're for it, Plano's for it. Dallas…they were silent about an antagonistic position on it. Very tactically. They were *silent* about it. What's happening is they're [city council member in the North Dallas neighborhood] trying to cause…to do anything they can to cause Cotton Belt to be afforded at the same time or cause delay factors. Those would all be victories for that neighborhood. We contend those are all exactly what they are: delay tactics. They are fear-mongering because there will be sound walls and other environmental protections. In a group of very vocal residents that are immediately adjacent to the rail line, they would just assume the rail line to go away. We're sitting there thinking, "The rail line has always been there. I'm willing to bet that you bought your house knowing it was there. How is it that the region shouldn't enjoy that?"

E: Do they still run freight on that rail?

D: No. several years ago it rerouted, it now comes up and goes along the tollway [190]. It stopped going through this North Dallas area. It got them [residents] thinking there was no longer going to be trains going through there. DART already owns it. We have secured all of the right-of-way through the city, and we're asking them to come down through here in a swing to come into Cityline. And yes, we will put in dollars. We'll put in more dollars than Plano. DART is going to choose this route. They can't just mechanically choose it now because they're in an early step in the environmental review process, and you're not allowed to eliminate options until you have a justification for them. Otherwise you lose federal funding.

E: Environmental justifications?

D: Environmental can include economic ridership. They can include a lot of things.

E: Yeah, so they're doing the same thing at North Lake. In Coppell.

D: Correct, to justify the swing down…so choosing those alternates is an important procedural step you have to do in the right order.

E: So how does that differ than like UTD or Coit/Renner. Those are set in stone in the initial plans? There aren't any environmental reviews you have to go through?

D: Those aren't alternates. Also development. You were asking earlier about developers. We work with them by sometimes being the extra mouthpiece and advocate for their desires and curiosities. We set a TIF for those areas. It was a negotiation. We negotiated by saying I will provide infrastructure support dollars if you make sure planning wise that you presume a land use on top of the rail corridor. I've had my engineers tell me exactly dimensionally where it needs to be. So long answer to say, development-wise, how do we work with developers? We understand our missions, we understand DART's agenda, we understand our stuff, we do studies, we negotiate, and we deliver those propositions.

E: Very extensive there. Awesome…okay moving on. The comp plan for the city was adopted in 2009.

D: Correct.

E: So what specific steps are taken to ensure that those public transportation goals are met? And has that changed since 2009?

D: Specific steps…everything from improvements to new features, no trails…

E: That's actually the next question.

D: Okay…so how, what's the cause for that to be implemented. Well, I read the plan for one. **laughs** and I knew what the agenda was for these areas. We tell a developer ahead of time: "Here's the comp plan. I'm already hinting to you what I need. Let's match our goals." One of the biggest blessings of a comp plan is you can communicate that. Sometimes we go get a grant from COG. Or I tell a developer, the rail base or other road improvements will be in a traffic impact assessment study that they will have to do for their development. So we know the plan, figure out in a partnership who should build those improvements.

E: So that hasn't changed since?

D: It hasn't changed. What's changed probably is the final layout of things. Now what are the next missions we should go about? Fundamentally, not much has changed.

E: Hindering on the same question…connecting public transportation to pedestrian infrastructure. Can you speak more about those efforts specifically?

D: Often times you're trying to find those corridors as well. Getting at trail corridors could be an interesting strategy. Richardson was one of the first suburbs with Dallas to propose that rail corridor needed only so much to put the rail in…what do you do with the remaining?

E: You put in a trail.

D: You put in a trail, yes. A trail by rail. You see this at Galatyn Plaza, the trail meanders in and out of land that is DART land. We asked them to license the easement to us, so we can mow it, take care of it, and run a trail there. Back to this phenomena of what you're looking at…is letting your trail system be one of your natural stretching devices beyond the "quarter mile". For people departing from the station, and now diffusing out. We now have a central trail which is south city limit to north city limit, trail by rail the entire way.

E: Is it all done or is it under construction?

D: It's all done. Thorough about 8 different funding sources. Now I'm working with Dallas at a tributary of the White Rock Creek Trail to come up and use the backside of Restland Cemetery or going around the cemetery to hook up to our trail. Another thing you can do about trails is take an old road like Collins Road, years ago planned to be six-lane divided, way over capacity…we made the outside lanes bike lanes.

E: Yes. Bike lanes are good.

D: That's done by us measuring traffic demand and recognizing we don't need that extra lane. Develop a street-becoming trail designation. Not shared. Separated.

E: Is it pylon separated? At-grade?

D: Just painted….then you have the Veloweb in the Dallas area. A regional trail map. COG has a regional trail plan master map. Transportation funding was traditionally only for road projects. Now there's an appreciation to actually mitigating the traffic, not just build more road for that traffic. Some of the funding allows us to be involved in TOD and urban village initiatives that mitigate traffic management by actually trying to be supportive of building things that can defeat traffic because you don't generate traffic. You try to have that live-work relationship be that close. When COG offers grant funding for that we tune in to all that and go after that. We're getting ready with the Cotton Belt to put a trail by rail all the way across. We're making sure our trails interface to the trail by rail project at DART. Part of is studying agendas at the same time to have them hooked up and occur at the same time.

E: Are there any example of pedestrian infrastructure you're focusing on, minus the trails?

D: It's about how save a pedestrian feels, certainly trying to cultivate and grant land uses that have the proximity for the amenity features they want. You have to get past that half

mile, but even at half mile in August is hell in North Texas…so it's still to be figured out. I'm still not pleased with this first mile, last mile, dynamic. Downtown Dallas, they have these shuttles like D-Link, and other things, where you have loopers and gathering shuttles. In Richardson, we only have two shuttle supplements. Not on-call. Galatyn Shuttle is a city shuttle that works out of the station that loops around the Galatyn Park Campus. UTD works out of Cityline Station and goes all the way down to campus. I think we have to continue to sophisticate shuttles. Stretch the ability at these stations to have loopers and quick catchers.

E: Goes into the District Circulator concept I mentioned earlier.

D: We have to do more of that, and we have to figure out the financial play on that. Is it the city's duty? Is it the developers that can get a front of station opportunity, as part of their rent structure? What does DART put in? There's an upcoming conversation about that. BRTs, shuttles, all of that are connectivity devices around rail stations. That's will stretch the last mile and the impact of the station.

E: Okay…I wanted to go back to sprawl…is that a prevalent concern when planning for TOD?

D: Not in our town. We were the sprawl in the 1960s, the first-ring suburb. We know we're a suburb becoming an urban area. We're in that mode. We aren't factoring in sprawl. We're frustrated in a regional policy about the sprawl and change in taxation policy that causes and allows sales tax to be used for different purposes. That penny that goes to DART, the legislature allowed cities to use that as an option. They could use that penny on other allowable using including economic development. Unbelievable. It's like giving sugar to a kid. You're giving these sprawled areas the "economic juice" to do whatever the hell they want. To do distorted economics. Sprawl has been accelerated in those years of the allowance of that alternate penny. Now they're constrained by that penny. McKinney and Allen now have to make that choice to give up that penny they've enjoyed the heck out of for building parks and development, and redirect it to be part of a transit agency? It's hard to give it up.

E: I had missed a question before….there are other actors you work with in TOD planning other than DART and developers. There's advocacy groups. There's NCTCOG. Can you talk about those players?

D: Congress for New Urbanism, some division and chapters of ULI, that help with studies and publications and seminars. Agencies in places to help you learn this stuff. Some years back that wouldn't have been around. 15 years ago, TOD would not have been a planning topic. Some of these agencies are relative to education and awareness. When it comes to core planning, some traditional agencies like COG, TxDOT and others evolving and moving a little bit towards that accommodation. Other players…every four years the question is what happens federally. Whether or not the feds can be a big part of

that. The high speed rail that goes from Dallas to Houston, too. That will be a game changer…so all of these agencies.

E: Okay…how do these goals that you provide for your city relate to your neighboring cities?

D: There are many times to be allies. Plano, Addison, Richardson…the three mayors wrote a joint letter to the DART board encouraging the Cotton Belt to be a priority in funding. There was an alliance there that we created. Missing from that was Carrolton. Do we work with others? Well we know *our* future in Richardson, Texas, is about access. We also know that there's only 7% of land that's never been built on. We're built out. Our story is about redevelopment too. If we're going to stay competitive. So I have a dual mission ad city manager to worry about the quality of the remaining first developments on greenfields, but I'm equally working on downtown Richardson to develop new reinvestment opportunities. I would say Richardson has been aggressive in that.

E: I wanted to hone in on the regional trail system earlier…

D: The Veloweb?

E. Yeah. That's a separate component to your transportation plan?

D: Thank of it as layers. They're integrated within their design.

E: Okay, so you're talking to Plano or Dallas on the trail system connecting stations?

D: We do have trail handoffs, border to border. In some cases we've done those. That's really where the Veloweb process works the best. We'll be savvy to what Dallas is doing down here and how do we cause a trail connection that goes from their trails up to our trails.

E: I only have a few more…one of the big issues is flight from the inner city. Making development affordable for residents that maybe don't have the income, or coming in from the city without an extra car and need to stay close to a public transport system. So…I wanted to know if there instruments to provide affordable housing, especially along these transit lines? Is there a residential density plan along these areas? And also, if you could discuss any equity issues regarding TOD?

D: So there is intention around our commercial area to cultivate densification. We believe that density will be necessary to fit commercial with the additive area of residential. Those choice proposition that give the chance for a worker to live close. Affordability is still an emerging topic, and I will tell you that's not something we have well figured out. The economics…we have to rethink the development features. Is it tiny homes, is it small areas, tight spaces? The ability for me to make it affordable doesn't happen by me getting rid of the cost. It could be answered through a design strategy. If it's affordability to be tackled through economics, then someone's going to have to figure out who is paying for

that. We aren't as a city in the business of trying to buy down raw development costs to achieve affordability. We just don't if we have it. So, I'm troubled by that because there can be a gentrification going, and other things. What I've seen happen so far is some smaller unit division features of those units that make the price point be still up. There's a lot of conversation out there about affordability. Whether or not it's going to be mandated or not will be interesting. Even if it's mandated, you still have to figure out how you're going to break the code. No one is trying to gentrify neighborhoods to drive out folks. It's the pressure of the economics. I would tell you right now I'm not comfortable with we've done our best work on affordability. The phenomena is just now showing up. The final price of construction is now going through the roof. It's costing more now to build.

E: So there's no incentives for developers to provide affordable housing or to apply for those tax credits…

D: Right. But tax credits are state or federal. And the state…so it gets to be, will someone be willing to give a relief in tax burden? I'm wanting to sit in on seminars to better understand my responsibility is and what my possibilities are to try to influence affordability through my seat.

E: Any equity issues in the city that aren't just housing?

D: Well…I think transit can be an equalizer. If my trip is efficient, and I have a good last mile at the beginning and end of the trip, then maybe that trip attribute becomes a piece of my lifestyle. Affordability can be a matter of proximity, but we can achieve that through making connectivity.

E: My final question…we've been talking about a lot of project you want to implement when looking at TOD. Can you discuss economic development goals that you want to reach with TOD?

D: Economic development, you parse it up as different tactics for different parts of the game you're playing. If I'm recruiting, I want a story that's attractive to you as a prospect, where you might want to plant your business. I would discuss workforce. If you're an already-existing business, I'm going to be active in my retention of you. If I have older parts of town, where I'm focusing on redevelopment…one of the things is I have to try to read the game plan of corporate companies. How is business being delivered? What is a worker for that business asking the business to provide as an expectation? It's about the workforce in the future. We have to figure out in the workforce, what's the bidding process going on for that workforce. Do companies need a ton of room anymore? There's also live-work units. All of these crafts-spaces and loft spaces and these types of lifestyles that is okay land use-wise. Either adaptive reuse or a brand new constructed space. So what I've just said, is I have to be attune to a modern work setting. Then figure out all of the attributes that make that up. The ability to think

about that and be attractive to folks. It's real important to be active in economic development and break it down into its modular pieces.

E: Oh…I have more questions than I thought. Two more for sure. One is you previously had a plan for a Beltline-Main Street Station. Can you tell me the story of that?

D: Yeah, there wasn't a mile of separation between Spring Valley and Arapaho. It wasn't in the capital plan for DART when they first made the Red Line. They kept it on the plan for a while…but it got dropped.

E: Has the sentiment changed in wanting that?

D: I think we would grab every rail station we could probably get. But at the same time, in terms of headways and riding efficiencies, it wouldn't work. We are getting ready to make some big announcements and be active in redevelopment of downtown Richardson. We're still going after an urban village treatment, and we have trail by rail. But for the next foreseeable decades, I just can't see it [a station] coming back in infill. Having said that, there's densification work happening there and a possible drop spot for shuttle access. Or if you have a bike, it's a 4-minute ride down to the Spring Valley Station.

E: This leads me to my last question. To tie it all in a little bow. Looking at your aspects of TOD at the corridor level…you have the initiates of developing in between, connecting trails, and coordinating with other cities. Anything else that you're looking at an entire corridor?

D: A couple of things…as long as there are parcelized cities, it's a softer coordination. I know at Forest Lane and Walnut Hill have development that was incumbent. Presbyterian Hospital was already there [at Walnut Hill] and the station just enhanced it. Forest Lane supports the TI folks and there's a little bit of a medical district there. I'd say the linear nature of the corridor is a little more coincidental. Unless you're in a long run of a corridor like in Dallas proper. You also can't do it in an abstract way, it's going to be tied a little bit to a couple of things. At Cityline we've gone from just office to mix, to form-based zoning. I would say that the ability to see a rhythm within our 4 rail stations and how they fit with others along the way isn't under some big master plan. There's no one by governance that can regulate it. We are the keepers of the land use for our area, and no one else can tell us that. I'm not going to sit here and take a less than highest and best use proposition for my land for the benefit of the corridor. So there's a little bit of competition. You can go for theoretical, but you have to look at the use in the landing area itself. You get down and start worrying about the rhythm of things that come out of Dallas. The interruption of that corridor is going to happen. You have these huge challenges. Unless you have done effective traffic design and freeway design to keep yourself an envelope to run a trail and train underneath it. So, just to say, the corridor idea is intriguing to me, and I do believe there's a stretching benefit. It's on that stretching where the impact it. Let's shuttle, let's make walker friendly areas, let's make bike

shuttling and ZipCar, densification areas. Let's do everything about that. By the edge of that one, you're almost to the edge of the next one. You get past a mile or so, then you really have gaps.

E: Yeah that's what I'm finding. Especially with Cotton Belt.

D: That's what you're dealing with incumbent neighborhoods.

E: That's what I'll have to focus on. Sometimes you can't do that development funnel. Sometimes you have to pick and choose.

D: If I had gone out and bought all of the parcels of land here [adjacent to 75], I wouldn't have just a corridor until I get rid of the remnants I don't want to use. I say if it's a corridor that you were given because it's a sliver of the road, you have to make that work. If you don't have corridors, you have to go buy corridors and build them. By doing so, you may be able to do other things like stretching it by doing rail by trail. Be sensitive when crossing creek systems and major roads like 635 and Bush. Those are natural interrupters. TxDOT now has a requirement to do connectivity. On their highway projects, they've become more sensitive to road and trail things that don't divide communities. Not adding rail, but getting a policy to allocate more than just a role. "It's your job" to put in that corridor a connection". They get to the 50-Yard Line, and you get to the 50-Yard Line. You can do this for a lifetime.

E: Yeah, it's a lot to think about. Thinking about is very fun. Thank you so much for the interview.

D: Alright.

Appendix D – Transcript with City of Plano

Date – October 21, 2016
Interviewees: Christina Day, Director of Planning (C) and Peter Braster, Director of Special Projects (P)
Interviewer: Evan Tenenbaum, University of Texas at Austin (E)

Interview Started with Explaining the Purpose of the Report

E: When I say corridor, I'm not just saying the 2 or 3 stations that Plano manages. It would be the context of those stations across the entire Red Line. The corridor that goes down from Plano to the CBD. The form it would take is half mile around the line. Not just the station area. Around the line in general. That's the scope of what I'm looking at. More broad, and not nodal. If you have any questions about that before I go into the Plano side…

C: It is consistent with the way we've looked at things in our comprehensive plan.

E: Awesome.

P: The caveat to this is, in Dallas, all of the transit lines are put onto existing rail rights-of-way, regardless of ridership or destination. So if your hypothesis as I understood it would be great if you could direct a line to where you needed it to go as opposed to what we did in Dallas, which is stick to the existing corridor regardless of if it was an activity center or not. Especially as you get away from the CBD. So the Green Line, you have lots of activities in through Inwood Station. That'd be the Hospital District. You get a lot of ridership not necessarily going to the CBD, but going to the Hospital District.

E: Exactly, that's a different type of corridor I'm seeing in my research.

P: The discussion on where it [a rail corridor] should go...the big discussion always was, what are the activity centers and what are they doing.

C: You're right. When you think about Legacy West as a major hub of job growth in North Texas, and there's no transit, I mean, rail, going there.

P: There's rail nearby, but we'd never be a thought to deviate off that and actually service it.

C: I mean, you've got a lot of right-of-way there, it's just called the Dallas North Tollway.

everybody laughs

P: You could also dip…it's up on a hill above the highway, so you could actually tunnel up underneath it [Legacy West] without having to do too much to get there. But, in my

experience in the last ten years in Texas, that's never going to happen. Even though it should.

E: That's also the issue I have been having doing this research. I know that there are districts or employment centers and areas that aren't currently being served by rail. My goal is to currently understand the areas that are served by rail, and see how we can manage and facilitate growth in those areas.

C: Okay.

E: So…I just want to get a regional context and how Plano works with other cities to manage their Transit-Oriented Development. So I'll ask a couple of questions. A few are general, ad few are more oriented towards Plano. For the start, can you describe your role in the process of TOD within the city?

C: It's sort of a partnership between…the Special Projects department does a lot of the on-the-ground work. We [Planning department] focus on more of the planning side upfront and the regulatory side kind of on the back end. Project-based management is really Peter's area.

P: And then I also deal with DART.

C: Exactly. The Planning Department doesn't have direct contact with DART. We have incidental contact periodically, but not much. We have a Transportation Engineering division that also does…

P: Much more "nuts and bolts" engineering with DART.

C: Yes. They have a significant relationship there. And of course there's always the political appointee that serves on the board.

E: So TOD would be mainly on your side, the specialist?

P: That's right.

C: That's why I thought it was important for him to be here to talk to you too. **laughs**

P: Let me give you some of my experience. While I'm not a planner, I have been doing…I've worked probably in the last twenty years, in transit and transit-oriented development.

E: You mentioned that you work with the people at DART.

P: I work with two or three people who do Transit-Oriented Development, and public-private partnerships.

E: So, can you describe the general process in working with DART, and also with developers?

P: Two different things. DART is a political agency that is much more focused on the core and the CBD than they are in the suburbs. They have done numerous studies and are working on how to prioritize their development sites. And the suburbs are generally on the bottom of that priority list. The market does not allow for DART to achieve its goals in the suburbs. The goals for DART are pretty simple. They want to have a ground lease of their land to generate and income stream, and that needs to be based on market rate ground leases. And you have to replace the parking with garage. So that puts them out of the market place, pretty much, in the suburbs. So what the cities do is that while we partner with them and we hope to have them along, we are always looking for opportunities to do development at the stations. But there hasn't been too many successful tries and it because it's difficult to meet their development goals within the current marketplace.

C: We really only have one partnership with DART that I can think of, which is our first Eastside Village One, which is immediately adjacent to the [Downtown Plano station] platform. What I would consider our first TOD. But beyond that, it's been public-private partnerships on city-owned land in the downtown [Plano] area.

P: We're now expanding beyond city-owned land to private land because the city's hard work has brought the market rates and proven a market for residential. Retail was already here, so that wasn't the problem. Moving forward, the DART partnership downtown Plano was just at the platform level, because there was no transit parking for downtown. It was always supposed to be just a Kiss & Ride Station. It made the first project pretty easy because you didn't have to replace parking.

E: So, on the developer's side there hasn't been…

P: Well, they've always been interested. I spent my nine years in Carrollton trying to get it going. Again, the problem out here is the fact that the rental rates didn't justify the building typology that we wanted. So that's something with garage parking. So developers are getting used to the ways cities are doing business, and it's much easier than maybe 10 years ago.

E: When planning for TOD…are there any other actors other than those two that are integral to any success? Advocacy groups? NCTCOG? Any other third-parties?

P: Yes, on the periphery there are. COG is one. They will give grants that help with infrastructure costs. So I will do more infrastructure to stitch together the street network better than what we were originally going to do. We got to do a Hike and Bike trail too. We use that grant money is much more of a value proposition. COG is a great partner for that. They also do have a TOD working group so we can share ideas across the region. That's also really good. Neighborhoods…here in Plano we have strong relationships with the surrounding homeowners' associations. They are the biggest supporter of

redevelopment that Plano has. I think it has served Plano really, really well. Amazing, really.

C: Yeah, and that's been developed over time. It's not something you can…just step out the first day and be like, "everyone loves us!"

everyone laughs

E: Yeah it's definitely a slow process.

C: Yeah, it's been this building of trust over the years, and our engagement in the process. We contact them, we work with them, and we try to respect their interests. Even the Downtown Markets Association has also been very engaged. The investors that have come to downtown, private business owners, have really helped make this sense of place. They've a very important partner. We've had some significant pioneers…for the placemaking downtown. Really key to have those people.

E: Do you think it's effective, the original place-making, or is it more effective the initial phases of what you've done in the initial phases of TOD that's making them [neighborhood] sway?

C: I would say it's one of two things. It's long-term relationship building and public involvement. In where we care about their opinion and demonstrate that repeatedly. Then secondly, the proof is in the pudding. They like what they see. They like the transformation.

P: The other thing is that Downtown Plano was already a place…it had a gridded network of streets that were all walkable because they were all laid out before the car, and then the city kept that. Mockingbird Station, which everybody holds up as the best TOD in Dallas is very much inward. It's actually hard to walk to. So it's actually not doing well anymore. There is no connection to the neighborhoods. It doesn't do anything to the neighborhood. It's just there. That's the big difference with Downtown Plano. Parker Road Station is just going to be an interesting one once that finally develops, because it's going to be more like Mockingbird, where it's more self-contained because of the geography of the place. Where Downtown…laid out, walkable streets before the car…we're back to doing that. Our bones of the whole fabric are right there.

C: More traditional neighborhood development layout to work with rather than a suburban model.

E: Can you hear about more plans at Parker Road Station.

P: We really don't have any. There's been a couple of studies, but everything's going to revolve around how do we go about moving parking to garages, how do we get it out of surface for development. I think we're going to see stuff around the edges to build a firm market, and then get cars into garages.

E: So you're saying there's more of an outside-in approach?

P: It often happens that way.

E: What about that strip of land on K Avenue?

P: Yeah, the city owns the land. Right now DART is undergoing a project to lengthen the station platforms, and when they do that, its lengthening is all to the south, so it makes that piece of land more accessible. And then they're going to build a pedestrian crossing so that we can access our land to the station. So once that sort happens, we can start…developers will understand that it's a good site.

C: To me, that's one of the best things that the city has done toward Parker Road starting as TOD because DART owns so much of the land around the station for parking because it is the end of the line, we really needed an alternative to kind of kick things off.

P: And even if this land may not end up being the most developable, we could shift DART's parking to it, and then use their land to do initial developments. And I think that's where the relationship with all of the folks at DART will come in play and do really well.

C: It's an interesting thought, because K Avenue carries a lot of traffic, and whether that side is better or not for development…I guess it depends on if you're looking at housing or…

P: Well the thing is, if I was a DART rider going to Parker Road station, if I were on the east side, I would park on the K Avenue lot because I don't have to go through, up, and down to the other side

E: Yeah, I've ridden DART. Archerwood is a mess during rush hour.

P: Yeah and the K Avenue Lot, you could almost charge for that one. **laughs** It'd be in and out like that.

E: So it's in initial phases. You don't have any RFPs out or anything?

P: No we don't have any RFPs out at the moment. Our hands are full at the moment with Downtown projects. We have a bit of a capacity problem.

C: One other comment I'd like to make...you mentioned earlier about predictability of development in the corridor, one thing we'd experience is that we don't want to underestimate the real estate cycle. I think that's a factor there, because the Junction 15 project, the two TOD neighborhood projects were delayed by effectively 8 years based on the Great Recession. So while there is predictability over the long haul, I don't know that I'd be sensitive about doing shorter-term predictions just because of the market.

P: That's what's good about planning and planers. Wait till it comes around again. Because it will.

C: We were very fortunate.

P: The big thing about choosing a developer as a partner: you really have to do your homework and search for the right one that works for you.

C: You got to have that balance. You don't want people who are doing the ugly building for cheap, but you do want someone that's going to give a quality product and still have that staying power.

E: Definitely.

P: Multifamily developers are not on the cutting edge of architecture. Specifically in Dallas, I think that there is a now a prototype, and we're fighting against it, because it's the tower on the corner, with craftsman's style overhang. It's getting tiring. And then they're cheap, and then they look good, so they get repeated. Cities have to push and shove a little further.

E: This may come into a future question, but…when looking at design, are you looking at what fits the neighborhood character, or whatever unique identity you want to fit for that development? Rather than a prototype?

P: Ideally, yeah, I think we want to do unique buildings. They need to fit in the fabric.

C: And consistent with what they promise the community during the hearing process.

P: Go ahead and expand your palette.

C: Frankly that has been a challenge for us, because we are in a historic area, and we have historic district in the downtown core.

P: The thing about Parker Road Station. If you want to create a place, it's got to be different than downtown. Why not make it different than downtown? Talking about corridors, that's what you need to do, looking through the corridor. How to make each place unique, yet flow from one to the next. That's what Carrolton is doing, that's what Plano is doing. The people who are really thinking about it...b

C: have you looked at our comp plan at all?

E: I was just about to get to comp plan questions.

everyone laughs

Christina pulls out one of the comp plan maps

C: So you can see here, one of the unique things about this new plan is we have "Transit Corridor" as a land use category because we really wanted to recognize transit-oriented development's impact on the built environment. Trying to pretend it would be the same and something else in town just didn't make sense to us. Old-school Euclidean planners roll in their graves when we do things like this. **laughs** It's essentially a mixed-use category. Obviously we want to respect adjacent neighborhoods, and we have language in the description about that. SO you can see we put in on the Red Line here, and also aligning the Cotton Belt with the exception of our existing research and technology and industrial district that's down here, which is a fixed job generator for this part of the city. We wanted to respect…because that's one of the things that was a little bit shocking to some of us. When DART opened, it was like, now you could see the side of Plano that was expected to have been seen.

P: Looking at all of the 80s and 90s buildings that were built anywhere, they all had a back. So that meant nothing. There was no ornamentation. Nowadays we realized that there are no backs.

C: Especially when you got an elevated train line coming through here. This was not the best quality development, generally speaking, in town, yet it's now exposed to the world, and really an entryway into Plano for people. It's not necessarily putting our best foot forward.

E: I didn't see this in the last comp plan, the "Compact Complete Center". Can you describe that use?

C: That's another new land use category. It is basically urban mixed use. It's walkable, mixed use, higher-density development.

P: That's why the comp plan got an award from APA.

C: We really tried to focus in two areas: transit and redevelopment of again retail locations. Notice Collin Creek Mall, notice Willow Bend Mall, we figure densification is the solution to mall issues long-term, and then of course, Legacy. Their town center development. And in future rail stations. Over hear new Shiloh, and up here at Collin College in case the rail expands north. By the way, "Compact Complete Center" is language from STAR, the Sustainable Communities rating system. That's their language, I want to give them credit. If you want to reference that. It is a standard within that sustainability rating system.

E: Alright, definitely. So continuing on with barebones of the comp plan…what steps would you take to ensure the comprehensive plan goals for public transportation are met?

C: I think it's obviously case-by-case. As property owners come in looking to rezone, we stick to our plan. The other thing, is we're looking at undertaking an area plan, because the land use around Spring Creek is so different and so distinct form what's shown there

today. We have some areas of town now that the new plan creates a conflict between the underlying zoning and future land use plan. We are taking proactive steps to reconcile those. Even around other transit stations we need to do some zoning cleanup. Anytime you adopt a new comp plan, you're going to have some of those conflicts. That's an important next step.

E: Okay, on the same boat. Public transportation – connecting that to pedestrian infrastructure. Making sure there's pathways, looking at block lengths, tree-lined streets, and connection to trails. Can you describe the process of implementing that?

C: One of the steps. Connection to trails, as part of Plano Tomorrow [comp plan], we actually took the Parks Master Plan and incorporated it into our land use plan. We stuck this in GIS for the first time. We took that, and you'll see that mimicked as open space on the future land use map. To me, those are critical. You got to recognize where open space is, and how it relates to your other land uses. We do have specific goals in our comp plan related to housing and sidewalks. I'm not sure that, the public works department really loves us right now. **laughs** They've done an inventory of sidewalks and found gaps in our sidewalk system. That's one of the assets Plano has. We have a very robust sidewalk infrastructure throughout town. We have a whole section on built environment on transit-oriented development. We have a section on the roadway system where we talk about improving intersections for bicycles and pedestrian pathways for increased safety, visibility, and comfort. We review and update roadway standards to accommodate all modes of transportation. Those are just a few of the things…we have a whole section on bicycles and bicycle policy, a section on transit and transit policy, and a pedestrian environment section as well. We've actually got an accountability system built in. We have a giant matrix that assigns each of these to a lead department with supporting departments.

P: Part of the Parks Master Plan is part of the Veloweb. Parks department has a trail planner and they are constantly building more trails and connections. All of the train stations are connected with the trial. They're building more trails to connect more stations to each other. Those trails connect to the cities surrounding us: Richardson, Allen, even Frisco. The trail network is pretty extensive.

C: you can see, we have a six-city trail plan: Dallas, Carrollton, Frisco, Allen, and Murphy all connected. The city is pretty serious about its trail system.

E: Awesome, that's part of my next question, is how you work with neighboring cities in regards to that kind of thing, and then specifically within TOD, is there any interaction between neighboring cities.

P: Oh yeah, there's a new trail that's going to be built that connects Cityline through to Parker. It goes right along the DART line. There are multifamily projects along that trail

that have been built recently that will be able to be connected to both stations via the trail network.

E: Yes. That's one of the suggestions I have in my study. By having that non-rail connection in between, then it acts as a backbone.

C: Right, and this is a great example for you, because you can see how it runs straight down the transit line. You're thinking like the planners.

everybody laughs

E: Couple of more questions. One of the big issues I'm seeing is a city center that is a change in socioeconomic statuses of people that used to live in the city center but no longer can afford it because more money is coming back into the city center and pushing those people out. With the conjecture that TOD is to help mitigate that outward expansion, we've used the term, suburbanization of poverty…are there affordable housing opportunities that you see within TOD plans.

C: Yes, we actually have two projects right now.

P: We have one that is for sale product, the townhomes just across K Avenue from here. 21 homes going in, seven of which will be geared towards affordable and first-time buyers. A program within the city that identifies them. Then another site that's an 80% affordable product. Community support for both, they fully understand the need for all levels for housing. The wonderful thing about Plano is, yes, we've put in multifamily, but there's also single-family, townhomes, condos, then you have rentals, both affordable and market-rate.

C: The other cool thing is our historically African-American community is here in downtown. There have been a ton of building going on there by Habitat for Humanity. So we've got a lot of affordable housing through restrictions. Not just apartments, but also opportunities for people to build equity and wealth through that neighborhood.

P: The east side is more affordable than the west side anyways. On the east side, you have homes that were built in the 40s and 50s. They tend to be smaller, then the current standard, though it's shrinking again…So what you're seeing is a lot of young people coming back into East Plano.

C: It's one of the places as a first-time home buyer you can afford to live. Around the US 75 Corridor, that's where most of our affordable housing is.

E: Any other equity issues that you face other than affordable housing through provision of transit-oriented development?

C: I don't think so. Our services are pretty equally distributed throughout town. If anything, it's the people on the west side that complain that they don't have the park space that the east side has.

P: That's also a geology and geography thing, not an equity issue. Because that's [the parks] where the creeks are.

C: Well that's the downside of having your creeks being taken up by private country club golf courses.

P: You can see where the greenbelts are. They're not there by magic.

C: They're by transmission line towers. **laughs**

E: Yeah, I grew up right next to the Preston Meadow Trail. **laughs** I initially thought that you could only have trails where power lines are. So when I went to the Chisolm Trial for the first time, I was thinking, "Why is this so much different?"

C: **laughs** Yeah it's pretty nice.

At this point, Christina had to excuse herself to attend another meeting, so the interview continues with just Peter and myself.

E: What are the specific economic development goals you'd like to obtain through Transit-Oriented Development?

P: See, my role here in the city to bridge planning and economic development. I don't necessarily do pure either. In suburbs, economic development has always been a function of office and commercial. Or office and industrial. They never looked a retail and housing as an economic development function. Transit oriented development comes along and it is exactly that. It's economic development as a part of place-making. It bridges that gap. It's a very important function of economic development. Because density is our only way to grow.

E: Right, at this point. So I have some other ancillary stuff I wanted to figure out from you, I guess. You answered a question I was going to have about sprawl. Watching the city sprawl for so long, and you're kind of done with that.

P: There's a bunch of tracts till open along the edges, but that's about it. Yet, you still have more people coming here. So that's where you're seeing a raft of multifamily along the highway corridors.

E: That's where those new districts are coming in. To densify…

P: Yeah, and then the question is on the gridded streets that we have, the boulevards that are all mile squares, you have retail at each mile…some of them are still doing well, and some of them aren't. So what do we do with the ones that aren't? It drags down the

values. We're going to start looking into how you convert them into something other than what is. That's not TOD but its economic development. So that's where roles like mine come into play.

E: Okay…so I asked about Downtown Plano and Parker road stations….can you describe your role with the Cotton Belt Rail?

P: Sure. Because of my history in transportation, I help the city management team sort of understand design modes. The region has decided that they were going to go for rail on the Cotton Belt for at least four years. The preferred method is rail, it may not end up that way. The rail s always going to be the preferred because of long-term growth, it's the one that can carry the most. However, the question is if it's ever going to have a ridership that justifies the expense of rail in the first place. It's unclear. Certainly, ridership projections are justifying the bus rapid version rather than the rail version. That being said, the city is supportive of transit on the alignment. If they can do rail, we would support it. If in four years they decide they need to do the bus, we would support that too. We're not against either of them. Some cities are against one of the modes. Addison is adamant that bus rapid transit isn't good enough. The mayor of Carrollton is a big proponent of bus rapid transit because of the cost. He doesn't see the benefit of changing the mode to rail. The other thing is, bus is more flexible

E: I was going to ask about that flexibility.

P: BRT can be converted. It's a fixed path. Buses don't need crossing gates, but trains would. But it could be converted. So that's not necessarily a problem. But if you get to a spot where the BRT needs to leave the alignment, you can do that with ease, you can just create a turn line. Whereas, in rail it can't really leave the alignment without major costs and investment.

E: So you'll go one way or the other on mode for Cotton Belt?

P: We support transit on the alignment. We would support either.

E: I was talking to Richardson about the alignment, and they were talking about swinging it so there's an interface connection at Cityline.

P: That's a very expensive swing. I'm not sure that if it goes BRT then the swing wouldn't happen.

E: I know Richardson has a vested interest in the swing.

P: They're also not proposing to pay for it all. They want the region to help them pay for the swing. Mind you the [proposed] 12th street station is only half a mile away so, I don't quite get the idea of the swing. Or if the ridership will justify it. But that's for Richardson to prove, not for me. But the rail line is going there as currently proposed by DART.

E: I've seen that there's a BRT proposal along Spring Creek Parkway, correct?

P: There is, that's coming up out of the work we did in the mobility study out of Legacy West. How do we service this new job center, which is tremendous, with rail? The answer was to use Spring Creek as a way, from the Parker Road station, to do rapid bus crossing over to Legacy.

E: One of the things I've seen in the study is the last mile problem. I live in one of those neighborhoods in the middle of Plano. It would make logical sense for me to use the rapid bus to get to the station instead of driving all the way to the station, hoping there's parking, making sure my car will be okay when I come back, timing everything correctly. All of that.

P: Patrick Kennedy has a couple blog posts about rearranging DART buses into the grid. Keep to the boulevards and keep to the gridded network so you can work faster service and frequent service. That would take a realignment of all of the DART bus routes. Houston just did it, so can we do it too?

E: That's more flexible than rerouting rail. Then going off the last mile problem…can you describe any shuttle links to rail.

P: We don't have any. DART has some along the 75 Corridor that feeds the two stations for shuttles, some on-demand stuff. So there are those kinds of things in place.

E: But you have no development coming to you and saying if you they could work out a shuttle link between Parker Road and our development?

P: The Legacy Business Park…they are talking about forming a transportation management association, and then you would start getting into the idea of doing these shuttles and having a method to pay for them. Then all of the employers of that area could support it with kinds of different means. Alternate start times, free passes for the shuttle system…let see what happens as it moves forward. The good thing is they're talking about it, so it's moving forward.

E: Yeah, that's one of the opportunities I saw when I was looking at Plano... I think that should be it.

P: Okay, great!

E: Thank you for meeting me.

Appendix E – Transcript with DART

Date – November 3, 2016
Interviewee: Jack Wierzenski, Director of Economic Development (J)
Interviewer: Evan Tenenbaum, University of Texas at Austin (E)

Interview Started with Explaining the Purpose of the Report

E: A warning I'm seeing coming into my research is, am I physically describing a half-mile buffer around a transit line at which to adhere development, or is it just looking at a corridor philosophically? It's a dichotomy I've been looking at. Is it a tangible buffer or more of a concept? It may work for other cities physically. I'm looking at how a corridor performs in a regional context. Can you talk about any concerns or questions you have about that?

J: No, I think what your approach is almost how we select what's feasible for a light rail alignment versus a bus corridor. When we pick our alignments, along the corridor…where would the benefits be, where would the ridership be? So, it falls right in line.

E: And that's for new alignment selection?

J: Yes.

E: When you're looking at current alignments you've had for 20 years now, and you're looking of ways to develop along those lines.

J: As long as they're set, with the idea that they have good potential for development along the line. So as the line matures, it's more received that development would occur at the stations we thought they were going to be in.

E: So you would say you're continuing to do that process as these lines grow to maturity?

J: Right, right.

E: Okay, so I'm going to go ahead and ask some of these prepared questions now. So this is the most general. Please describe your general role in the process of TOD.

J: We have a board TOD sub-committee that's very interested in it, so our role is to support that. Part of that is identifying the stations in all of the corridors that have potential for transit development on our property. There's a split between the DART property and property around our stations that DART doesn't own. We can influence both, but the other is we have to work with the cities. The cities have land use powers, DART does not. DART also doesn't have economic development abilities to provide incentives like TIF districts. Cities can do that. Part of the role is, to show the board that on our property what our priorities are for different station areas, and then the other is to

work with our member cities to make sure we get the appropriate development in the corridors.

E: So you only have control of the properties that you own at the stations?

J: That's right. A majority of that is parking lots that are underutilized.

E: Are there any sites that aren't parking lots?

J: Yeah. At LCJ/Skillman, that's one we're working with a city council member right now, looking to do an RFP on that. That's 18 acres, part of it has parking on it. The rest is just grass. We're not able to go out and just buy property speculatively. In cases like that, we bought the property because it was two big parcels where we located the station, so it was benefit to buy it and have the remaining surplus property.

E: Krystle [City of Carrollton] mentioned at Trinity Mills Station, there's that parking lot.

J: That's the old Park and Ride, then when we opened the train station at Trinity Mills, the Park and Ride was decommissioned. The parking shifted over to the station area. So we're using that property now to join with the City of Carrollton. We're going to do a joint-RFP on that.

E: Is that something you donate to the city to do?

J: No, we don't donate anything. We're required to get fair-market value. Developers have a hard time understanding that. Because we're a public agency, they think we can. We can't even discount the value. Cities can do that, it goes back to the economic development abilities that we don't have in our legislation. So we can't do that. Some agencies on the west coast like Portland can do that, but we can't do that. State law doesn't allow us. And if it's federal money, federal doesn't allow you to it either. You're required to do fair market value. Now, one thing they're doing in Los Angeles is they can discount the property of the land because they're putting affordable housing on it and calling it community benefit.

E: You can't do that in Texas.

J: Well, **laughs** we're running into some issues here. Affordable housing is a big issue. Our position at DART has been that it's a city's issue for policy. We will work with the cities on that. But the other is the requirement for affordable housing easts into developers' ability to make money. Because they got to discount that, they've got to come up with something. One of the RFP's on Mockingbird Station, one of the issues now is that if we put multifamily in there, is it going to cause financial issues? So we look at non-multifamily uses. The other is what the City of Dallas is in the midst of right now, trying to refine their housing requirements. They are in the process of identifying areas of opportunity which fulfill the needs of affordable housing. Which would be a lot of the station areas.

E: Yeah, that's what I figured.

J: This could cause some "heart burn" because we've got some board members and some staff that are looking to maximize the revenue off of a piece of property. Then if you put affordable housing in that works against that. So it's the issue of if DART's a business or a public entity.

E: In your opinion, what side are they leaning right now?

J: Right now, they're leaning to making money. Our TOD policy is: community benefit, ridership, and revenue, but it seems the top of that pyramid right now is revenue. It needs to be balanced. In the past, ridership has been the driver. Ridership drives this projects, then this gets to the last mile issue, is if we can have people living there. If you've read City of Dallas council comments on D2, they want us to look at the bus routes. A lot of these stories of people taking three hours to get to work because they have to go from bus to another bus to a train. So how do we shorten that out?

E: I've talked with a colleague of mine who is from Houston, and how different they are. The purpose of Dallas's rail versus Houston's rail. An article I've read talked about the advantages and disadvantages to both. It's was pretty neutral.

J: Houston seems to be more of destination-oriented. DART is more all of the above. In some cases we are more commuter-oriented, like the Red Line, but then there's other destinations like Fair Park, Victory, the Airport, though that's largely employees…

E: Okay, so going back to that RFP you're doing with the City of Carrollton. Are there other similar projects at other stations?

J: There could be potential in Plano at Parker. Where the city owns this piece of property on Avenue K. that they've been trying to get us to look at.

E: Because of the platform extension?

J: No, there's a lot of land that's been tied up in parking that the idea is to put parking into a structure. Then there's a family that owns a piece of property right by the station, that if we can combine it we could make a big development, though we would have to shift parking around. The city's land comes in on that also. We did another joint-RFP with the city [Dallas] at Buckner Station, but that was because they had some HUD money for TOD. We went out, did that RFP, and nothing came of it. We're thinking of doing that again, but with just ourselves because the city won't be putting any HUD money into it. Oh, and Spring Valley station, that may be more of a City of Richardson thing, working with property owners, trying to find a developer that can use part of our property as a catalyst. Generally, I think Trinity Mills is the best one for a joint-RFP, because they're putting in basically the same amount of property as DART is. We'll do a

selection together, but then we'll negotiate development agreements on our property separately.

E: Alright…so while we're on the topic of working with cities. Cities and developers are your two main actors when developing TOD. Can you describe working with each is like? Is one easier to work with than the other, and how your goals may or may not differ than theirs?

J: Developers are the hardest because their goal is making money. They're not into it for altruistic reasons. Cities are easier to deal with because we basically have the same mission. Developers, at the same time, a lot of them don't understand the transit agency side of things. I've had a number of them come up and say we should donate the land, because they pay sales tax too. Also federal requirements. If we got the property with FTA money on it, then we have federal requirements. That's always one more step, FTA has to review it and approve it.

E: Is there a federal match for D2?

J: It's at 49%.

E: So you're going to have stringent…

J: Oh yeah. D2 will, definitely. Right now it looks like it's going underground.

E: Ok, so more about the process with the city?

J: The process is, they've got the land use powers. We're going through this at Mockingbird right now. We've had a couple meetings with city staff. They have to be joined at the hip with us. We've got MF3 zoning, which allows whatever we want, at Mockingbird. But the city still has to approve it, because even though we have the zoning for it, we have a site plan that was approved for the city in 1992, it was a special council resolution for a transit facility. So nay changes to that site plan has to be approved by city council.

E: So it's another barrier?

J: Exactly. Developers hate doing that stuff, but it's part of the process.

E: Has the city backed off on any plans?

J: No, with all of the cities, we share ahead of time, so they can give us a heads up. They've been telling us we need to keep an eye on down the road for affordable housing. They're not sure which way the council is going to go. Depending on the politics.

E: So transparency is key there.

J: Exactly, no surprises. There are some real estate things that the law allows us to keep out. If we negotiating on the dollars, and things like that, that is closed-session. Developers think they can come into a room like we are doing right now, negotiate a number. It doesn't work that way. We've got to go through our board process for approval, which takes 6 weeks. That's assuming there aren't any questions on it, if there are that sets you back further. That process goes on, you can't avoid it.

E: Can you describe outside stakeholder groups? For instance advocacy groups, educational institutions, charities, non-profits that you've had to work with?

J: Generally, non-profits have done a lot for the homeless. A lot of facilities for them. Again, they come in thinking they can get the land for free. You can't do that. We've been very supportive of affordable housing. There's one on 14th Street in the City of Plano. It's aimed at veterans and artists. It's largely workforce housing. We're more than happy to do something like that. It's a type of thing that we can go out to support and show their importance to beginning in ridership to the DART system. Other agencies…right now, because it's on the front burner, the Housing Authority, how do we identify properties. The school systems, the something. The city is looking at where the school system has properties and what has potential. A lot issues coming to the surface now. How do we balance it all out with what our mission is?

E: Any HOAs?

J: No. Usually the time when HOAs get involved is more of alignment. Like the Blue Line.

E: So they don't care about development?

J: Generally on the development side, the HOAs get involved, when they largely oppose because it brings traffic to a community. If you get a strong showing of people in opposition to something, council members will listen.

E: Any of the Universities?

J: Oh yeah. I've been working with SMU on an art project. A lot of times, with universities, the number on is access.

E: Like at Mockingbird Station?

J: Yeah, our SMU shuttle to Bush Library as well as SMU. UTD has really grown. The shuttle between Bush Turnpike [Cityline] Station and the UTD Campus.

E: Will that shuttle change once the Cotton Belt is built?

J: There plans to be a station right there at UTD. It will be a while before they go to construction there. They've got their plans on expanding their campus around the station area.

E: So they won't necessarily need a shuttle. Or maybe it will run less frequently.

J: Yeah, it's a little ways out, but I don't know…a lot of success too at UNT Dallas. A lot of the reason we just opened the new three miles…we changed our service plan alignment to accommodate that. Now it hooks over to where the campus is.

E: Is there a branch that will still go to the Southport area?

J: I think that's dead. **laughs**

E: Okay, I saw it on the 2030 Plan, and I thought it was weird why it would go there.

J: It was politics. It was a trade-off in order to get support in leaving the Cotton Belt out to put that in. It comes down to politics on all of these things. They're in the process of updating the plan to the 2040 Plan. They're going to go back and look at an alignment that comes off of Forest, around Coit, up towards Valley View, and into Addison. That's always been real strong from a ridership side, but largely expensive because it would all be underground.

E: Yeah, no right-of-way until you get to Addison. There's those railroad tracks…

J: Yeah, DART owns that.

E: Alright…continuing on, these are more tailored to the transit agency. How do you attribute TOD planning to combating sprawl?

J: The sprawl is really outside the City of Dallas…

E: But you have significant ridership coming from those areas of sprawl.

J: Yeah, the numbers…60% of the riders at Parker Road are coming from outside the service area. It's been an ongoing dispute on how to deal with that. The big one is to get them to join DART. That's an issue they go through too. They don't have the sales tax to do that, tied to other things. The issue is when you go outside the service area, we can't do anything. WE do have a contract with Mesquite and Arlington, but the idea is ultimately they [cities outside service area] will join DART at some point.

E: But that's on them?

J: Right. They still have to find the money to do it.

E: Do you talk with these cities regularly?

J: Service planners do.

E: Is there mutual interest, aside from the financial aspect of it?

J: Oh yeah, if it wasn't the financial issue. The area south of Dallas around Cedar Hill, Duncanville, Desoto…they're always talking about getting transit access. The Red Line from Westmoreland extending down to Desoto and Duncanville…has always shown real good ridership. Just, they don't have the funds to do it.

E: What about cities that have pulled out of DART? Flower Mound and Coppell?

J: Coppell in particular, with North Lake being there…with the Cotton Belt, there's going to be a station there. We've been discussing with Coppell about them putting some money into DART because we know a lot of their residents will want to use that station.

E: Do you think it's realistic for all of these cities [to join DART] in the short-term?

J: Yeah, I don't know. We've been saying that for years and it never seems to get closer. They all talk about it. Allen and McKinney especially. We own the right-of-way through there. They [McKinney] have a great environment that would be great for a rail station.

E: Who was the last city to join DART?

J: I think the initial 13 in 1983. Then in 1989, Flower Mound and Coppell pulled out. Just by a handful of votes.

E: Okay, moving on…I don't want to hold you...how are you able to connect single-station goals with region-wide planning? In regards to creating an activity center within a corridor? How do you connect moving people from one area to area you would want to develop?

J: It's all reflected in TOD goals. The big issue is don't put a station in that will just draw riders from the next station down. We want each station to be independent in terms of the development around it, whether it's a destination or an origination site. Whether it's the local goal, or the regional goal, it's the same thing. How to connect those areas and get people out of their cars. Cities have the land use authority. They can create policy that corrects development around the rail structure that we put in.

E: Are there any other BRT corridors you have planned, other than the one in Plano connecting Legacy West to Parker Road Station, and the possible Cotton Belt alternative?

J: The system plan has Northwest Highway, and that was looked at seriously in the last plan. They call it BRT, or express bus, or rapid bus, or whatever.

E: **laughs** That's the thing, though. There's a stigma associated with the bus.

J: I remember doing public meetings, when we opened the Red Line, people coming up completely pissed off that the train was going to replace the commuter bus. They like the commuter bus, but not the regular bus that stops often. Same thing with D-Link.

E: Are there any specific TOD plans that you just want to talk about in general?

J: The one thing is, we generally go through inventory of all of our TOD properties, which is largely the parking lots and exceptions we have talked about. In the past we've gone through an assessment based on access, based on unused parking spaces, what the market is. We've done this weighted process, and then we ranked them. Last May, the discussion was why we ranked them. The board, years ago, said they wanted them ranked. So now we un-rank, then we just do it alphabetically. The question is how to go back through them and decide which ones are priorities. We're playing back and forth with that. The RFP at Mockingbird and at Carrollton was set precedent with the committee on moving forward with others. We're looking at potentially Buckner, a couple of other smaller ones.

E: So it's more case-by-case, rather than having one ranked the highest, so you have to have something there.

J: Yeah.

E: Do you have specific stations you would consider underdeveloped or low development-ready?

J: Spring Valley is development-ready. But the issue on that is being able to sublet property. LBJ/Skillman, the issue there is the market. The only thing I've been called on there has been from hotels, which is not transit-oriented. So it's more of what the market is and what the expectations are.

E: Any of the southern ones? I've noticed a lot of small scattered parcels as vacant, just in random places in the station area.

J: Westmoreland has been one for years. There's a couple that we've looked at for years. At Kiest, the shopping center, they've been trying forever to get something there to change that. Westmoreland, we own a lot of land over there. Every time we've had a developer come in, they've had great ideas but it doesn't go beyond that. There's a lot of political support, Westmoreland in particular. A number of council members and board members in the past have tried to get something to happen there.

E: There's three more topics left I wanted to talk about. Park and Rides, last mile goals, and infill stations. So firstly, just talk about Park and Rides versus development.

J: Number one, being able to reduce down the parking. We just updated a parking study for Mockingbird, and its shows DART parking…we can drop that number from 720 to around 450. That will then go into a structure.

E: so you're an advocate of on-street and structure. That's more of a city thing.

J: Yeah. And the city is supportive of it. And the other thing is, and COG is the partner on it, is the FTA grant for $1.4 million, and the big part on that, and what I've been pushing for, is a real parking study of the developments that have occurred along the DART system, how much parking they built and how much is really being used. It's going to that they're putting in a lot of parking that's not needed, and that's millions of dollars that could've gone to providing affordable housing or something.

E: Or last mile infrastructure?

J: Yeah.

E: Okay, so *last mile*…can you talk about your last mile goals. Other than the bus system.

J: The thing is, looking at other technologies, whether it's Uber of Lyft. ZipCar, they're at three stations now. That has been very successful And then the Hike and Bike trails. We've been very supportive of allowing our cities to use unused right-of-way along the rail lines. Richardson's a prime example of using rail right-of-way for Hike and Bike trails. The COG and the cities have done a good job of developing plans that take advantage of all of the rail line access. I think we're really on the right track. A big issue in Dallas in particular is shared bikes. It just can't get off the ground. There's a lot of reasons for it. One is it takes a lot of subsidy.

E: I guess the goals for those is just to encourage more of that and less of driving?

J: Yeah, I think what we can effect on our end is providing space or accessibility to our infrastructure. We can't build a structure for somebody else, but we can allow them to build that, like the Katy Trail. The bridge over Mockingbird is under construction now, then there's also a bridge over our tracks between the University Park facility and our property.

E: I don't know if the city is doing street improvements along Mockingbird Lane to connect the station over her or not…

J: That's in long-term goals. They've had some accidents down there.

E: It's the biggest "Flaw" of Mockingbird Station…

J: One of the things is when that bridge comes across [US 75], you'll be able to go from this side, up and over, and you won't have to cross at-grade.

E: Okay…finally, I want to discuss any infill station plans DART has.

J: Carpenter Ranch is moving forward. The Stadium one is maybe moving forward, last I've heard. The bridge [over the highway where the station would be located] is going forward, at the old stadium site [Texas Stadium], for the project on the north side of 114. Then the old stadium site is another project. So those are two infill stations. Lake

Highlands was an infill station, which still has spurred the development that we want. There's still some meeting on that.

E: So Carpenter Ranch?

J: That's moving forward. That's really, how it gets paid for. All infill stations are agreed upon that someone else would pay for them, whether it's through development or a TIF or the city. DART will front the money, but then it gets paid back.

E: And then, any plans for development once that's through?

J: Yeah the Verizon property. It looks sort of Cityline-ish. Probably more residential, a couple of office building.

E: Okay…and I have to ask about Knox-Henderson again.

J: That will never happen in my lifetime. **laughs**

E: Really?

J: Yeah, the estimate done in 2002, it was going to be $100 million. And that was in 2002. It's on the list, and it's actually being looked at as part of the system plan update because council members have brought it up…

E: That's a great neighborhood for transit.

J: Yeah, it is. It's a missed opportunity. If the neighborhoods around there would've supported it back the 80s and 90s, it would be in there. But instead it took them until after the fact to realize it. To go back in and do that within an operating system is almost cost-prohibitive.

E: So, to take that $100 million…how would that be different than the funds for Cotton Belt or for D2? Would it have to be put into a completely separate bond?

J: Yeah, I don't know. There's several ways they can do it. I don't know if TIFs can cover it because it's too expensive. If the city did bonds…who knows what the number is today. It could be double.

E: It's a shame it's not a priority. It's a very transit-compatible neighborhood.

J: Another thing is underground versus at-grade…it's something like $15 million to do an at-grade station. You have to do Knox-Henderson underground. And back when we did the numbers in 2002, there was a lot of open space there. Now a lot of that has been built on. Even though ridership looks real good there.

E: does the McKinney trolley run up there?

J: That's one of the things that they're pushing, is to extend the trolley up to the Knox-Henderson neighborhood.

E: Okay….I believe that is all I had. If you had any questions for me.

J: No, no, I think this is good. Looking forward to what you write up.

E: Thank you so much.

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