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Transit Oriented Development for Nashville: Learning from Europe

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To the Graduate Council:

I am submitting herewith a thesis written by Erin Ashley Gray entitled "Transit Oriented Development for Nashville: Learning from Europe." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Architecture, with a major in Architecture.

Thomas K. Davis, Major Professor

We have read this thesis and recommend its acceptance:

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(Original signatures are on file with official student records.)

Transit Oriented Development for Nashville:
Learning from Europe

A Thesis
Presented for the
Master of Architecture
Degree
The University of Tennessee, Knoxville

Erin Ashley Gray
May 2012

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Primary Advisor: T.K. Davis
Committee Members: Ken McCown and Avigail Sachs

Thank you for all your help.

ABSTRACT

A popular movement in the past decade has been to implement transit oriented development in city planning. Transit-oriented development, or TOD, is nationally characterized as mixed-use development located within a 2,000 feet diameter from a mass transit center. However, the typical format for TOD in the United States, initiated by Peter Calthorpe and fermented in the West Coast, lacks consideration in unifying various forms of transit. Individuals are more likely to participate in public transportation if they do not have to solely rely on one method of travel. On the other hand, TOD has been wildly more successful in European cities than in America (as is reflected in the percentage of individuals that use public transportation) by implementing an integrated transportation system that combines different modes of mobility (rail, metro, bus, car, bike and pedestrian).

One of the assumptions designers often make is that a logical proposal, based on just regional and economic conditions found in America, will encourage individuals to utilize and increase rider-ship on public transportation. From casual observation, it seems likely that the various sustainable innovations cultivated in Europe could be implemented and Modified for American cities.

Although many American urban planners are skeptical that sustainable city design approaches derived from European countries can be relevant to cities in the United States, similar concerns regarding the decline in the urban fabric and dependency on the automobile are simultaneously being addressed in Europe as well. While taking into account that the United States varies in climate, terrain, and demographics (not only within its different regions and States, but from its European counterparts also), the European policies regulating urban sprawl should be used as a starting point in reorganizing TOD in America.

Nashville, Tennessee is renowned for its successful collaboration between government agencies and city planners. The Nashville Area Metropolitan Planning Organization (MPO) has undergone several studies and is currently on the brink of implementing a wide-scale bus rapid transit line along the Northeast Corridor. My intent is to activate the intersection of Ellington Parkway and Trinity Lane with a Transit-oriented development that takes into account and adapts European planning schemes that are environmentally conscious.

PREFACE

Major policy initiatives include:

- 1) A bold new vision for mass transit;
- 2) Support for active transportation and walkable communities;
- 3) Preservation and enhancement of strategic roadway corridors.

Nashville Area: Metropolitan Planning Organization

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CHAPTER I INTRODUCTION AND GENERAL INFORMATION

City Growth

The geometric structure of a city can have a great influence on how a city develops. Although, in the past most cities have grown in a radial fashion, it has come to the attention of urban designers that linear cities are more favorable. Linear cities provide ideal mixed-use environments in a dense pattern of development. Besides having the ability to become more compact and reduce sprawl, it is also easier to initiate a mass public transportation system in linear fashioned areas. Thus, a mass transit facility would be more efficient and capable of alleviating congestion.

While Nashville is momentarily a radial city, the Metropolitan Government of Nashville and Davidson County aims at restructuring the core of the city itself. Future development and new public transit line will be conducted along five corridors that begin in downtown Nashville and flow in opposite directions. Essentially, by consolidating development to just these corridors, Nashville would become five linear cities in one. These structural corridors would not only alleviate stress on just Nashville, the surrounding sister cities would also be greatly transformed.

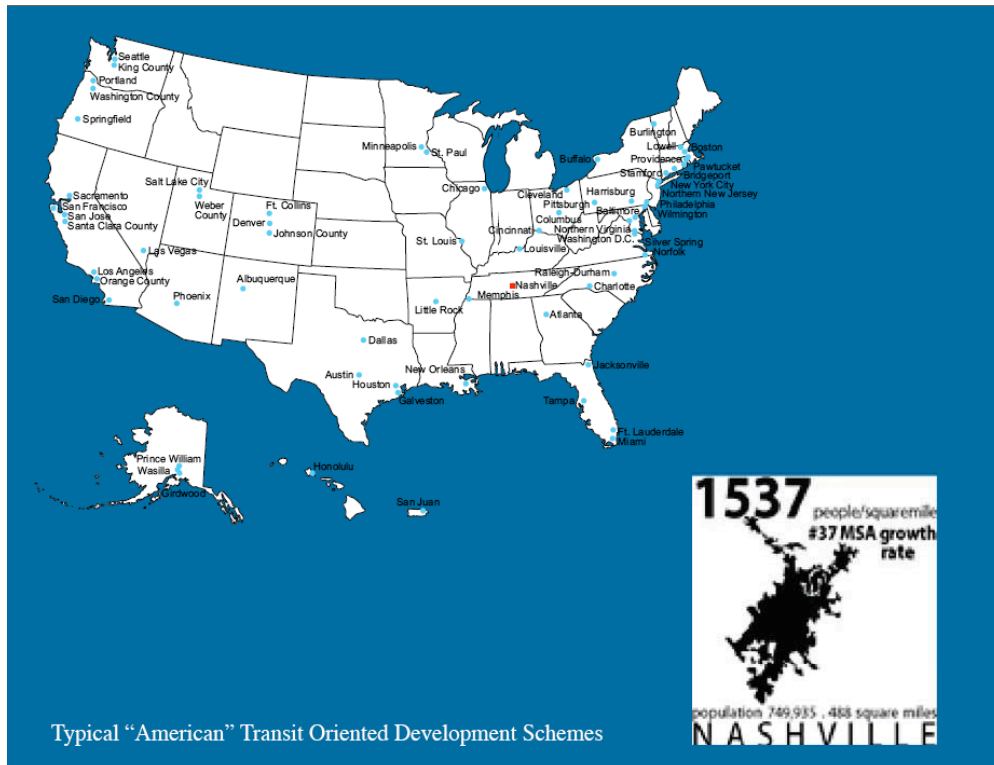


Figure 1. Creating Place (2007). Source: University of Arkansas, Community Design Center.

TOD Station Types

TOD Type	Land Use Mix	Minimum Housing Density	Frequencies
Urban Downtown	Office Center Urban Entertainment Multifamily Housing Retail	>60 units/acre	<10 minutes
Urban Neighborhood	Residential Retail Commercial	>20 units/acre	10 minutes peak 20 minutes off-peak
Suburban Town Center	Primary Office Center Urban Entertainment Multifamily Housing	>50 units/acre	10 minutes peak 15 minutes off-peak
Suburban Neighborhood	Residential Neighborhood Retail Local Office	>9 units/acre	20 minutes peak 30 minutes off-peak
Commuter Town Center	Retail Center Residential	>9 units/acre	Peak service Demand responsive

Table 1. TOD Station Types. Source: University of Arkansas, Community Design Center.



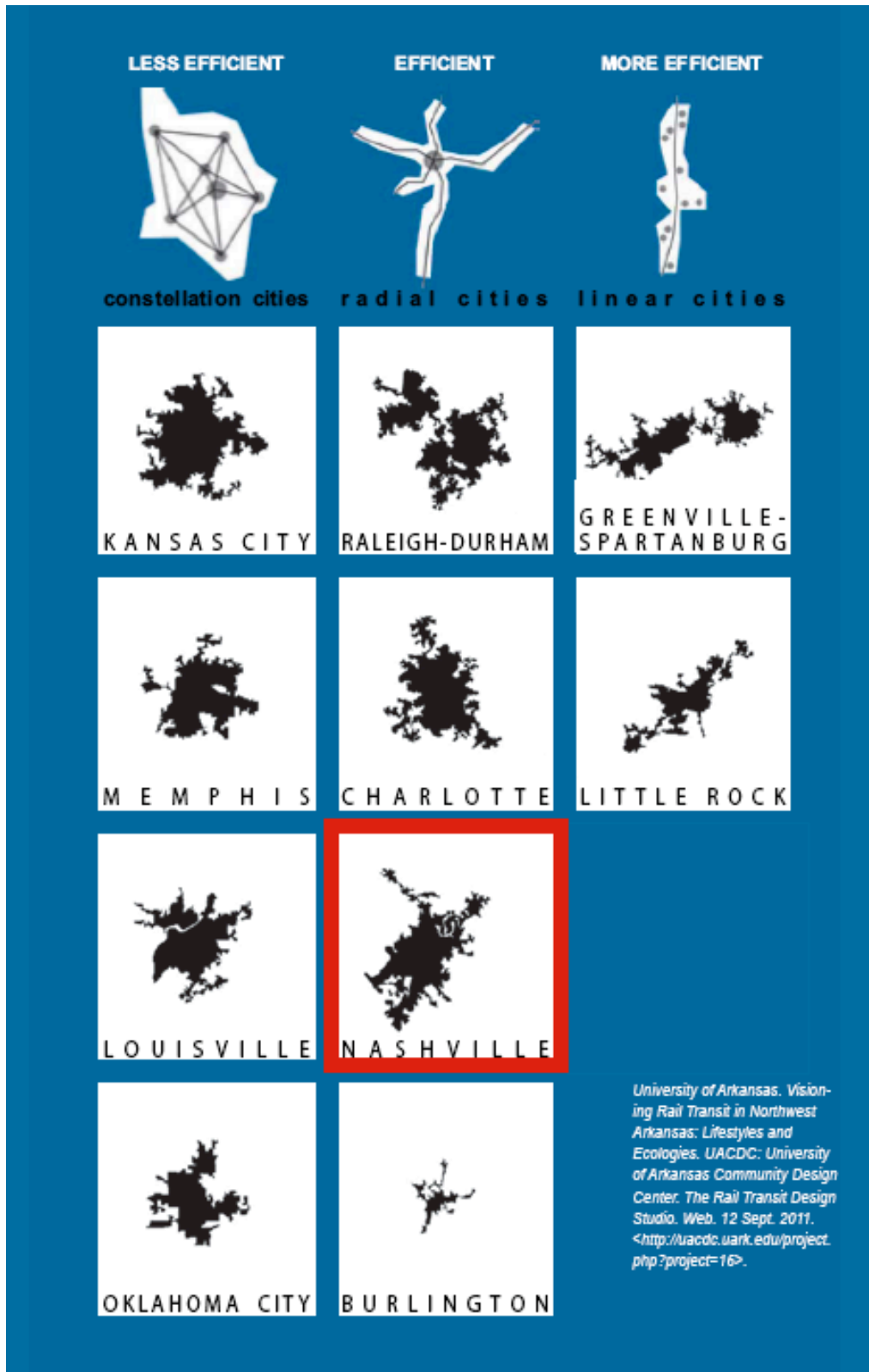


Figure 3. City Layouts. Source: University of Arkansas, Community Design Center

TOD Planning Metrics



Streets/Public Space

TOD requires pedestrian-friendly street networks with both high connectivity and proximity among destinations. Well-designed pedestrian facilities and civic spaces are important anchors in creating desirable public environments around transit stations.



Blocks

Block sizes lose their capacity to support pedestrian activity above 500 feet, or seven acres, and ideally should be less than three acres or approximately 400' x 300'.



Transit Station

Commercial uses, housing, employment centers and civic spaces should be within walking distance (half-mile) of transit stops. Transit stations may become activity centers within TOD districts rather than single-use constructions relegated to district margins.



Housing

All market grades of housing with a mix of type, density, and cost should be developed in TOD districts to create social and economic viability.



Parking

Since parking is often the largest land use, urban parking strategies attentive to footprint, street frontage, and location must balance parking needs with the creation of a desirable pedestrian-oriented environment. Outdated suburban zoning codes result in parking areas greater than the building areas they serve. For example, at 5 spaces per 1,000 square feet of building, retail parking becomes 150% of the size of the enclosed building.



Employment Centers

Residential and employment land uses are significant determinants in creating ridership. Substantial ridership increases occur once employment centers concentrate 125 employees per acre in TOD neighborhoods.



Commercial/Retail

According to the Urban Land Institute, the primary role of retail and service functions in TOD districts is their "amenity contribution" in the creation of great places for living and working. Outside of large retail agglomerations like malls and big box power centers, retail on its own will not generate notable ridership..."retail follows rooftops".

Table 2. TOD Planning Metrics. Source: University of Arkansas, Community Design Center

TOD as a New Real-Estate Product

Transit supportive development along the corridor includes dense expansion near station areas. If done correctly, this would stimulate businesses and more residents to relocate along the new transit line. Along with additional employment choices, shopping and a variety of housing would be contained within a ½ Mile of the station locations. Inevitably, this would reduce commuting vehicular traffic, and make this potential scheme a viable and economical possibility for the future.

The Nashville Metropolitan Planning Organization came up with a prototype TOD development, estimating that the scheme would provide an estimated 1,100 jobs for the associated office space and 450 jobs attributable to retail.

Downtown Nashville itself generates around 13,500 new jobs a year. On the other hand, growth patterns in the outlying counties reveal that jobs are actually being generated in a decentralized manner as well. Therefore, development in these areas (away from the city's core) will provide even further economic stimulus and employment zones. MPO studies reveal that booming areas will profit from warehousing and population-related industries (retail, education, social services, and construction). Their market research finds that new mixed-used development would spur 24,324 new jobs between now and 1230.

Further economic and fiscal impacts include:

- 1) *\$64 million increase in employment.*
- 2) *Additional government and state revenues from sales*
- 3) *Enhanced income and property taxes*

Despite the various characteristics found in neighborhoods between Downtown Nashville and Gallatin, Transit-oriented development, in general, must maintain certain characteristics in order to encourage more individuals to live, work, and invest within a ½ Mile radius of the transit station. Because of this, a more pedestrian friendly, public and dense atmosphere is created.

Dense pedestrian friendly town centers and commercial intersections that are within easy reach of transit would support the quality of growth needed for this region. This would also work hand-in-hand with the new corridor/transit analysis in order to establish an environment that provides increased housing and transportation options, supports a variety of age demographics within the community while also promoting a more mobile and healthy lifestyle. Lastly, the diminished space requirements would also aid in preserving natural and cultural resources.

Transit Oriented Development can also be viewed as a vital real estate opportunity that could potentially revitalize the urban framework, re-instigate downtown centers, create more affordable and varied housing opportunities, and support the introduction of mixed-used development within suburban neighborhoods.

In order to successfully achieve a profitable TOD development, the following criteria must be implemented throughout the scheme:

- 1. Location efficiency – dense and walk able proximity**
- 2. Variation – different housing and lifestyle options**
- 3. Public space – civic institutions and green space increase property value and provide a higher economical return.**
- 4. Concept of creating a “Place” – TOD development should be conceived as a destination, not just as a stop.**

CHAPTER II HISTORY OF TRANSIT ORIENTED DEVELOPMENT

Parameters observed within many Transit Oriented Developments in the U.S.

Pros:

Design takes into account potential growth.

Concentration on Infill and Redevelopment with affordable construction.

Cons:

The established Transit corridors do not integrate with the surrounding environment.

Stations are designed primarily for efficiency but lack accessibility, thus discouraging individuals to use the facilities.

Mass Transportation is not reinforced due to the lack of secondary modes of transit and the limited amount of pedestrian-friendly zones.

Priority is given to reaching the maximum demand growth and achieving the most profit possible, instead of taking into account “the user.”

Feasibility of the residential areas is marginal considering the plan is based on an “office park.”

Garden City

Sir Ebenezer Howard's design for a "Garden City" established a set of principles for surrounding neighborhoods that were each protected by natural green zones and connected to public railways. Many of Howard's ideas are still used as guidelines in order to achieve self-sufficient, pedestrian-oriented communities.

Pros:

Design formulated around "the individual."

Improved the quality of life for residents.

Controlled growth (30,000 inhabitants), prevents overcrowding and congestion.

Resident, Industry, and Agriculture provided for in the same environment.

Promoted recreation and leisure.

Separation of traffic from the rest of the residential district.

At the heart of "the garden city" stemmed cultural and civic institutions. Idea of the community is strengthened.

Cons:

Rural belt surrounding the community prevent any urban growth for future development.

Requires centralized control that is not always in place.

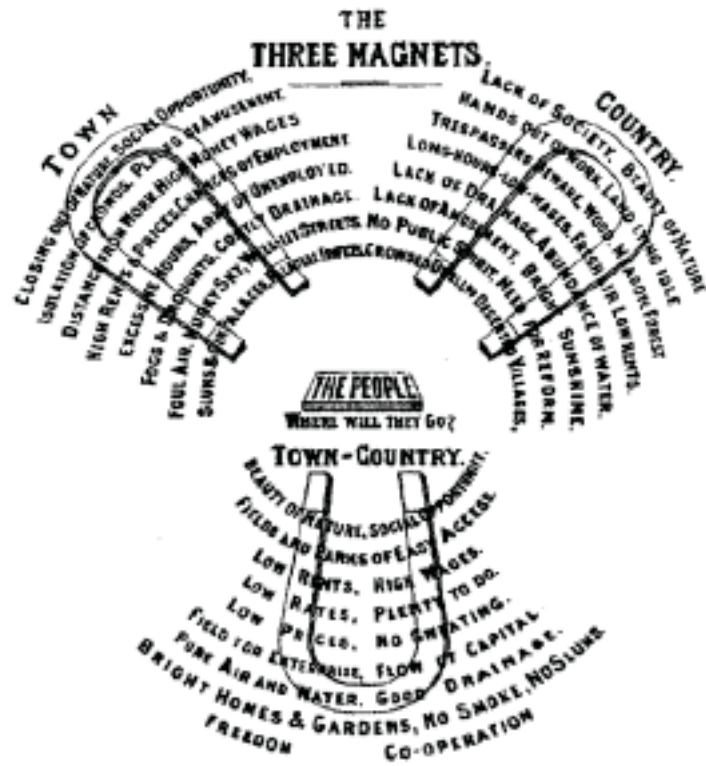


Figure 4. Town-Country Scheme (October 2010). Source: Architecture + Urbanism

Guidelines Taken from Europe

Heidelberg, Germany

Freiburg, Germany

Berlin, Germany

Zurich, Switzerland

Stockholm, Sweden

Linz, Austria

Vienna, Austria

Graz, Austria

Helsinki, Finland

Den Haag, Netherlands

“These are cities that are frequently cited in European planning and environmental literature and that have been engaged in a variety of innovative and cutting-edge local sustainable initiatives. Cities were favored that were doing a number of different things and that had adopted and implemented sustainable policies in a wide range of sectoral areas (ideally, these places were not simply doing one thing but were attempting more holistic strategies).”

Beatley, Timothy. 2000. Green urbanism: learning from European cities. Washington, DC: Island Press.

Pros:

Different design approaches since postwar WWII.

Headstart - context of new urbanism and sustainability established early on while American cities have only recently begun to implement environmentally friendly features.

Traffic restrictions (including parking) - priority given to pedestrians and bicyclist instead of the motorist.

Coordinating Transit and Land use.

Integrated Transportation System - multiple forms of public transit is provided along with

various routes within the same system itself. (Therefore alienation to far-reaching communities is prevented.)

Issues Addressed by TOD

Traffic Congestion

Environmental and Health Concerns

Energy Conservation

Social Equity

Quality of Life

“Transit villages are not just physical entities. There are important social and economic dimensions behind transit village design. By creating an attractive built environment, complete with a civic core and prominent transit node, people are more likely to feel a sense of belonging and an attachment to the community.

Transit villages must also be economically viable and financially self-sustaining. Creating attractive urban environments that have good transit access to the rest of the region should, by definition, produce economic benefits. By creating better quality neighborhoods in areas with superior transit services, private investors will return to these areas, putting them on a road to financial recovery.”

Beatley, Timothy. 2000. Green urbanism: learning from European cities. Washington, DC: Island Press.

As cities have grown over time, it was common practice to organize the city layout according to activity. Unfortunately, by separating each zone by program, the downtown districts became depopulated and alienated from the rest of the city. Although the city’s population kept increasing, the development within the city limits often times would stall. Individuals abided by the philosophy to work here but to live elsewhere. This also led to the urban areas to only become active during certain hours of the day. Many cities began to resemble a heterotopic space that was infrequently inhabited and in essence just a temporary point of movement.

By reconsolidated the city’s framework, designers should aim to fulfill three guidelines through redevelopment: mobility, sustainability and identity. This should especially be evident when the previously segregated zones are successfully reconnected with a public transit system. While there are multiple forms of mass transportation already provided, further links are needed between the different lines and different types

of systems (metro, bus, bike, vehicular, and pedestrian). It is also vital to ensure that these various transit systems do not compete within the same space. The new and efficient forms of mobility would initiate a change in the structure of the city as well.

The reformation and consolidation of the city structure would also alter its essence and identity. A city should strive to become sustainable and should be capable of living and working in the same environment, however it would be unable to sustain itself if any of its key parts were removed. In this sense, the structural grid and transportation within the city acts as a protective shell. Therefore, an affective organizational force is needed. This can be achieved by establishing areas for economic development within industrial zones while still creating self-sufficient community districts. Interventions in the urban organization would spur new incentives to redevelop the surrounding regions and create a ripple affect through the area. These intervals will also assist in any long-term planning. Again, mobility still needs to be taken into account because the streets infrastructure not only minimizes traffic; it also preserves the historic sector by controlling sprawl.

New Transit Lines will bring about growth along the northeast corridor, allowing for development to be opened up and converge at key focal points. The intersections of these civic corners provide optimal locations for bus transfer terminals. These then would bring passengers to the historic downtown district or the larger terminals.

Urban Corridors

Urban planners have come to realize that a city's transportation system acts as a spine for development and can be utilized to restructure the surrounding growth. A consolidated and integrated public transit system can efficiently connect the metropolitan area to its surrounding municipalities. One such city is Curitiba, Brazil, whose radial plan was remodeled into linear avenues along the mass transportation lanes.

During the 1950's and 1960's, Brazil experienced a rapid migration rate from the rural suburbs to the cities. Curitiba was able to maintain the increased population by implementing a Master Plan in 1965. One of the most significant changes that occurred because of the new Master Plan was the establishment of distinct areas for economic development along the new transit corridors. These were still maintained within industrial zones, and still created a self-sufficient community district.

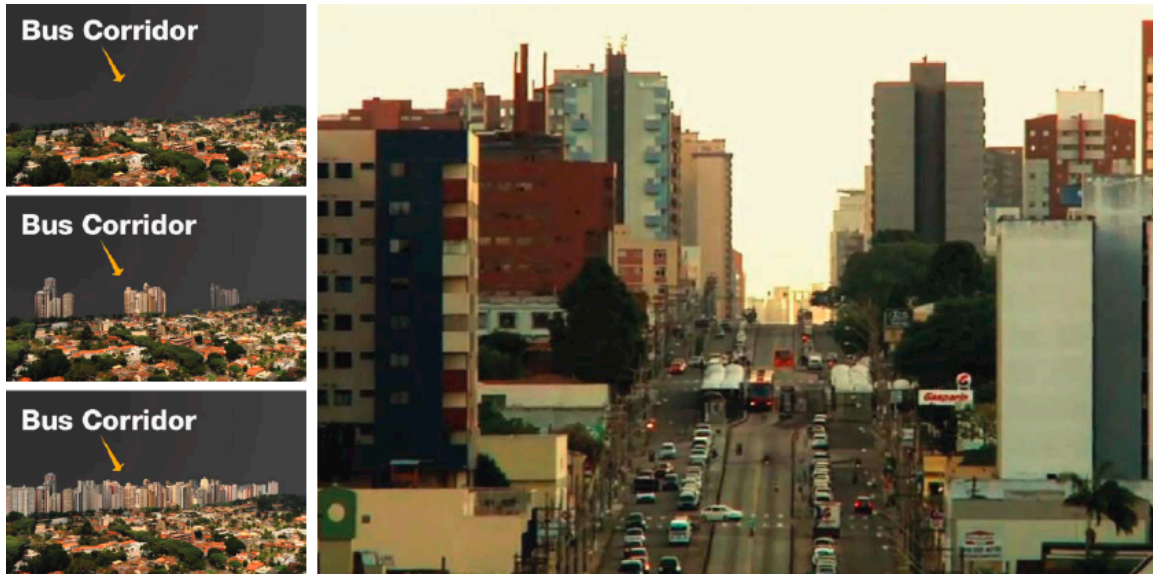


Fig. 5. Corridor Development in Curitiba, Brazil. Source: Horizon Solutions

Curitiba's Master Plan is organized around "five arterial structural growth corridors (that) dictate the growth pattern in the city. These structural corridors were composed of a triple road system with the central road having two restricted lanes dedicated to express busses, which helped to keep the bus system independent of congested traffic."

The transportation system in Curitiba is made up of a total of 340 routes, including feeder lines, express lines and inner-district routes. "The feeder lines pass through outlying neighborhoods and make the system easily accessible to lower density areas. Sharing the roads with other vehicles, these feeder lines connect with the express system along the structural corridors."

However, a dilemma arose while trying to distinguish between the inner city passengers and the individuals connecting from the outlying neighborhoods. A two-fare system proved unfair to those having to make multiple stops and transitions before arriving to their final destination. This brought about the creation of a unified fare and the creation of 25 Bus transfer terminals, along with 221 pre-paid boarding Tube Stations throughout the city.

Each terminal, although placed in different locations along the express lanes, possesses the same characteristics. Intended to be immediately recognizable and emblems of permanence, the stations were also efficiently designed for convenience, reliability and to "improve bus operating speed." In order to accomplish this, a pre-boarding fare system needed to be implemented along with the transit hubs being elevated. This allowed the dwell time between platforms to reduce to "no more than 15 to 19 seconds" per stop

(one-eighth of its original time). The increase in ridership (75% of the 2.2 million inhabitants), was able to decongest the amount of traffic. Besides being able to accommodate “simultaneous loading and unloading,” these stops become heavily populated commercial and destination intersections.

For this reason, one should not only evaluate the qualities of the bus terminal, the surrounding economic development and its impact on the community should be taken into consideration as well. After all, investors are more likely to invest in bus corridors because of the public space and social conveniences it provides. For instance, the user-friendly amenities include newsstands, post offices, flower shops, and smaller retail facilities. The terminals, in actuality, eventually contributed to the renovation of the adjacent two blocks to become dense business sectors.

CHAPTER III CONTEXT

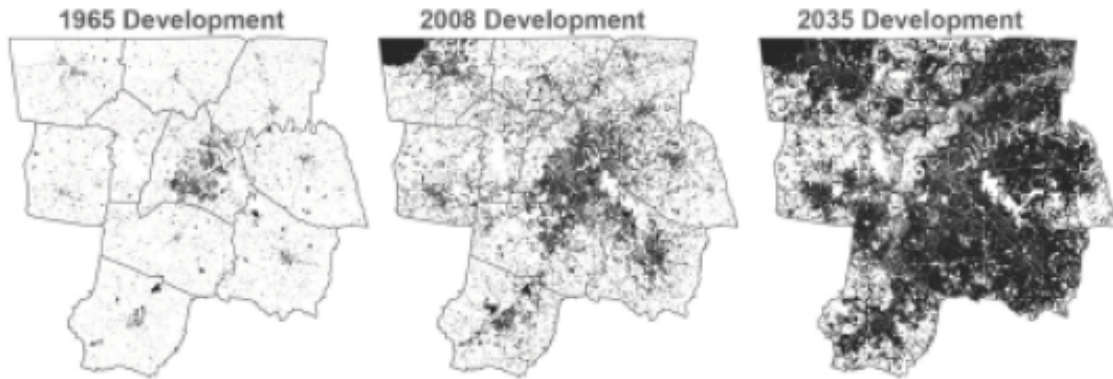


Figure 6. Past, Present and Forecasted Development Patterns. Source: Northeast Corridor Mobility Study

Nashville currently has a population of 1.8 million and is continuously growing. Because of this, the Northeast Corridor Mobility Study was conducted in order to find a feasible method for Nashville to expand in a positive and economical fashion.

“The Northeast Corridor stretches approximately 30 miles from downtown Nashville northeast to Gallatin, encompassing the cities of Hendersonville and Goodlettsville and surrounding unincorporated parts of Sumner County.”

Nashville Area: Metropolitan Planning Organization

Currently, the Metropolitan Transit Authority (MPO) is seeking other methods in which to reduce congestion and travel times for commuters. The increased transit services include the addition of the Music City Star (the express and inner-city bus system) and a commuter rail service from the city of Lebanon. Yet, the increased level of demand requires the MPO to seek additional alternatives.

Growth in the Northeast Corridor will continue to have a noticeable impact on accessibility and mobility for those who live, work and shop in the corridor. Efficient and well-planned transportation improvements in the study area can provide the region with the ability to leverage its strengths to attract and sustain a strong employment base. Additionally, growth in the corridor will have a direct impact on land uses and quality of life, which warrants the establishment of a preferred land use scenario to coincide with appropriate transportation improvements.

The study also recommended that in the long term, infrastructure and land use plans be structured to accommodate future high-capacity transit. This study addresses

similar issues in the Northeast Corridor, with increased emphasis on the relationships of land use and transportation alternatives.

The study concluded that the development of a Light Rail Transit System would need to be implemented in order for this scheme to become realized. However, since this is a long-term goal (estimated twenty-five year process), it would be recommended to initiate this process with a rapid bus system first. This way, the initial “build-up” of a mixed-use, pedestrian friendly community offering a wide variety of housing, retail and work oriented facilities, would already be under way. Having a development starting point would encourage more readily encourage investors to become involved. Therefore, this study aims at consolidating and outlying the necessary process to spur the already mapped out Northeast Corridor Mobility Study into action.

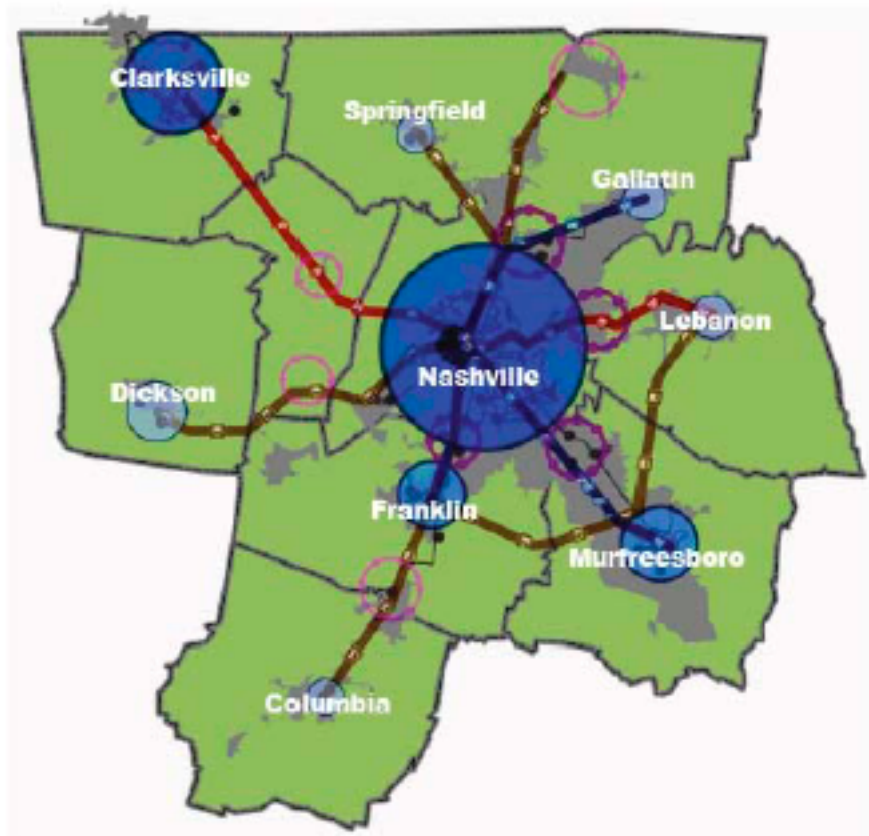


Figure 7. Proposal of Corridor Analysis. Source: Northeast Corridor Mobility Study.

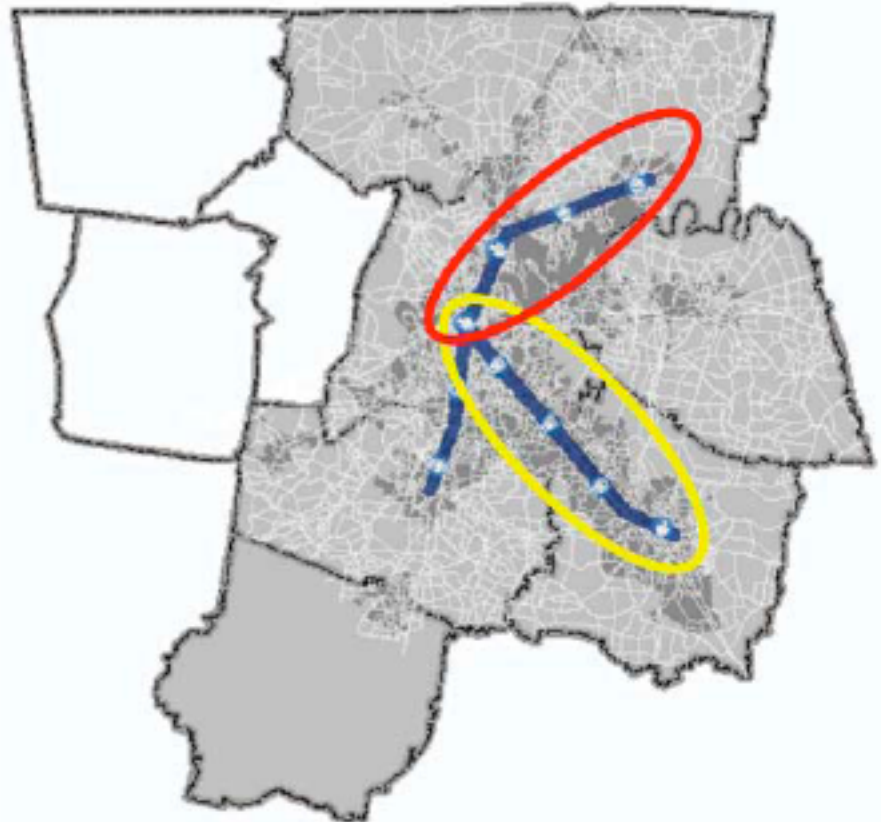


Figure 8. Northeast Corridor Mobility Study. Source: Northeast Corridor Mobility Study

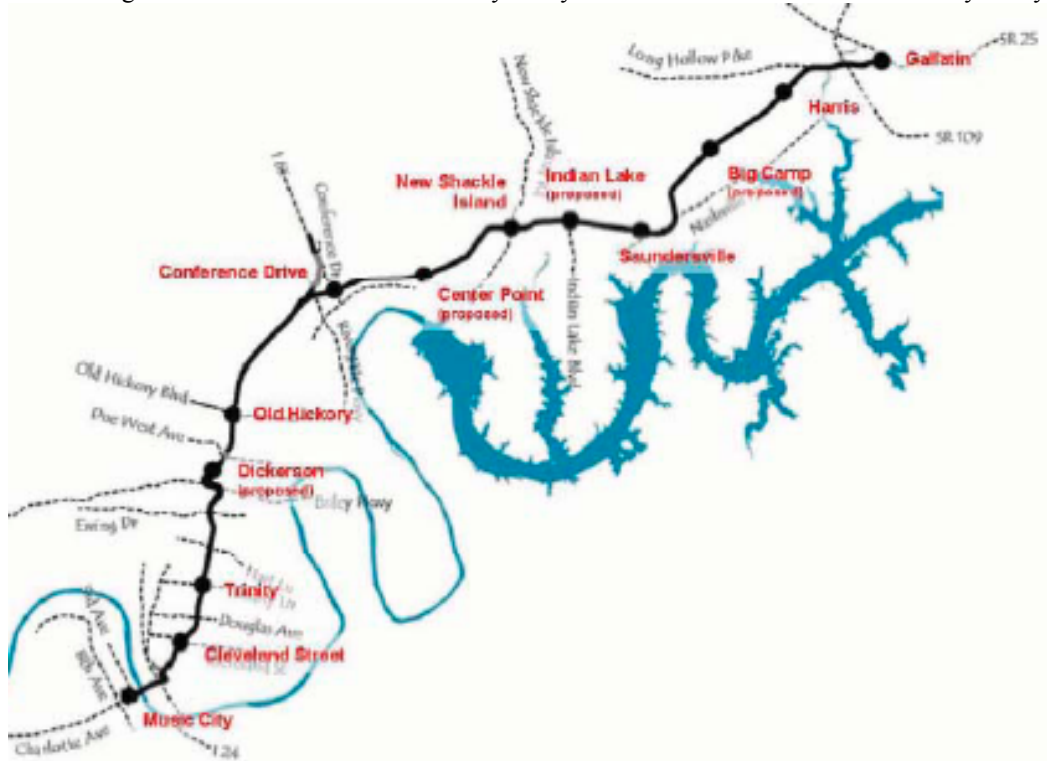


Figure 9. Potential Transit Station Locations Along Corridor. Source: Northeast Corridor Mobility Study.

- *How do various growth scenarios inform demand for specific land uses such as residential, office, commercial and retail?*
- *What mix of transportation investments will most effectively meet the demand resulting from potential growth scenarios?*
- *What is the most appropriate mix of future land uses in the study area that encourage (and maximize the use of) specific transportation modes like bus rapid transit or commuter rail?*
- *What potential benefits and costs are there to local, state, and federal governmental entities including transit service providers?*
- *What are the fundamental economic connections among, and associated advantages of, land use planning, real estate development and various transportation-related initiatives such as joint development, transit-oriented development (TOD), transit-adjacent development (TAD), and other mechanisms?*

Goal 1: Improve access and mobility within the study area through identifying mobility solutions and providing alternative transportation options along the corridor.

Goal 2: Ensure adequate service is offered to Accommodate zero-car households and other transit dependent populations.

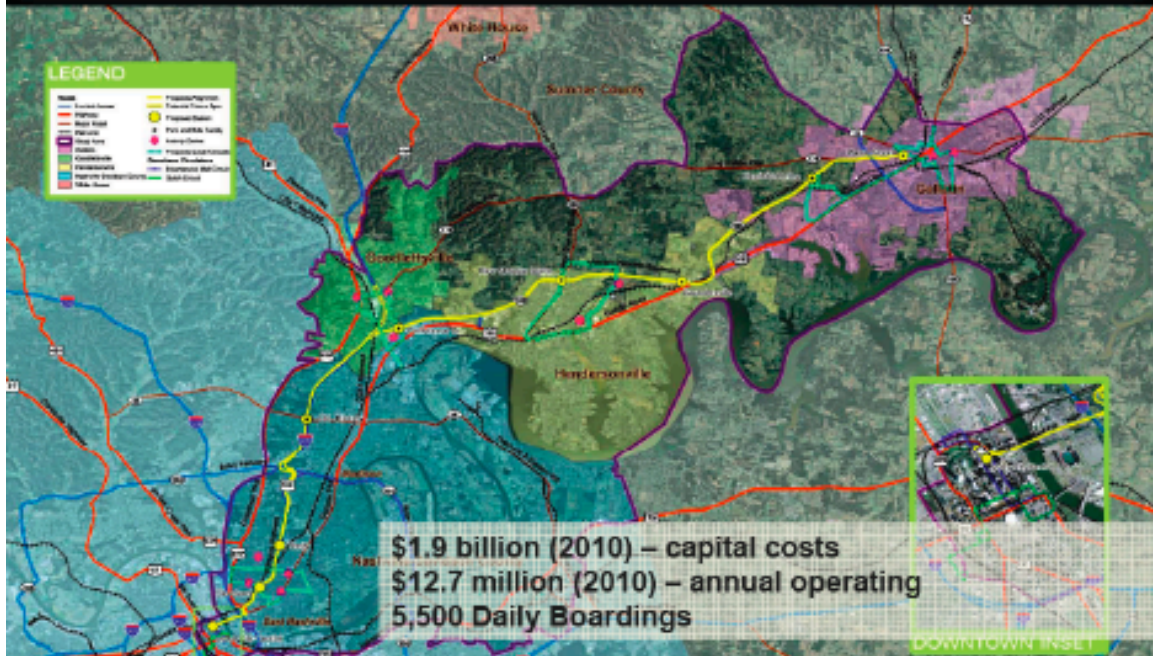
Goal 3: Promote environmental sustainability through appropriate development patterns while integrating transportation and land use to reduce auto and truck trips. Additionally, attempt to reduce pollutant emissions to minimize impact on attainment status.

Goal 4: Steward transportation funds to incorporate market and economic analysis for a realistic plan, determine development potential, and recommend incentives for desired development patterns.

Goal 5: Improve safety and security in the corridor while considering the transit/pedestrian/auto interface.

Nashville Area: Metropolitan Planning Organization

Light Rail Transit Alternative



Bus Rapid Transit Alternative

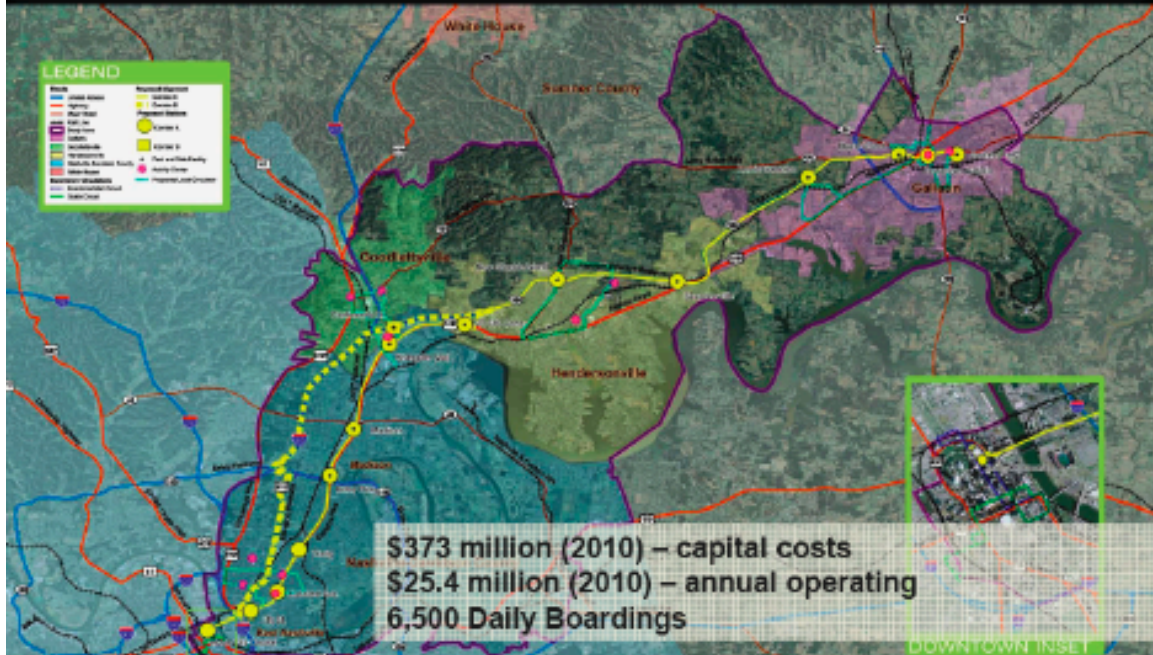


Figure 10. Transit Alternatives. Source: Northeast Corridor Mobility Study.

Site Location

Sumner County and the city of Gallatin have in recent years become major employment centers. Growth along the Northeast Corridor (especially Ellington Parkway) would demonstrate a desirable land use scenario while increasing land value, land use, and quality of life. The intersection of Trinity Lane would noticeably be altered. Trinity Lane is the first noticeable projected stop and is at the moment under utilized. Although its location is not even midway between the downtown area and Gallatin district, its expected new development would directly influence both of these sectors. For instance, the easy accessibility and mobility would support individuals seeking closer accommodations to their jobs. In an ideal situation, Trinity Lane could become a sustainable, live-work, environment but it would also be capable of inhabiting commuters. In this instance, mass transit could be utilized to control congestion and the number of transit-dependent citizens.

The addition of the rapid bus and/or light rail system would not only provide support for those dependent on transit, it would also encourage individuals to try other forms of transportation as well. As of 2006, 54 percent using public transit have no other means to get to work. However, the aim of extending the transit line along the Ellington Parkway would be to increase ridership overall. The study area is capable of handling the increased population while supplying a viable location for future employment.

The increase in public transit ridership would have positive impacts on congestion and mobility by serving as a bypass. Much of traffic would be pulled away from already heavily crowded zones (such as predominant crossing points over the Cumberland River) and redistribute capacity along the newly developed corridor. The 2035 Regional Transportation Plan is under the impression that traffic along Dickerson Pike would also be influenced and benefit.



Figure 11. Intersection of Ellington Parkway and Trinity Station

Site Parameters

The Nashville Metropolitan Planning Organization identified various options and were then narrowed down to three for a more detailed analysis:

- #1 - Commuter Rail along the CSX Corridor
- #2 – Light Rail Transit along Ellington Parkway/SR-386 Corridor
- #3 – Bus Rapid Transit along the Gallatin Pike (US – 31E) Corridor

Following an in-depth analysis, of the three build alternatives, the Commuter Rail would not be a beneficial solution because of its projected low level of riders. Therefore, this option will not be further examined.

While the Light Rail Transit would require the highest cost, it would inevitably gain the highest amount of ridership. And in the long run, long-term benefits would justify the initial development costs. LRT is also capable of capitalizing on a local and regional identity. On the other, Bus Rapid Transit is predicted to only draw 84 percent of the LRT capacity, but its operating cost would only be half. All in all, the additional transit along the corridor (in any shape or form) will attract more investors and improve facilities within the area. Foreseeable, this could be a very work-related environment. Therefore, it is for this reason that the long-term (LRT) and short-term (BRT) are being formulated in this scheme from downtown Nashville all the way to Gallatin.

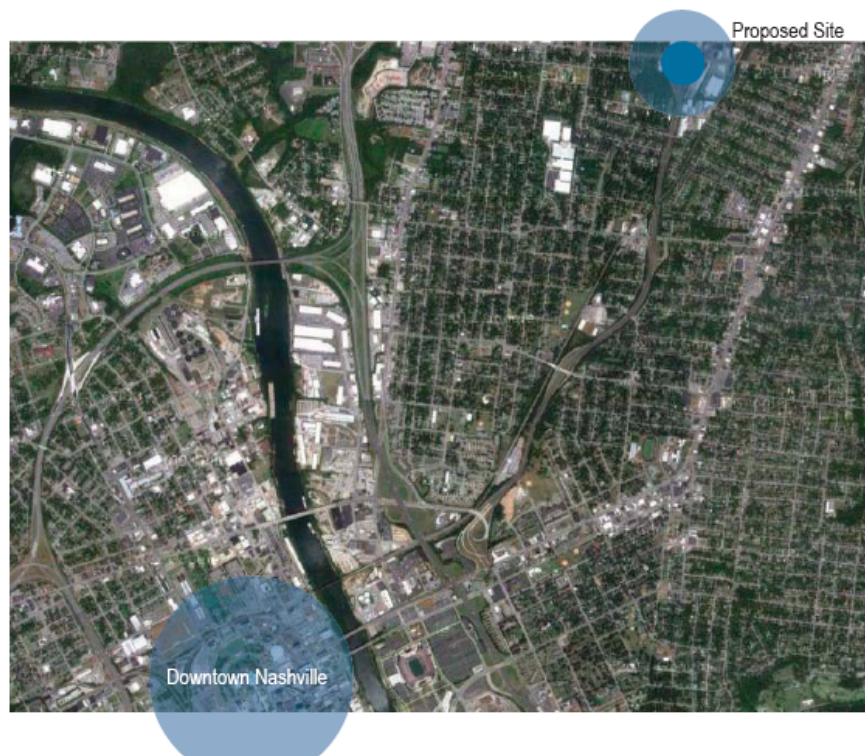


Figure 12. Site Proximity to Downtown Nashville

Trinity Station

The initial development will follow a strategic outline that emphasizes where transit centers need to be established and what kind of building programs will occur within a 2,000 feet diameter. As a premise, it adopts medium densities (12-18 dwelling units per acre), mixed-uses (day care, convenience retail, office, work/live, etc.) mixed types and prices of housing (including affordable), and reduced parking requirements (1.2 spaces per unit, plus park and ride accommodation). The intent is to produce a walk-able, pedestrian friendly environment, where the design of high quality public space is prioritized.

The virtues of transit-oriented development are that it enhances quality of life for its residents, improves public health by virtue of encouraging walking rather than driving, leads to economic development, contributes to community character through the design of public space, is inherently environmentally sustainable, and increases transit ridership.

As suggested by the Nashville Area Metropolitan Planning Organization (MPO) and Regional Transit Authority (RTA), a potential transit station stop is proposed at the intersection of Ellington Parkway and Trinity Lane, in Nashville TN. The selected site is also capable of being an extension of the existing Music City Star commuter rail transit system. However, because the existing zoning on the site pre-dates the presence of a mass transit stop, zoning, parking requirements and building codes will be modified to maximize the transit-oriented development’s unique potential. Therefore, a knowing advocacy for variances of the existing legal parameters may be made to enhance the density of conventional development and will be consistent with “national best practices.”

	Generic TOD Density Goal	Station Specific TOD Scenario	Existing Standards
Residential Density (units/acre)	15-20 units/acre minimum (net)	15-75 units/acre 35 units/acre (net) average	15 units/acre maximum
Non-Residential Density (FAR)	.50-.75 FAR minimum (net)	.25-.40 FAR .30 FAR (net) average	1.0 FAR maximum

Table 3. Density Standards. Source: Northeast Corridor Mobility Study.

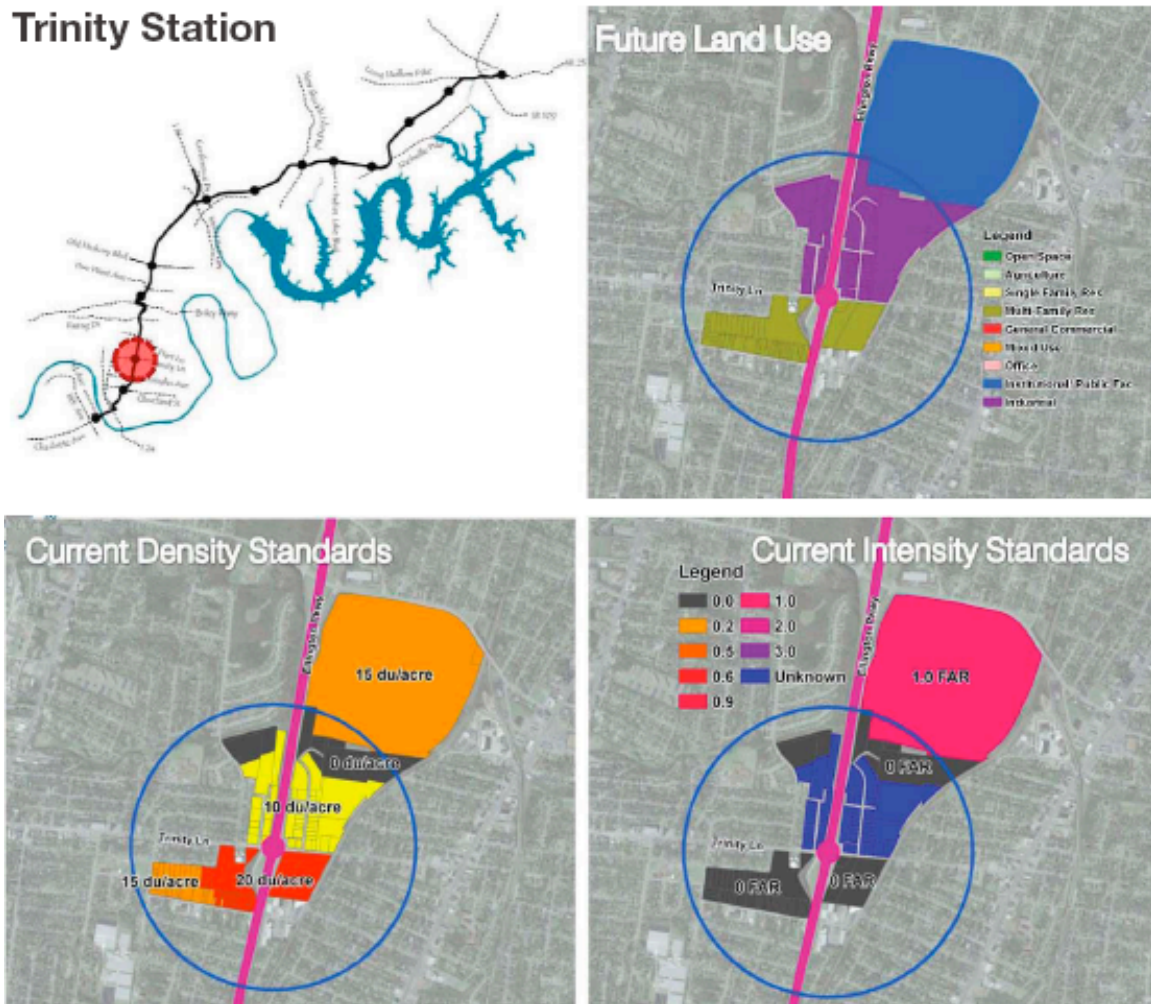


Figure 13. Trinity Station Parameters. Source: Northeast Corridor Mobility Study.

In addition, with restraint and considerable discretion, the project proposal can acquire for demolition non-residential structures that are dilapidated, under utilized, or inappropriate as uses within the half-mile radius of the transit stop. Acquisition of existing residential structures to enable new development should be held to an absolute minimum.

Transit-oriented development is inherently a public-private partnership, simply by virtue of the public sector's investment in mass transit infrastructure that determines TOD's location. Recommendations regarding public-private partnerships that can provide financial incentives to achieve the benefits of TOD should also be made. A theoretical financial analysis can be utilized to determine the economic benefits provided by medium density development of mixed-use TOD. It will also allow one to calculate and provide public-private partnership incentives for viable, high quality, and innovative

development.

The project will be drawn to depict full build-out, but will be conceived and diagrammatically represented as three logical phases of development.

Current Site Conditions

“The growth experienced in the Nashville region over the last several decades has resulted in the conversion of large swaths of previously undeveloped land into low-density automobile oriented development. There are many disadvantages to this pattern of development, including diminished agricultural lands and open space opportunities, encroachment upon critical ecologies and habitats, increased congestion and commuting time, and physically inactive populations. Furthermore, such low density development is costly to the public by increasing demand for the expansion and maintenance of inefficient infrastructure systems. “

Nashville Area: Metropolitan Planning Organization

The rapid population growth naturally led to a household expansion as well (more than 9,400 housing units within 7 years). The majority of the character along Ellington Parkway is made up of single-family, detached, multi-family units (59 percent). Built in a compact fashion. However, the predominant condition of these homes around the Trinity Lane Intersection are in desperate need of repair.

One must also take into account that while the percentage of commercial, office and/or industrial land use is low in comparison to the residential development (14 percent), it has however steadily been increasing. This might have something to do with its close proximity to the interstate and other arterial road networks. These commercial areas have continuously spread beside the transportation corridors. It should also be noted that there are currently mixed used developments occurring nearby. In the long run, this type of retail and housing competition will aid in the redevelopment of Ellington Parkway. An additional 23 percent of the total land use is made up of vacant land. Yet, the majority of this is not occurring along the transit corridor but are still capable of fulfilling needed infill and can support the redevelopment of existing commercial centers that are failing.

CHAPTER IV DESIGN AND IMPLIMENTATION

The analysis conducted by the Nashville Metropolitan Planning Organization (MPO) was considered as a clear and defined set of constraints. However, MPO established these parameters primarily from an economic standpoint. Yet, by incorporating a lower density standard, the new Transit Oriented Development becomes a more enjoyable and livable condition that can effortlessly acclimate to the surrounding conditions.



Figure 14. Existing Density

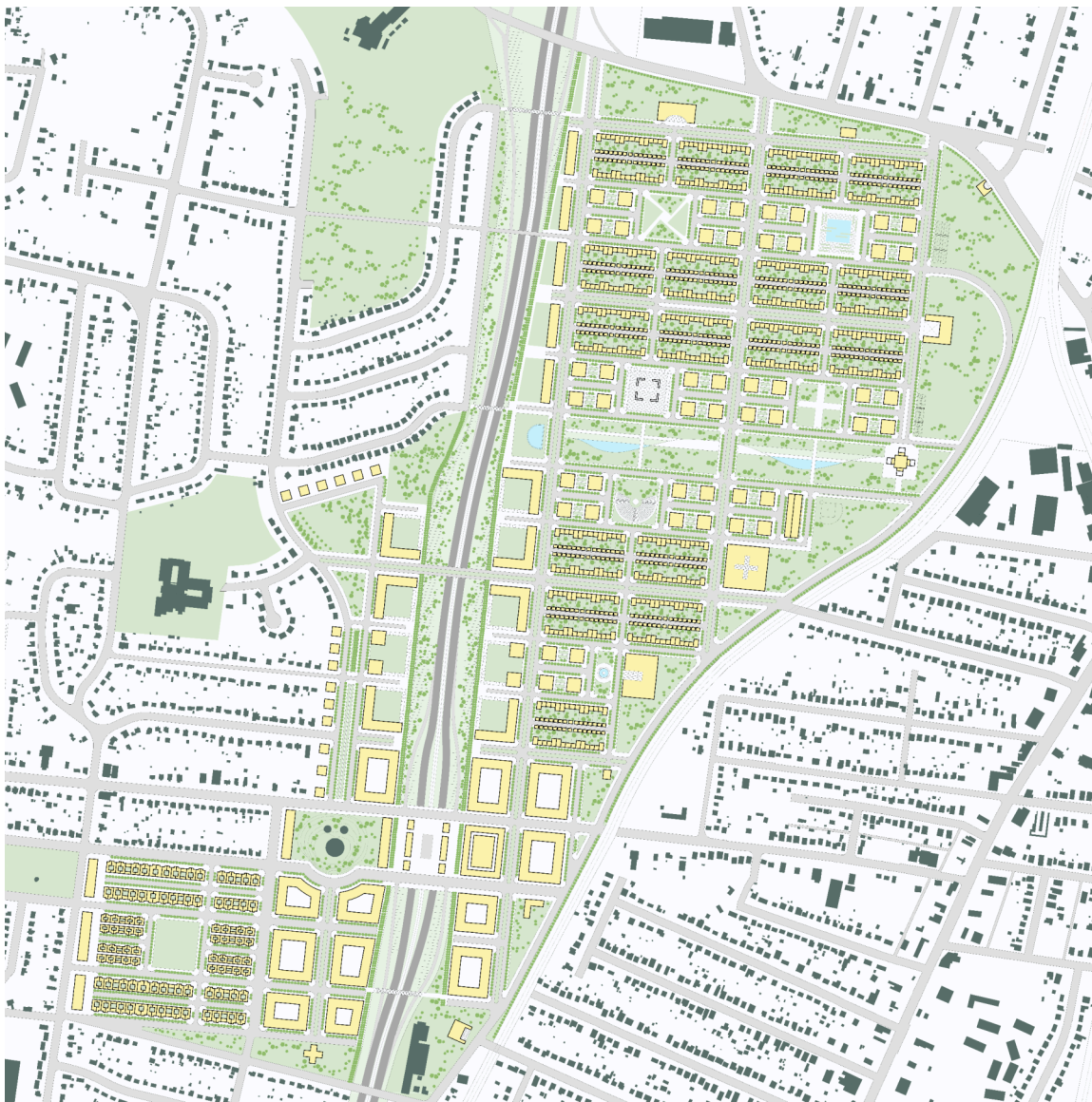


Figure 15. Proposed TOD Development



Figure 16. Developmental Growth Phases



Figure 17. Potential Growth Activated by Transit Station



Figure 18. Location of Block Study

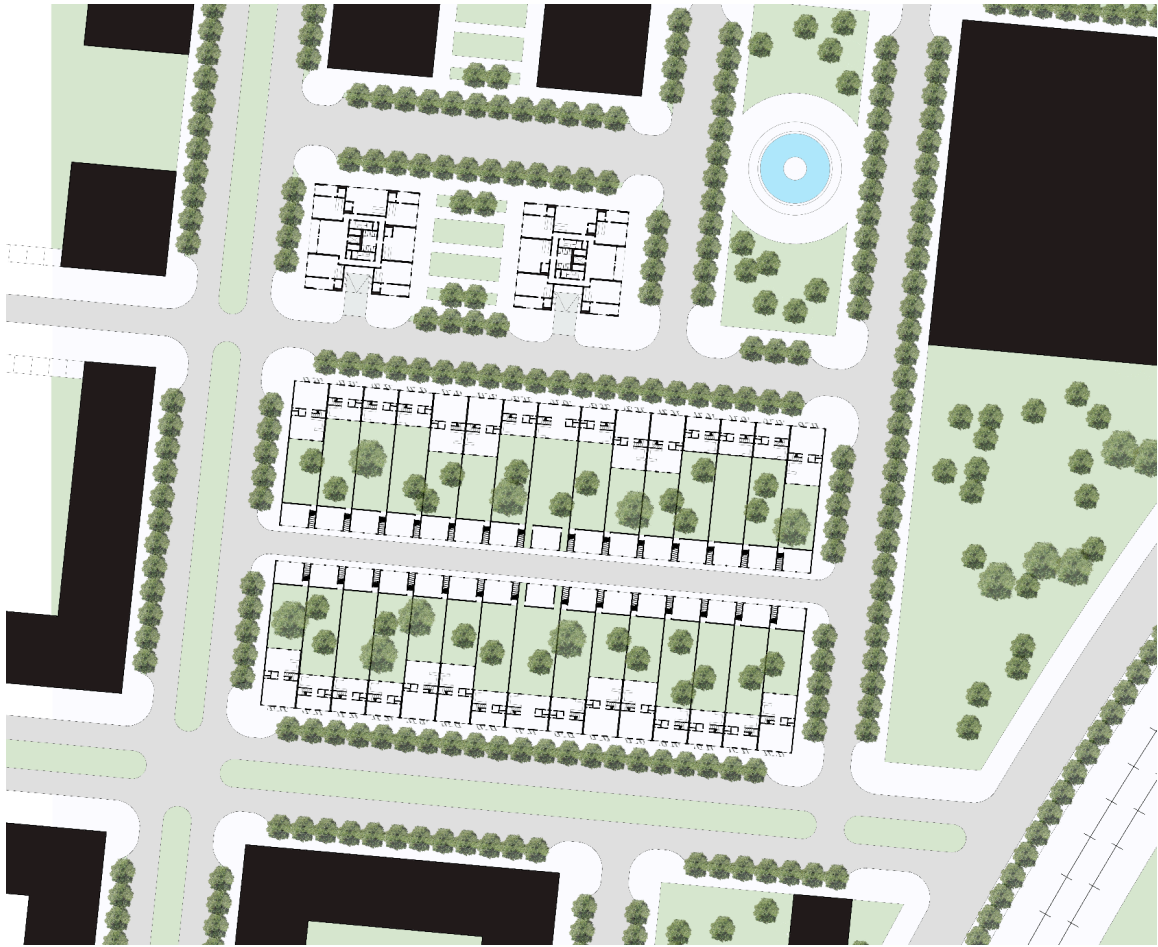


Figure 19. Savannah Modeled Block Condition



Figure 20. Potential Section through Rowhouse Block and Public Square Condition

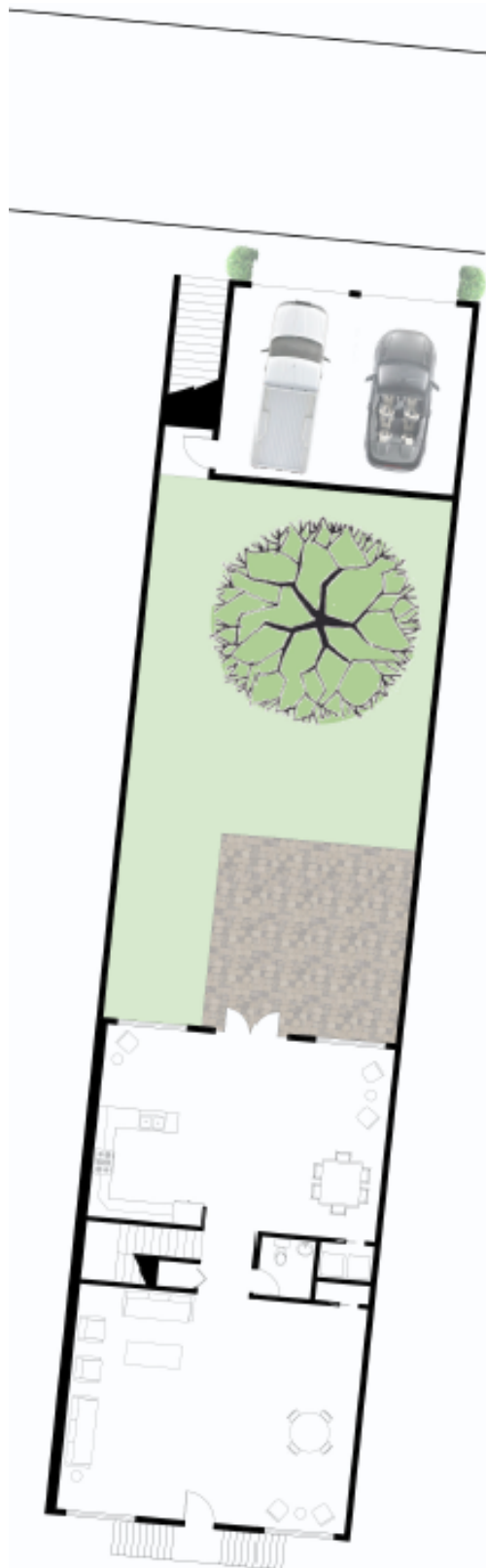


Figure 21. Possible Rowhouse and Granny Flat Option (First Floor)

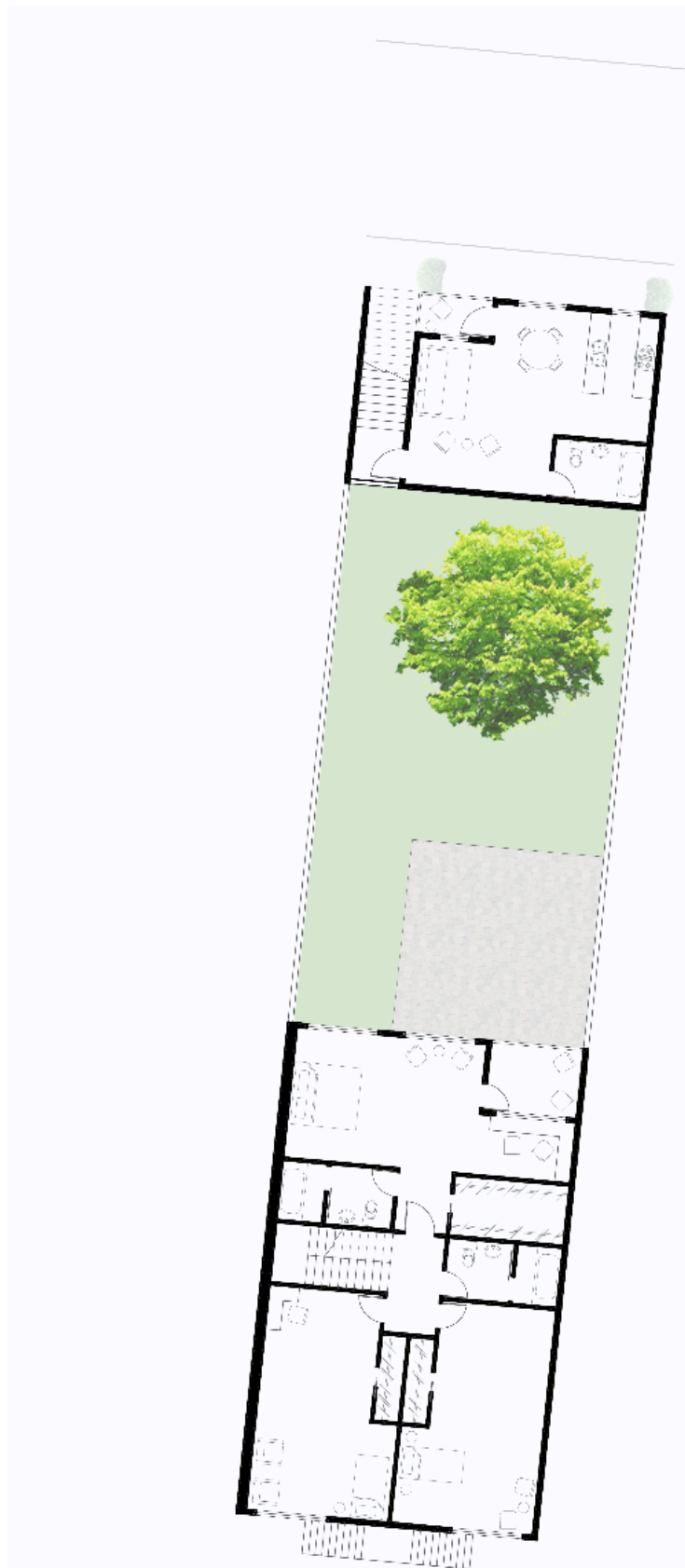


Figure 22. Possible Rowhouse and Granny Flat Option (Second Floor)



Figure 23. Potential Variation in Rowhouse Facade

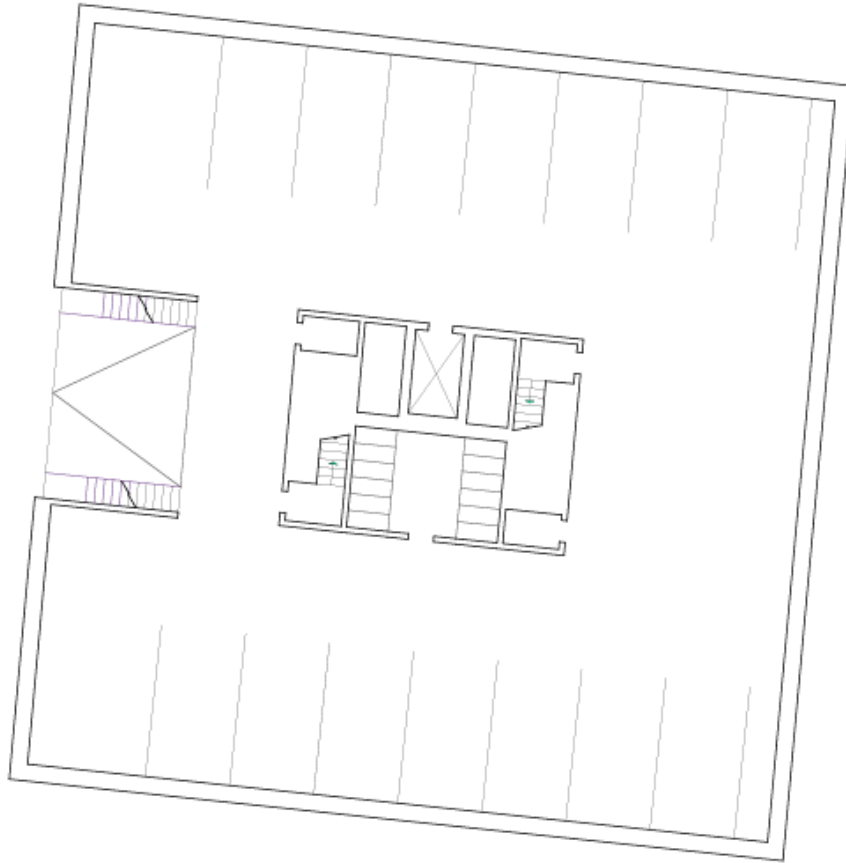


Figure 24. Urban Villa: Parking Garage



Figure 25. Urban Villa: Typical Floor Plan

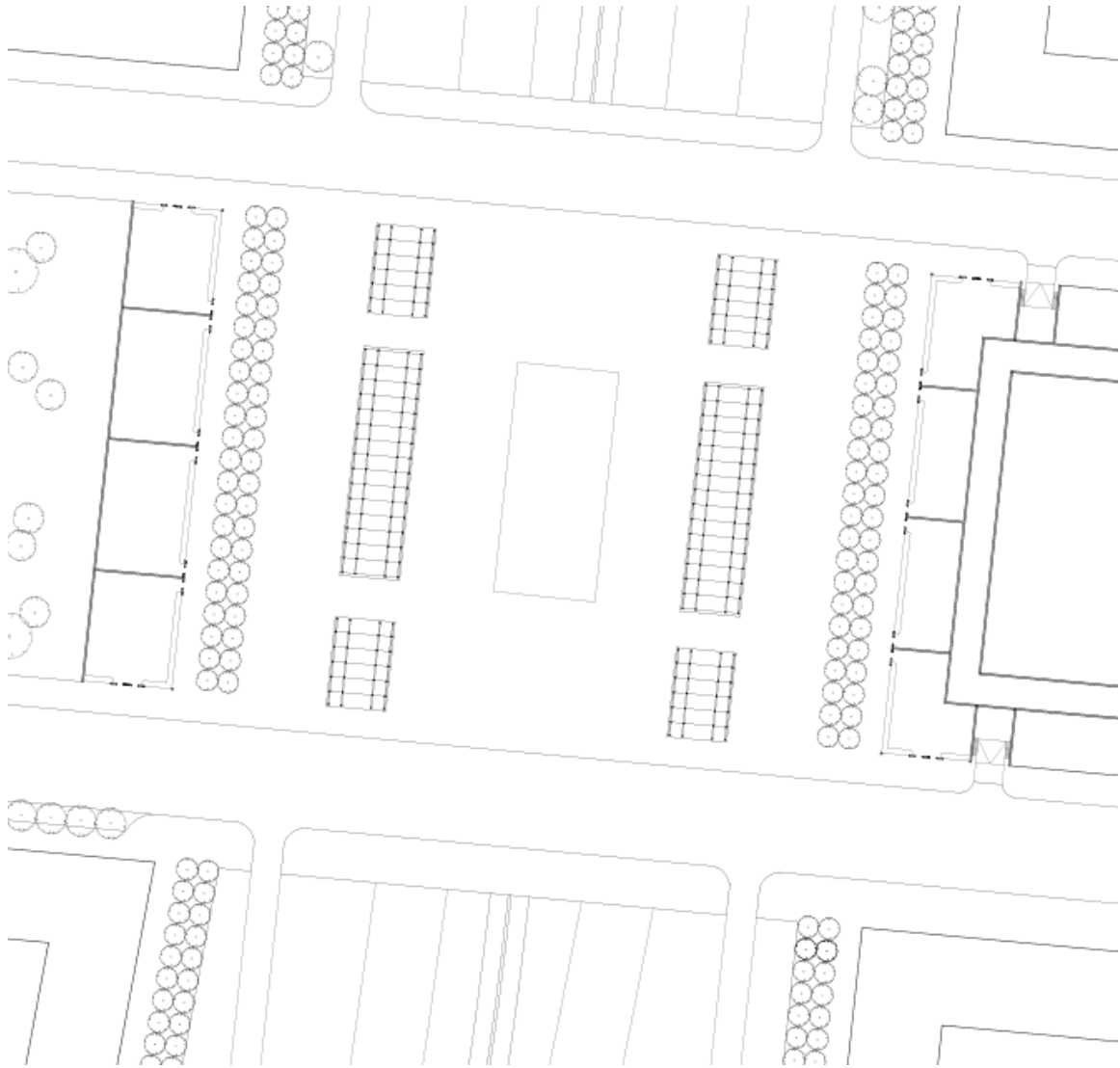


Figure 26. Trinity Station Platform

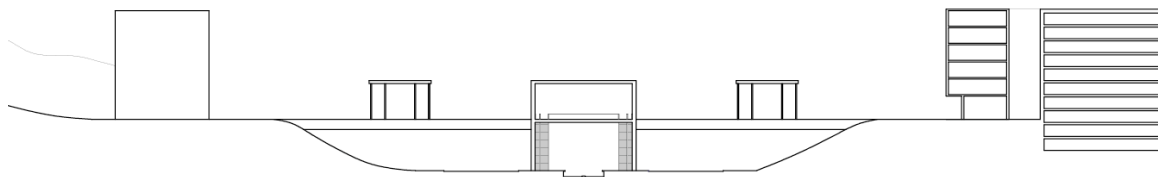


Figure 27. Section through Trinity Station



Figure 28. View from Walkway along Transit Corridor

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Vita

Erin Ashley Gray spent the majority of her childhood on a military base in Germany. Her experiences abroad instilled a desire in architectural history and style. After graduating from the University of Tennessee, Knoxville in Architecture, she was encouraged by her professors to also pursue a Master's degree in Urban Planning.