

THE CONNECTIONS BETWEEN LYNCH'S FOUR METHODS OF INCREASING
ADAPTABILITY AND FORT WORTH'S URBAN VILLAGES PROGRAM

by

CHIYANG XU

Presented to the Faculty of the Graduate School of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

MASTER OF LANDSCAPE ARCHITECTURE

THE UNIVERSITY OF TEXAS AT ARLINGTON

August 2014

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Acknowledgements

I would like to take this opportunity to thank all the people that played a critical role in the writing of this thesis. First, I would like to thank my co-chairs Dr. Pat D. Taylor and Professor James Richards. Without the support and advice from my co-chairs, I could not have finished this thesis. I want to give my special gratitude to my committee members, Dr. Pat D. Taylor, Professor James Richards, and Dr. Taner R. Ozdil, for pushing me to the end and offering solutions to guide me to complete my thesis. In addition, I gratefully thank Professor James Richards and Dr. Taner R. Ozdil for connecting me with knowledgeable respondents. I give thanks to all of the respondents who spent their valuable time with me to complete my data collection for this research.

My thanks also go to my editor, Joshua Atherton, who spent hours with me every week to rewrite my written English. I also would like to thank the inspiration provided by Lynch's *Good City Form*, which set this research in motion.

At last, I would like to extend my thanks for my parents' everlasting support. My parents provided financial and mental support though these years of studying abroad. I appreciate my little sister who joined my family when I could not be there with my parents. Finally, I would like to thank all of my friends who supported and encouraged me to complete the research. Special thanks to my girlfriend Linjun Yuan, who took care of me when I was ill.

May 12, 2014

Abstract

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Chiyang Xu

The University of Texas at Arlington, 2014

Supervising Professor: Pat D. Taylor; James P. Richards

The purpose of this thesis is to identify the relationship between Lynch's (1981) four methods of increasing adaptability and the planned changes in city form of Fort Worth's Urban Villages program. The four methods of increasing adaptability, based on the theory that deals with human values and settlement forms, were first described by Lynch (1981). According to Lynch, the four methods of increasing adaptability are improved access, reduced interference between parts, use of standardized units, and excess capacity. By manipulating these four methods of increasing adaptability, planners and landscape architects can increase the adaptability of city form, which can in turn help them successfully implement the master plan of the cities they develop. This study reviews how these four methods of increasing adaptability were manipulated to support the planned changes in city form of Fort Worth's Urban Village program. The goal of this research is achieved by using maps analysis and interviewing key informants. The results of this study provide future planners with a more complete understanding of how to increase adaptability between the master plan and changes in city form.

Because city form can be manipulated and rebuilt based on changing circumstances, this thesis studies the planned changes in city form that were envisioned

in the unique master plans of the Urban Villages, especially as these changes relate to the four methods of increasing adaptability described by Lynch (1981). In addition, the interviews discover the relationship between Lynch's four methods of adaptability of city form (1981) and Fort Worth Urban village Program from the view point of selected key informants.

This study is done in three steps. In the first step, four of Fort Worth's urban villages are selected as study sites. The four selected urban villages exhibit the majority of the different possible site conditions of the sixteen urban villages. In the second step, the maps from the urban villages' master plans of these four selected sites are compared with the maps and data of these same sites from immediately before the urban village program began. These morphological, land-use, and transportation maps and data are studied to identify planned changes in city form to these four selected sites and how these changes relate to Lynch's four methods. In the third step, key informants are interviewed to identify how Lynch's four methods of increasing adaptability were manipulated to support the planned changes in city form generated by these same urban villages. The data of interviews' transcription analyzed using Taylor and Bogden's (1998) analysis theory.

The results of this research are used to identify how the four methods of increasing adaptability support the planned changes in city form of Fort Worth's Urban Village program. This research also helps urban designers better manipulate the four methods of increasing adaptability to design new cities or redevelop existing cities. Finally, this research initiates a corpus of data on city form change, especially in relation to the four methods of increasing adaptability, which can provide city planners and landscape architects avenues for future research.

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Chapter 1

Introduction

This thesis focuses on observing the four methods of increasing adaptability of city form, and how these methods support changes in city form. This research focuses on Fort Worth's Urban Villages program areas because these areas were identified by Fort Worth as being ripe for redevelopment (2013 Comprehensive Plan, 2013). In addition, each of the sixteen areas selected by Fort Worth for the Urban Village program has a vision for their future development as seen in their master plan documents. Because the Urban Villages program has sixteen areas to develop, the researcher has a wide variety of sites from which to select. In this thesis, the master plan documents of the selected Urban Village areas are studied and compared with the maps of these same areas from immediately before the Urban Villages program began. The interviews complete data collection from a different view point. The key informants provide their understanding about how Lynch's four methods supported Fort Worth Urban Villages program. The results of map and interview data analysis focus on the four methods of increasing adaptability of city form, and how these methods were manipulated to support the planned changes in city form of the selected Fort Worth's urban village areas.

1.1. Problem Statement

Landscape Architecture is a profession that provides a design for a site following their clients' requirements. In other words, landscape architects provide a future vision for the development of a site. This vision adapts the current site to the development plan (Professional Licensure: Definition of Landscape Architectural Practice, ASLA, 2002). Adaptability of city form is what landscape architects analyze, modify, and use in every design process. Better adaptability means that a city form can fit its future development more easily. The adaptability of city form plays an important role in the landscape

architecture design process. However, the adaptability of city form has rarely been analyzed carefully because doing so is complicated (Lynch, 1981).

There is an inherent conflict between the adaptability and stability of a place. A totally adaptable environment, in which people could surround themselves instantly and without effort with the setting of his or her choice, would be a fairy-tale nightmare. Place would be meaningless and the pattern of life would dissolve in conflict and chaos. However, a totally stable place would be boring and could not fit with the development needs of the city. The characteristics of adaptability of city form must deal with these tensions between adaptability and stability (Lynch 1981 p. 175).

According to Lynch (1981 p. 175), people often perceive things around them as unchanging and stable until something dramatic changes in their environment. However, Lynch believes people can be trained to use the adaptability of their environment to increase their comfort with it. The built construction always holds more stability than adaptability, but when a city is developed, its city form needs more adaptability than stability, meaning developers must identify strategies to increase adaptability. Lynch (1981) discusses four methods of increasing adaptability of city form that can be modified to increase adaptability: providing excess capacity; providing improved access; reducing interference between parts; and using consistent and repeated units. These methods concern settlement form, activity patterns, and how form and activity are managed. However, although these methods are clearly interrelated, Lynch discusses and analyzes them independently. Therefore, to better understand these four methods of increasing adaptability of city form, they need to be observed and analyzed together at a specific site. After this analysis, strategies to modify the four methods of increasing adaptability of city form could be identified.

In addition, according to Lynch (1981), when developing a city, building a new structure at a new location or completely rebuilding an old historical site is often seen as being easier than adapting the old structures to newly desired functions. The new

structure may be functional, but the rebuilt place becomes disconnected from its history, meaning it is stripped of its value and heritage. Thus, he suggests that more adaptability of city form is better. However, while previous research focuses on the physical city form and the human value behind it, little previous research integrates the shift of city form with ways to increase the adaptability of city form. Because city form has the ability to be adapted to new functions without compromising its value and heritage, this current research studies the four methods of increasing adaptability of city form and how they can be manipulated to support changes in city form.

1.1.1. The Importance of Adaptability for City Planning and Development

It is important to provide adaptability of city form to address predictable and unforeseen changes over time. Adaptability means the ability of a place to be easily modified to some future planned changes in function (Lynch 1984, p167). It means that a city form with increased adaptability can more easily accommodate future development. It also means the city can more easily achieve its development form, following changes in function and human behavior.

During the past several decades, urban sprawl in the United States has overtaken billions of square feet of land in order to create space for Americans to enjoy a low density city form. Urban sprawl has consumed much of the natural environment during the urban expansion process. According to Nelson (2002) "We have about 110 million housing units and, by my reckoning, about 22.2 billion square feet of office space, 16.5 billion square feet of retail space, 7.7 billion square feet of warehouse space and 14.8 billion square feet of manufacturing space. Nearly half of this development is more than forty years old. Much of it will be replaced over the next generation" (Nelson 2002, p. 83). However, the urban sprawl development has caused several problems, like traffic jams, air pollution, losing the feeling of community, and the huge cost of infrastructure

(Squires 2002). In addition, “The land that is used needs to be adapted to constantly changing demands. Yet our planning system is unresponsive and slow. People have moved out of cities to seek a better life in suburbs, creating urban sprawl (Reeds 2011, p. 123).” The old process of development is no longer suitable for development in the United States (Reeds 2011). It is time to find a new city form that matches people’s behavior and the city’s functions, and adapt this new city form to the current cities.

There are several city development solutions that have been examined, and some of these have proven to be successful. These successful development theories point to the same direction of building a more compact, sustainable, human scaled, and environmental friendly city form. All of these theories are imagining a city form with a higher density community, pedestrian-friendly environment, mixed-use or multi-use central area, and protected natural resources. Realizing these visions requires adapting the existing city form to a new one with a limited cost.

By increasing adaptability of city form, it is easier to make new development fit to the development plan, lower the cost of construction, protect the historical structures, and prepare for future change.

1.1.2. Lynch’s Four Methods that Increase Adaptability of City Form

According to Lynch (1981), there are four methods to increase the adaptability of city form. These four methods are providing excess capacity, improving access, reducing the interferences between parts, and using consistent and repeated units. According to Lynch, “Some of these methods are a matter of settlement form, others of activity pattern, and others have to do with how form and activity are managed” (p. 176).

The first method identified by Lynch (1981) to increase the adaptability of city form is to provide excess capacity. This means the city’s development plan should provide an extra volume of space for the future development of city form. This extra

space could be identified, for example, as the empty space between buildings that might be large enough to fit in another building, or a broad highway that could manage predicted future heavy traffic that is not present at the time it is built. In this thesis, these types of areas are identified by comparing morphological maps from two time periods. The first set of maps is the Urban Village master plans from four selected sites. The second set of maps is the same four sites from immediately before the Urban Village program began.

The second method identified in Lynch's (1981) book is to improve access. Improved access means the ability to reach city resources by multiple means of transportation. Improved access also means the ability for people to conveniently change their activities and quickly obtain necessary resources. Improved access is identified in this research by the study of the streetscape, city resource development and the means of transportation used in the four selected Fort Worth Urban Villages.

The third method identified in Lynch's (1981) book, *Good City Form*, is to reduce the interference between parts. Reduced interference means that when one part of the city has to make a particular change, other parts of the city do not also have to change. At the city scale, reducing the interference between parts does not mean separating all districts by use of a clear edge. Instead, reduced interference means that a flexible and merged edge area is the better way to make city form more adaptable. In this thesis, reduced interference is studied by analyzing the edge condition of land use maps in four selected Fort Worth Urban Villages.

The fourth method identified in Lynch's (1981) book is to use consistent and repeated units when accommodating diverse functions. It means using the least numbers of forms, building styles, zoning codes to achieve the most number of functions. This refers to standardizing common elements of construction such as streetscape design,

designing evenly sized street blocks, and using the same materials for paving or building. Using consistent units creates a common language with which to speak when developing the parts of a city. By doing so, the elements of the developing areas are more easily connected and patterned. In this thesis, the use of consistent and repeated units is identified by studying the zoning code, streetscape, and building foot prints of four selected sites.

Lynch (1981) clearly describes each method and provides several examples of how they are manifested in city design. However, the four methods of increasing adaptability are difficult to measure by themselves. Therefore, because all four methods are related to the specific elements of city form discussed above, this thesis will study changes in these specific elements to identify how the four methods of increasing adaptability can be manipulated to support development.

1.1.3. Why Choose Fort Worth's Urban Village Program

In 2002, Fort Worth began the Urban Village program (Urban Village Development Program Brochure 2006). The goal of Fort Worth's Urban Village program was to create sixteen urban villages to revitalize the city planning goal. These urban villages were envisioned to contain a concentration of jobs, housing, entertainment, public spaces, civic buildings, public transportation stops, and pedestrian activity (2013 Comprehensive Plan). The City of Fort Worth created a unique master plan for each of these sixteen urban villages.

There are a great number of people flooding into the North Texas area, and the current infrastructure of this area can't support this population growth (Vision North Texas 2010). Satellite cities share population pressure with central cities, and control the expansion of the metropolis (Howard 1898). But, in last century, the growth of suburban cities in United States of American did not provide the social function as satellite cities.

Suburban cities did not control the expansion of central city, but increase it. The urban sprawl caused traffic congestion, and low quality of urban life (Grant 2006).

The urban neighborhoods that are close to downtowns are supporting more people outside the downtown areas. In addition, these areas around downtowns are the major residential areas that contain the majority of the population. These areas could offer jobs and shopping opportunities, and many of areas have been developed to support people to live independently. Some of these areas no longer need the support of their nearby and older downtown areas. These independent areas away from downtown traffic, known as urban villages, have their own strong communities with living, shopping, and working centers (The Urban Village Institute 2008). Urban villages offer a means to live in a walkable urban area apart from the population, traffic, and job stress that mark most downtowns.

There are different standards to evaluate the livability of cities; however, they all include an environment that is pedestrian friendly, has convenient access to places to play, live, and work, abundant natural resources, and multiple modes of transportation for all people and their activities (Buchwald 2003). These qualities are the major value of urban villages. Successful urban villages provide these qualities of city living to people. These are the qualities of city life that single-use development does not provide.

Urban villages are compact, dense, self-sustaining, walkable communities with a strong residential component. They have a central mixed-use area surrounded with a high density of residential development. They have compact development in which people can live, work, and be entertained all within walking distance of each other (The Urban Village Institute 2008). Urban villages are a suitable city form to limit endless urban expansion, strengthen the local community, and raise the quality of urban life.

1.2. Research Objectives

The objective of this research is to observe how the four methods of increasing adaptability identified by Lynch (1981) supported the changes in city form in four of Fort Worth's Urban Village areas. The specific objectives of this research are:

- To identify the methods of increasing adaptability used in Fort Worth's Urban Villages development master plan documents;
- To determine how the methods of increasing adaptability were manipulated to support changes in city form in Fort Worth's Urban Village program's master plan documents.

1.3. Research Questions

The research questions are the direction and the focus of this thesis. The questions explored in this thesis are:

- Which methods of increasing adaptability are used in Fort Worth's Urban Villages program development master plan documents?
- How do the four methods of increasing adaptability support changes in city form in Fort Worth's Urban Villages development master plan documents?
- How do these methods of increasing adaptability support changes in city form in Fort Worth's Urban Villages development master plan documents from the view of landscape architects and planners?

1.4. Research Methods

This thesis uses both qualitative and quantitative methods to answer its research questions (Taylor and Bogden 1998). Urban Village maps and documents are collected from Fort Worth's Planning and Development Department, North Central Texas Council of Governments (NCTCOG) and Google Earth. The maps and documents focus on urban morphology change, land use change, and transportation improvements. Interviews are

done with key informants from Fort Worth's Planning and Development Department, and others who have specific knowledge about the development of Fort Worth's urban villages. The interviews help to clarify which methods of increasing adaptability were used during the development of the Urban Village program, and how they were manipulated.

Four methods of increasing adaptability of city form are carefully examined Fort Worth's Urban Village program. The first method is providing excess capacity, which is observed by studying the four selected sites' morphology. The second method is improving access, which is observed by studying the increased city source and improved transportation system in Fort Worth's urban villages' master plan documents. The third method is reducing interference between parts, which is examined through the analysis of land use of at the edge area of urban villages. Finally, the fourth method of increasing adaptability is using standard units, which is examined through the combination of land use and morphology maps.

In order to have a complete understanding about how Lynch's four methods support Fort Worth's Urban Village program, five informants were interviewed. Key informants are selected based on the standards listed in section 2.3.1. There are four major interview questions for each interviewee. Each of these questions is related to one of Lynch's four methods of increasing adaptability. The interviews were recorded. By analyzing the interview data, the relationship between Lynch's four methods and Fort Worth' Urban Village program are found.

1.5. Definitions of Key Terms

City form: This refers to the physical pattern of urban infrastructure (Lynch 1981). Also referred to as urban form, city form represents the physical layout and urban design of the city. Urban design takes into consideration density, street layout, transportation,

and employment areas. City form is heavily influenced by growth management issues such as urban sprawl, growth patterns, and phasing of developments (Squires 2002).

Fit of city form: The fit of a settlement refers to how well cities' spatial and temporal patterns match the customary behavior of its inhabitants. It is the match between action and form in its behavior settings and behavior circuits. Fit is linked to characteristics of the human body and of physical systems in general (Lynch 1981, p. 151).

Urban village areas: Urban village areas are small geographic (usually one square mile) areas zoned for dense, multiple-use development, and are mass-transit and pedestrian friendly. In these areas, parks, business, entertainment, homes, and stores are all within walking distance of each other with a consistent look and feel that emphasizes the culture and heritage of those who call it home (City of Fort Worth). Currently, Fort Worth has sixteen urban village areas. These villages were divided in to three groups by their locations: Central, Southwest, and Southeast.

Urban village master plan documents: The urban village master plan documents set out a short and long-term vision for the urban village. Each of them includes initial analysis, staff conversations, establishment of principles and values, and subsequent development of concepts, strategies, and projects (Urban Village Master Plan).

Adaptability of city form: It is part of fit, which is one of the five dimensions of good city form. Adaptability of city form is the ability of city form to fit a specific human behavior or activity (Lynch 1981, p. 170).

1.6. Limitations and Delimitations

The limitations and delimitations of this research are:

- Fit is the match between place and whole patterns of behavior. Human behavior is highly influenced by culture. This thesis only focused on a very

short time of Fort Worth's history. It did not involve culture as a part of city goal.

- The urban villages program is a part of Fort Worth's development plan. Other planning also affected the city form in urban village areas. This thesis only focused on the Urban Villages program.
- Natural areas and open spaces are not studied; they are an important element affecting Fort Worth city form.
- Only four urban villages are selected from sixteen urban villages for detailed analysis. The findings from four selected sites do not represent the exact data of the entire Urban Villages program.
- According to interview subjects, Lynch's four methods of increasing adaptability of city form are more academic than what is happening pragmatically in the real world.

1.7. Summary

This chapter introduces reasons why adaptability has not been well studied, the importance of increasing adaptability of city form, and the definitions of Lynch's four methods of increasing adaptability. It also introduces the development plan of the Fort Worth Urban Villages program, and the reasons Fort Worth's urban village areas are chosen as study sites. From this information, the research objective and research questions are given. Several key terms important for this research are explained. The method used in this research is briefly explained; the method used is detailed in Chapter Three: Methodology. In Chapter Two, the literature related to city form, Lynch's four methods of increasing adaptability, urban village development, and Fort Worth's Urban Villages program are reviewed. In Chapter 4, the second hand data and interview data are further analyzed. The conclusion from these data are summarized in Chapter 5.

Chapter 2

Literature Review

2.1. Introduction

This chapter presents a review of the research and literature related to city form and urban village development. This provides the basis of understanding for the relationship between city form change and adaptability of city form. Section 2.2 includes a review of city form development of New York City and the definitions of major city forms. These reviews show the importance of adaptability for city development and design. The review of New York's city form development shows the city form development process since the founding of the city to the 20th century. Section 2.2.1 highlights the connection between the changes of city form and the reasons for these changes at various times, and how adaptability helps changes in city form. Section 2.2.2 presents a review of the major city forms, and the functions, human behaviors, and cultures behind these physical forms. This part shows the importance of adaptability for city forms, which transforms city forms from one function or human behavior to another. After the review of city forms, the city design theories related to Lynch's four methods of increasing adaptability of city form are discussed in Section 2.2.3. This part offers an understanding of city form theories and adaptability of city form from Lynch (1981). Finally, Section 2.3 presents general knowledge of the development of urban villages and the background information of Fort Worth's Urban Villages program.

2.2. City Form

2.2.1. *Development of New York City Form*

This section of the literature review presents an observation of city form change with New York City as the observation subject. According to Lynch, his four methods of increasing adaptability of city form can be observed through the city form changes of New

York. In addition, the elements that influence changes in physical patterns are discussed in this section. These elements are social, political, economic, and other human patterns (Warner, Whittemore 2012). This review focuses on the elements that caused changes in New York's city form and the changes themselves, from the 17th century until now.

New York City was founded in the seventeenth century. The city started with the arrival of settlers, slaves, and domestic animals. The master plan of New York City included areas for shelter and trade, along with the design of the natural environment. The areas of trade started to have a more permanent location, and the city had weekly markets for the trading needs of its people. The original streets that enabled the trade sprouted supporting streets, creating a more diverse street system. House lots were designed within a few miles of the areas of trade along the established street system. Outside the house lots, the elements and landscape emerged with a European Village style (Warner, Whittemore 2012).

By the mid-eighteenth century, because New York City lacked a populous farming interior, it failed to grow as a traditional trading post. "The economy of the city shifted from furs and fish to timber, sawed lumber, and iron, and from crops of oats, wheat, and barley to export trade (Warner, Whittemore 2012, p. 21)." However, the city was surrounded by farms and farming villages. Small multipurpose dwellings were the major buildings of the city, and these buildings consisted of wood material for poor people and brick for rich people. The city was prepared to become a monopoly. However, at that time, the road system was not well developed, and most of streets were unpaved. Paved streets were near docks and concentrations of stores (Warner, Whittemore 2012).

By the 1820s, the population of New York City reached 110,000. The city still remained a dense human settlement of wooden and brick dwellings. Buildings were designed in close proximity to the sidewalks. More streets were paved. The city grew

large and was divided into grids with edges following natural edges like water. The grids made it easier to link the new planning and the existing streets. There were only a few parks and plazas in the city. There was no public transportation. Most traveling citizens relied on walking. The form of the city and its future form depended on the building of shops and homes (Warner, Whittemore 2012).

In 1860, the population of New York City reached 400,000. The demographics of the population were complex, with a mix of immigrants from Ireland, England, and Scotland. The rapid pace of population increase made the city develop faster than any time before. It forced the city infrastructure to make great changes to support the population increase. Due to increased trade, the amount of traffic also increased. High-rent land and commercial activity occupied the major part of the city. Iron came into wide use, which provided new structural material for bigger buildings, like houses, stores, warehouses, and shops (Warner, Whittemore 2012).

At the end of the 1800s, more modern buildings in New York City were made from steel and concrete. Private corporations occupied the center of city. The city added much new infrastructure to support the central concentration of growth. Electricity had an important influence on the function and value of land in the downtown area. Building height grew to more than twenty floors. In the downtown area, ten story buildings replaced five story ones. Business expansion resulted in downtown area expansion.

By 1925, the centralized development of New York City shaped its dense urban form. After several decades of business development, the city became an international commercial and manufacturing center.

Four major elements shaped the form of the city. The first was the policy of limiting immigration from southern and eastern Europe. The second element was the massive increase of automobile ownership. The third element was the institution of land-use controls and zoning. The fourth element was the freedom of financial innovations of consumers and real

estate. These elements transformed city into a highly concentrated multicenter form (Warner, Whittemore 2012).

This kind of racially and class-patterned form was a major reason for the later low-density metropolis. New patterns of urban growth included new road construction, suburban area planning, and commercial finance. Land speculation increased the possibility of home ownership, leading to a real estate boom (Warner, Whittemore 2012).

After World War II, the cities of North America were not like those in Europe, Russia, China, or Japan. The cities had no bombs and armies. However, an atmosphere of fear and conservatism influenced the development of city form. It encouraged the complete monopolization of growth by the expansion of the suburban areas. The suburban area growth was fast, and mostly for middle class and upper-income residents from the city. Highways and parkways were designed for traffic to flow on and off without stopping. The road system encouraged the massive growth of the use of the automobile. Parking spaces and flamboyant signs were located in front of stores. The city form in the downtown area did not change much. The population growth in cities forced a government focus on public works, like water, streets, sewers, streetcars, and subways. More people could afford houses in suburban areas and cars for transportation (Warner, Whittemore 2012).

By 1975, New York had become a polycentric city. The city form was uneven, which reflected the persistent inequalities of post war prosperity. Downtown areas were surrounded by suburban areas. The downtown area had retail and commercial properties; however, most of them were a decade old and lost their appeal. The highway program caused the most important changes in city form. New building for housing, commercial, office, and civic was encouraged by the open-arm policy of federal funds and federal highway development. The major mode of transportation became the private automobile.

The government took the ownership of the railway, bus, and subway. Suburban areas continued to grow. The growing population in suburban areas increased new employment, shopping, and entertainment options. Auto dealerships, major malls, roadside motels, drive-through restaurants, and gas stations took advantage of the highway system. One-story commercial buildings were commonly set back from the street by parking spaces. The construction of the highway system guided suburban industry. Because of the increasing electric power needs, the location of power stations also became a critical element influencing the city form development (Warner, Whittemore 2012).

New York had become a global city with a new form. In the downtown area, one or two story buildings could not satisfy the needs for building space. Downtown was full of tower buildings. However, the area of downtown did not spread. Suburbs continued to grow. The units of development were from a few acres to several hundred. In some large developments, builders placed suburban apartments near the arterial roads and malls, set single-family houses in the interior, and town houses next to open spaces, golf clubs, swimming pools, malls and stores surrounded by large parking lots. Most of the large malls were located next to the region's highway nodes. Air shipping and international shipping helped the city become a center for the distribution of cargo. The downtown was influenced by wealth and globalization to become "a revived downtown, but less as a true center for the metropolis than a playground for the rich, the corporate, and the hip." (Warner, Whittemore 2012, p. 139)

In the 1990s, the policy of recreating the downtown as a 24-hour district provided opportunities for recreation, retail, office, and residential development, which helped revive the downtown area. It boosted the area's image and led to significant growth in tourism and business conventions. Following the experience of European cities, the downtown area began to try to balance the use of the automobile with other modes of

transportation, such as walking and cycling. By the 2000s, “many City neighborhoods boasted improved sidewalks, sidewalk plantings, bump-outs, curb cuts, raised crossings, bicycle lanes, and other measures aimed to make the City friendlier to multiple modes of transportation.” (Warner, Whittemore 2012, p. 142) The suburban areas continued to change. The inner ring suburbs became the home of the region’s largest big-box stores. The railroad commuter suburbs had developed as the towns for middle or upper-middle-class. The inner ring suburbs became the most attractive places in which to live because of the services and proximity to the city’s employment. However, the land value was very high, and that limited the number of new families. In the outer areas, some business and large corporations took advantage of the low land values. At the edge of city, there were many big-box stores, traffic, outlet malls, and office parks.

Some developers created new ways to manufacture the outer side suburbs. They built open-air malls mimicking a traditional pedestrian streetscape surrounded by large parking lots. The environment imitated the suburban villages of Europe. Some of developers built small towns. The small towns used small lot sizes, and built in higher densities than was usually allowed. In return, the development left public open spaces for communities.

The history of changes in New York’s city forms is representative of a range of changes of city form. The elements that influenced the changes of city form vary though the time. The city form has changed and will continue to change. The following two tables organize the information related to New York’s city form change. Table 1: Changes of New York City Form and Their Incentives shows the importance of adaptability of city form in order to support the city to fit its unpredictable future. Table 2: Table 1Connections Between Changes in New York City Form and Lynch’s Four Methods shows how Lynch’s (1981) four methods supported New York’s city form change during its history.

Table 1 Changes of New York City Form and Their Causes

	Changes in City Form	Causes of Changes
Seventeenth-century	City was founded.	A city for Shelter and trade. Master plan designed with natural environment.
Mid-eighteenth century	The city was surrounded by farms and farming villages. Small multipurpose dwellings were the major buildings of city.	The city grew as a traditional trading post. The economy of the city shifted.
1820s	Buildings were designed in close proximity to the sidewalks. The city grew large and was divided into grids.	Populatioin Increased to 110,000.
1860	New infrastructure to support the population increase.	Population increased to 400,000. The demographics of the population were complex.
At the end of 1800s	The city added much new infrastructure to support the central concentration of growth.	Electricity had an important influence on the function and value of land in the downtown area.
By 1925	A dense urban city form; a highly concentrated multicenter form; racially and class-patterned form.	The city became an international commercial and manufacturing center. The policy of limiting immigration from southern and eastern Europe. The freedom of financial innovations of consumers and real estate. racially and class-patterned city form.
After World War II	Expanding of suburbs; Parking spaces and flamboyant signs located in front of stores.	An atmosphere of fear and conservatism. More people could afford houses in suburban area and cars for transportation
1975	A polycentric city. The city form was uneven. Downtown area surrounded by suburban area. One-storage commercial had been commonly set back form the street by parking spaces.	Reflects the persistent inequalities of post war prosperity
2000	Downtown was full of tower buildings. Suburbs continued to grow. The Downtown was less as a true center for the metropolis than a playground for the rich, the corporate, and the hip. The inner ring suburbs became the home of the region's largest big-box stores. The railroad commuter suburbs had developed as the towns for middle or upper-middle-class.	In downtown area, one or two floors buildings could not satisfy the needs of building space. The downtown influenced by the wealth and globalization. the policy of recreating downtown as a 24-hour district.

Table 2 Connections Between Changes in New York City Form and Lynch's Four Methods

	Excess Capacity	Improved Access	Reduced Interference Between Parts	Use Consistent and Repeated Units
Seventeenth century		Street system	Outside the house lots, the elements and landscape emerged with a European Village style.	House lots
Mid-eighteenth century		Paved streets were near docks and concentrations of stores.		Wood material for poor people and brick for rich people
1820s		Most traveling citizens relied on walking.	Edges followed natural edges.	The grids city form was used to developmnt the city.
1860		Due to increased trade, the amount of traffic also increased.		Iron had been widely used,
At the end of 1800s	Building height grew to more than twenty floors.			Buildings were made from steel and concrete.
By 1925		The new road construction helped massive increase of automobile ownership.		The institution of land-use controls and zoning.
After World War II	The road system encouraged the massive growth of automobile.	Highways and parkways are designed for traffic to flow on and off without stopping. The road system encouraged the massive growth of automobile.		
1975	The growing population in suburban area increased new employment, shopping, and entertainment options.	The highway program is the most important change for city form. The major mode of transportation became private automobile.		
2000	In downtown area, one or two floors buildings could not satisfy the needs of building space. Downtown was full of tower buildings. However, the area of downtown did not spare. Outside the downtown, some business and large corporations took advantage of the low land value taking places.	Most of large malls located next to the region's highway nodes. Followed the experience of European, the downtown area began to against the automobile.	At the edge of city, there were many big-box stores, traffic, and outlet malls and office parks.	The units of development were from fewer acres to several hundreds. builders placed suburban apartments near the arterial roads and malls, set single-family houses in the interior, and town houses next to open spaces, golf clubs, swimming polls, malls and stores surrounded by large parking lots. Some developers built open-air malls mimicking a pedestrian, antique streetscape and surrounding large parking lots. Some other developers created small towns with high density and open spaces.

2.2.2. Major City Forms

In Kostof's (1991) book *The City Shaped*, he divides city forms into four major types: "organic" patterns, the grid, the city as diagram, and the grand manner. Kostof (1991) clearly explains each type's physical pattern, function, and how the human behavior has been served. The study of these types of city forms helps to understand the different qualities of city forms, whose specific qualities can be incorporated into future design and planning. In order to follow the changes of city functions and human behaviors, adaptability of city form plays an important role in city development.

The first type of city form described by Kostof (1991) is "organic" patterns. "Organic" patterns are developed by the passage of time, the geographic shape of land, and the daily life of citizens. The forms of cities manifest into irregular, non-geometric, and "organic" shapes. The shapes of streets are snaky and curved. Open spaces of "organic" cities randomly appear and do not follow any order. These unplanned city forms are defined by Kostof as a "celebration of an eventful topography, the responsive and flexible evolution of its form, and its native with the rhythms of communal living" (1991, p. 43).

The form of an "organic" pattern relates to five distinctive diagrams. These diagrams are similar but not exactly alike. One of the five diagrams is the city as organism. This concept grew with modern biology and the science of life from the mid-seventeenth century. This diagram sees the city as a living system. Open spaces and parks are the lungs of the city, the central area is the heart, and the roads and traffic lines are blood vessels. The second diagram concerns the role of topography. In this diagram, the form of the city reflects the shape of its natural environment, and the setting and spread of human settlements fully respond to their landform. An example of this diagram is a river town in which the city form follows the shape of a water boundary. The third

diagram concerns land division. This diagram creates “organic” patterns by “dividing land under the practice of measuring by metes and bounds (Kostof 1991, p. 59).” The fourth diagram is synoecism. It means “the administrative coming together of several proximate villages to form a town (Kostof, 1991, p. 59).” There are two ways of creating synoecism: one is when people leave their old towns to join a new one; the other is when several villages merge to form a town. The form of synoecism absorbs the shapes of these old towns, including their road systems. The open spaces between villages slowly fill and may become markets or commercial centers. The final diagram concerns the law and social order. It is the result of social structure and the limits of public control. In this diagram, the city form is made based on the respect of customs, ownership, and the visual privacy of people (Kostof 1991).

The second type of city forms is the grid. The grid is the most common city form for planned cities. The grid form is the common solution to standardize uneven sites, to equal the share of land, and to parcel and sell land as real estate. Straight streets are easy to defend and are used to control a city’s population growth. In fact, defense and agricultural and commercial development are the major purposes for the grid form. In addition, the grid form serves a symbolic need for rulers. For example, the planning of Chang’an of the Tang dynasty created a city that subsumed all of the people under the government’s control (Kostof 1991). The grid form commonly begins on flat land. Even on a flat site, the grid form may reflect the natural effect of its boundaries. For example, river towns often plan their main streets parallel to the waterfront. The streets of grid form seek the balance between natural irregularities and planned blocks.

Historically, there are two purposes the grid form has served. One is to facilitate orderly settlement and colonization. The development of new open land is its main function. The other purpose is to bring modernization and order to disordered places. The

grid form is often expressed in military arrangements, religious convents, mercantile capitalism, and industrial planning (Kostof 1991).

The third type of city form is the city as diagram. These forms are often designed in perfect geometric shapes, circles, and polygons. Most of these city forms have centrality-radial convergence or axial alignment. Because of the nature of this kind of form, attempting perfection in geometrical shape, "most of them remain theoretical. If they ever do get built, the diagram cities often only remain for a very short time" (Kostof 1991, p. 162) because of the fact that form follows the function and human behavior exhibited in cities.

This city form was designed for specialized environments or communities. This form was designed for regimentation, like military camps, monasteries, and industrial towns. There is a central point of all these city forms. This key point in the diagram commonly is the center of faith or power like many holy cities built or planned in history. The holy cities transform the city form into a microcosmic heaven. This form is also used as a political diagram to celebrate monocentric dominion. The most influential elements are the axis and circle. The axial form is often used with other city forms to emphasize and highlight the effects of monocentric dominion. The effects depend on either of two inducements: cosmology, or physical and cultural topography. The political axis is formed by the locations of political powers that symbolize the connection of the form of local political power. Other types of political city form are used to diminish the importance of the center. They are the concentric and the radial form (Kostof 1991).

The diagram form has its strength in function. Some diagram cities are designed based on the logic of defense. The web of central points allows designers to create a traffic system for a large size city, like Howard's (1898) Garden Cities, or Washington D.C.'s original plan.

The fourth type of city forms is the Grand Manner. "The Grand Manner seeks to achieve its instruments of Heroic scale, visual fluency, and the luxury of building materials" (Kostof 1993, p. 218). This city form designs the topography to serve the visual and planning needs if the local original natural landform cannot meet the planning requirements. Most of the time, this type of city form development is outside the old city core. This is for two reasons. One is when the old city form cannot accommodate the increase of new traffic; the other one is when modern life requires opened up land forms to extend its development to the surrounding areas (Kostof 1991).

This style is based on the model of the understanding of cosmic or local political systems; however, the biggest concern is visual delight. The Grand Manner manages the city form as a theater, creating a great visual experience in the whole city. The high points of land are important centers of the Grand Manner. According to Kostof (1993, p. 228) "the formal creation and manipulation of heights, in order to locate public buildings above the setting of daily life, and to produce a sense of arrival, of dignified approach, is central to the urban experience of the Grand Manner." The urban experience of elevation change is achieved by three ways: platforms, stairs, and ramps. There are several other elements that create the experience of Grand Manner form. The first one is a straight street. Straight streets function as an element that promotes the public order and connects the whole community at a higher speed. The second one is a diagonal. These elements are "usually the result of trying to accommodate in a regular scheme a prior stretch of road, or of the coming together of two disparate sections of urban lay out." (Kostof 1993, p. 232) The third one is trivium and polyvium. These two street styles help to bring the diagonal street form into a connected city form. The fourth are boulevards and avenues. These are wide roads with large and tall trees on both sides. The boulevard is used to distinguish urban and country areas. The avenues are lined to

emphasize the axes of city form. The fifth one is uniformity. This element depends on consistencies on building styles to create visually continuous street walls. However, a city full of similar buildings is not attractive; therefore, the sixth element, variety in unity, brings informality, irregularity, symmetry, and variety into the city form to make the streetscape more interesting. The seventh element is vista, which controls the distance of view. The eighth element includes markers and monuments that are used “to accent a vista, and to fix the space of a formal square” (Kostof 1993, p. 266). There are three common ways to realize the markers and monuments: triumphal structures, commemorative columns, and statues. The final element is the ceremonial axis. It is straight and wide streets, and shows the focal point of power and celebration of history (Kostof 1993).

2.3. City Form Theories From Lynch

The following sections described the theories related to Lynch’s (1981) four methods of increasing adaptability in his book *Good City Form* (1981). According to Lynch, city form is commonly understood as the shape of a city or urban pattern. However, these two words, ‘city’ and ‘form’, only refer to the physical man-built structure of a city, and do not include the people in the city. Humans build cities and make plans for them, and make decisions to develop and redevelop them. Therefore, when defining city form, the human element should always be considered. An evolving city form is the result of changing human needs, and is the basis of city planning theories (Lynch 1981). Therefore, when the history of city form is explained, the human element should always be included as a part of it.

2.3.1. Three Theories of City Form

Lynch offers three theories to explain city form: Planning theory, Functional Theory, and Normative Theory (Lynch 1981). Planning theory considers the decision

making process of city development. Functional theory focuses on explaining the benefits of a form and how a form functions. Finally, Normative Theory deals with the relationship between human values and city form, which helps to determine whether the city form is good or not good. Normative theory defines what a good city form is, and this idea is central to this thesis and further developed in Section 2.3.1.1. All three theories help to define the meaning of city form. City form is the combination of complex decision-making based on the entirety of the needs of the city and the presentation of human values (Lynch 1981).

2.3.1.1. The Normative Theories

There are three groups of Normative theories. The first group views a city as a microcosm of the cosmos, which exemplifies the rules of nature or gods. This theory connects humans with nature or god. The form of city in this first group is based on the understanding of nature. Also, each culture has their own story about their religions, and these stories explain the standard of their cities. All these different city forms are used to emphasize the power of nature and gods. A clear hierarchy of power is found in this microcosm to maintain the stability and harmony of human social structures and city form (Lynch 1981).

The second group of Normative theories views a city as a machine. From this perspective, cities are built based on temporary or immediate needs, like military camps. The city form based on this theory is quick and easy to build, organize, and expand. The grid towns of the United States are familiar examples. The city form of Fort Worth in the 1980s is a typical grid town. The form of grid towns makes the land easier to develop rapidly, and easier to buy and sell land property. This city form based on the premise of a machine is not limited to the grid layout, however, as the city form is based on the view of parts and wholes and their respective functions. The advantages of this form are its

equitable division of space and ability to manage the flow of goods and people (Lynch 1981).

The third group of Normative theories views a city as an organism. This theory developed with the rise of biology in the eighteenth and nineteenth centuries. The organism as a form has a clear border and stable size. The change of the border or size happens when the shape is reorganized. The whole organism is dynamic, and it has harmony inside. Every part of the city has its own function, and they all different. All parts work together to make the city operate smoothly. The form expressed in this view reflects the cooperation of the whole society to maintain the balance of the city (Lynch 1981).

2.3.2. Basic Performance Characteristics of Good City Form

All three groups of Normative theories discussed in Section 2.3.1.1 provide the foundation for Lynch's theory of good city form. His theory is based on five dimensions of performance that measure the quality of good city form. These performance dimensions are based on three tactics. The first tactic is the linkage between form and purpose. The second tactic is the added places with particular description to a spatial form, for example, using particular social institutions that are directly related to that form. The third tactic, however, is the realization that a performance standard of cities should not be set. All dimensions of performance should be able to analyze any city form. They should be important qualities for most of people and cultures. In addition, all dimensions of performance should include the human values in a physical place. The five dimensions of performance are vitality, sense, fit, access, and control (Lynch 1981). This thesis focuses on the dimension of fit, and this dimension is further discussed in Section 2.3.3.

Vitality of city form is defined by Lynch (1981, p118) as "the degree to which the form of the settlement supports the vital functions, the biological requirements and capabilities of human beings, how it protects the survival of the species." There are three

principal features included in vitality. They are relatively clearly defined, depend to an important degree on the nature and environment, and share characteristics similar to human bodies across different cultures. These features are sustenance, safety, and consonance. Sustenance means having appropriate amounts of water, air, food, energy, and waste. Safety means the control of hazards, poisons, and diseases. Consonance means that the environment fits the human requirements of temperature, body rhythm, sensory input, and body function. In addition, vitality provides for other living things that are useful to man, and helps stabilize whole communities for the present and the future.

Sense of city form means “the clarity with which it can be perceived and identified, and the ease with which its elements can be linked with other events and places in a coherent mental representation of time and space and that representation can be connected with nonspatial” concepts and values (Lynch 1981, p. 131). The degree of sense depends on specific form and quality. “Sense of place” can be simplified as identity. It means whether a place could be recognized or identified as a vivid, unique, particular part of a whole city. Sense of place can be analyzed and measured by the recall, description, and recognition of a place. Sense of place also can be described as being explicitly connected to physical form in terms of congruence, transparency, and legibility. Sense of place can present a deeper meaning to a space, which is called as the expressive or symbolic significance (Lynch 1981).

Access is one of the most basic and important functions of a city. In the planning process, access has been well developed. Lynch (1981) classifies access by the feature of what can be accessed. One of the basics is the access to people, which satisfies the social needs of humans. Another is the access to certain human daily activities like work, and other important financial, medical, recreation, education, and religious services. Another feature is the access to material resources, including food, water, and energy. In

addition, the access to space is an important need for people. The places can be open spaces, particular buildings, the natural environment, or specific landscapes. Finally, Lynch (1981) discusses the access to information. Access has its own characteristics. Every single person has unique access ability to his or her special groups of people or places. It highly related with weather, time, and seasons. The mode of access can be varied. In addition, access is not considered as a goal to be maximized. The cost, diversity, and time of access should be controlled at an appropriate level. Three types of maps help to measure the quality of access: maps of general potential of access to persons, maps of substandard access, and maps that compare the areas actually being accessed with all of the areas that could be accessed. The analysis of access helps the study of social equity and regional economy (Lynch 1981).

The dimension of control defined by Lynch (1981) as “the degree to which the use and access to spaces and activities, and their creation, repair, modification, and management are controlled by those who use, work, or reside in them.” (Lynch 1981, p. 118) Control can be achieved in different levels. It been understood as the legal ownership of certain kind of right. The first level of the right of control is the right of presence, the second is the use and action, the third level is appropriation, the fourth is the right of modification, the final level is the right of disposition. The control of city form is the settlement that the control is certain, responsible and congruent. “And these three dimensions relate to its present, potential, and future users and to the structure of the problems of the place.” (Lynch 1981, p. 220)

2.3.3. *Fit of City Form*

Fit is defined by Lynch as “the degree to which the form and capacity of spaces, channels, and equipment in a settlement match the pattern and quality of actions that

people customarily engage in, or want to engage in—that is, the adequacy of the behavior settings, including their adaptability to future action” (Lynch 1981, p. 118).

Fit links the human body and physical system of a city. The force of each element changes others to fit with it. This effort to fit applies to both sides, the human and the physical side. However, how city form adapts to fit human behavior is the focus of this thesis. To fit city form to human behavior, a program for a structure or settlement is required. “The program should focus on general and predictable behaviors” (Lynch 1981 p.154).

Also, according to Lynch (1981, p. 161), “The most useful devices for increasing fit have more to do with generalities of process than with generalities of form.” Therefore, this study focuses on the process of city form change as a means to study the adaptability of city form. There are four methods of increasing adaptability.

- By providing excess capacity;
- By improving access, specifically in means of transportation and city resources;
- By reducing the interference between parts;
- By using consistent and repeated units.

2.4. Urban Villages

2.4.1. *What are Urban Villages?*

The term urban village includes two different city forms. The words “urban” and “village” present two kinds of artificial environments that give people two different feelings of spaces. “These words are filled with opposing emotions.” (Sucher 2003, p. 16) The term “urban village” draws people’s attention because they want to feel both of the sensations. People want to live in this kind of city where they could build connections with their neighborhood, and at the same time maintain their privacy and still make friends

from all kinds of social levels. Urban villages show a vision of space that offers the density, choice, and independence of the urban and the homey, intimacy of the village (Sucher 2003). The city life that urban villages provide satisfies the social needs that “urban” or “village” could not satisfy individually. Urban villages also benefit city development. According to Boringhieri (2000), urban villages are one type of local self-sustainable development. Urban villages are built based on each region’s territories and traditions.

2.4.2. The Development Principles of Urban Villages

This section of the literature review discusses several main principles of developing urban villages. This discussion is based on Sucher’s *City Comforts*, the Urban Land Institute’s *Creating Great Town Centers and Urban Villages*, and the other documents and books that detail the development principles of urban villages. The principles selected are related to the four methods of increasing adaptability of city form. A better understanding of how to develop urban villages helps to connect the four methods of increasing adaptability and Fort Worth’s Urban Villages program.

In all of the literature, the involvement of the public and local community is considered very important. Also, the local policies and regulations and the ability to raise funding plays a large role in the development of urban villages. However, because these issues are not directly related to physical city form change, they are not discussed in this research. The principles that are reviewed in this research are integrating a mixture of uses, providing multiple choices of transportation and development flexibility, connecting development with the community, and investing in sustainability (Urban Land Institute 2008).

“A mixture of uses is one of the most important qualities defining urban villages” (Urban Land Institute 2008, p. 54). The purpose of a mixture of uses is to allow different

activities of city life to occur in one place, to force more complex and intertwined human relationships, and to create more interesting places. Places with a mixture of uses are where people have more opportunities to connect with each other. A mixture of uses includes mixed-use and multiple uses.

The mixed-use identified by Fort Worth Planning and Development Department (2005) is to “promote compact, pedestrian-oriented, urban development in which a combination of residential, commercial, institutional, and light industrial uses occupy the same building, site, or district.” Multiple uses is different from mixed-use. Multiple uses means different uses for constructions that are located within a walkable distance. This kind of development avoids the time gap between the development of retail use and the development of residential and office uses.

For a mixture of uses, parking is one of the most critical issues to be designed throughout the development process. Parking design concerns the location, amount, time, and types of parking situation for different types of development. In addition, following a mixture of uses, the development style commonly conforms to three guidelines (Sucher 2003, p. 45):

- Build to the sidewalk/property line;
- Make the building front “permeable”(no blank walls);
- Prohibit parking lots in front of the building.

Providing multiple choices of transportation is another important quality for urban villages. According to the Urban Land Institute (2008, p. 13), this includes “Streets that can comfortably accommodate multiple modes of transportation, like public transportation, pedestrians, bicycles, and private vehicles.” The streetscape of urban villages is designed for more people, a better pedestrian experience, and improved bicycle facilities. In urban villages, walking and cycling are safe and pleasant. People are

free to choose the most suitable mode of transportation for their various activities. The urban villages' transportation development commonly conforms to four guidelines: (Urban Land Institute 2008, p. 14)

- Promote bicycle use;
- Lend support for public transit use;
- Provide transit amenities;
- Support pedestrians.

Development flexibility is an important quality for urban villages and is a way of adapting to future changes. It is a tool of implementing the framework for a new development, like a master plan broken down into several phases. By planning development flexibility as a part of the urban village plan process, technological innovations are easier to be accommodated, and changes in community, retail, and residential trends are easier to support. There are several guidelines to achieve development flexibility discussed by the Urban Land Institute (2008) in *Creating Great Town Centers and Urban Villages*. The most basic one is to incorporate mixed-use zoning, which has the ability to increase density and allow for shifts within a project. Another guideline to achieve development flexibility is to use a phased development process that helps adapt to possible future changes (Urban Land Institute, 2008). Four other guidelines that could be followed to achieve development flexibility are:

- Design buildings that can be used as retail, office, or residential space
- Adapt building footprint to future land use without changing the urban fabric
- Harmonize the relationship between the development and its surroundings
- Dissonance design as a role/tool to deal with the relationship with surrounding area.

Another important quality for urban villages is connecting development with the community. A strong connection to the surrounding communities benefits the urban village development and helps the development more easily to adapt to its surrounding environment and community. This connectivity occurs both physically and emotionally. The physical connectivity has different levels, such as pedestrian or automobile traffic. One clear way to enhance physical connectivity is to create comfortable accessibility to the surrounding residential and commercial areas, and the park system. “Although the cars are still the primary mode of transportation to and from town center development, public transit, bike paths, and trails can reach out to adjacent areas and can provide a natural means of access” (Urban Land Institute, 2008, p67). The connection to the urban village is partially achieved by the physical design. In addition, the emotional connection is another important element of connectivity between urban village and its communities. “Skillful urban design is a necessity to avoid projects that are monolithic, dysfunctional, or unwelcome additions to community’s landscape” (Urban Land Institute 2008, p. 27).

The city life that urban villages provide satisfies the social needs that “urban” or “village” does not offer. From Boringhieri’s (2000) point of view, urban villages are local self-sustainable development. Urban villages are built based on each region’s traditions.

2.4.3. Fort Worth’s Urban Villages Program

In 2002, the Mayor-appointed Commercial Corridors Task Force, with guidance from Fort Worth neighborhood stakeholders and community leaders, identified sixteen areas to be developed into urban villages. In 2005, some of these identified areas were re-evaluated and eliminated from the program, while other new areas were added to the program. The Urban Village is the term the City of Fort Worth uses to describe its urban neighborhood development program. According to the Comprehensive Plan (2013, p. 145), “The Urban Village program seeks to revitalize 16 urban villages by providing

capital improvements and development incentives that leverage private investment and enhance pedestrian and transit access.” In addition, urban villages are characterized by a mix of uses and open spaces with densities and designs that encourage transit and pedestrian activity (Fortworthtexas.gov).

2.5. Summary

This chapter reviews the literature that demonstrates the connections between Lynch’s (1981) four methods of adaptability of city form and city form development. The city form development of New York City, from the seventeenth century to the twenty-first century, is reviewed and organized into two tables. Four major city forms of human city development and are reviewed. In addition, the chapter introduces Lynch’s (1981) ideas about city form. Finally, the literature related urban villages and Fort Worth’s Urban Villages program is reviewed. The literature reviews help to provide a better understanding of city form, Lynch’s (1981) four methods of adaptability, and urban villages, and helps to demonstrate connections between them.

Chapter 3

Methodology

3.1. Introduction

This chapter explains the methods that used in this research. In order to observe Lynch's four methods of increasing adaptability of city form in Fort Worth's Urban Villages program development, the methodology of this research is divided into three steps. The first step of this research is to select four sites that include site conditions from most of the sixteen Fort Worth urban villages. The result of the site selection allows this research to study a limited number of urban villages and still have an overview of the changes in city form in Fort Worth's Urban Villages program. The second step is to analyze how Lynch's four methods of increasing adaptability supported city form change in the four selected sites. This step is completed by using each urban village's master plan documents and maps information from North Central Texas Council of Governments (NCTCOG) or Google Earth. The master plan documents of urban villages have detailed master plans illustrating city form changes. The third step is interview and interview data analysis. . The data of interviews' transcription analyzed using Taylor and Bogden's (1998) analysis theory. This step uses standards to select key informants. The informants are interviewed using open-ended questions. The interview data are used to complete the master plan documents analysis.

3.2. Research Design

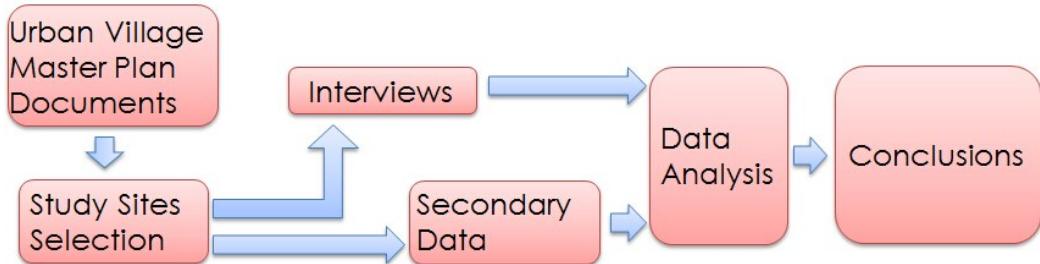


Figure 1: Research Design

3.3. Site Selection

The purpose of sites selection is to identify four sites that have similar site conditions and characteristics of the surrounding environment representative of all sixteen Fort Worth urban villages. These conditions and characteristics are identified from the urban villages' master plan documents and Google Earth Maps. However, the characteristics of the sites inside the urban village areas are different from the characteristics of their surrounding environments. These two areas commonly offer different development opportunities, directions, challenges, and issues. The opportunities and directions of the areas inside the urban village edge are mixed-use, commercial, retail, office, restaurant, and open space development. The challenges and issues for urban village areas are city form reorganization, parking, safety, and level of identity. The characteristics of the surrounding environment influence the city form of urban villages. In addition, these characteristics are highly influenced by urban village development. The characteristics of the surrounding environment are convenient access to highways, parks or open spaces, shopping centers, churches, hospitals, offices, and education institutions. Two tables are created to illustrate the conditions of these two areas. Based on these tables, four urban villages are selected to further analyze how Lynch's four methods of increasing adaptability supported city form change in Fort Worth's Urban Village program.

3.4. Data Collection

3.4.1. Secondary Data: Urban Village Master Plan Documents

The second step is to individually analyze the master plan documents of the four selected sites. This is done because each site has its own special site conditions and resources. Lynch's four methods of increasing adaptability are also individually analyzed in each site. This is done because each method has its individual way to be analyzed.

3.4.2. Interviews

The first step of the interview process is to make a standard to identify the group of interviewees, in order to obtain useful and relevant information. The interviewed people are selected by the following standards:

1. Must have basic knowledge about city form or urban form.
2. Must have a general understanding of the whole city form of Fort Worth.
3. Must have knowledge of Fort Worth's Urban Village program.
4. Should be involved in Fort Worth's Urban Village Program.

The interviewees must satisfy conditions 1, 2, and 3, but not 4.

In order to identify which elements have changed during the shift in city form, the interviewees are asked the following specific questions to identify Lynch's (1981) four methods of increasing adaptability that used in urban village development. In addition, these open ended questions may lead to other ways of increasing adaptability of city form.

1. Excess capacity is one of the ways to increase the adaptability of city form (Lynch, 1981). This means the city's development plan should provide an extra volume of space for the future development of city form. This extra space could be identified, for example, as the empty space between buildings that might be large enough to fit in another building, or

a broad highway that could manage predicted future heavy traffic that is not present at the time it is built. When Berry-University Urban Village, Six Points Urban Village, Berry and Riverside Urban Village and Near East Side Urban Village were developed, were new structures built on existing empty space? Were any existing structures demolished to create space to develop new structures in these Urban Villages? Was space created for development in any other way?

2. Improved access afforded by transportation is another way to increase adaptability of city form (Lynch 1981). Access refers to the ease of reaching city resources by multiple means of transportation. What changes in access have been made, if any, since the development of Berry-University Urban Village, Six Points Urban Village, Berry and Riverside Urban Village and Near East Side Urban Village?
3. Reduced interference between parts is another way to increase adaptability of city form (Lynch 1981). This means that when one part of the city has to make a particular change, other parts of the city do not also have to change. At the city scale, reducing the interference between parts does not mean separating all districts by use of a clear edge. Instead, this means that a flexible and merged edge area is the better way to reduce interference and therefore increase the adaptability of city form (Lynch 1984). During the development of Berry-University Urban Village, Six Points Urban Village, Berry and Riverside Urban Village and Near East Side, what considerations were made to designing the edge between the Urban Village areas and their surrounding areas?

4. Using consistent and repeated units is the final way to increase the adaptability of city form (Lynch 1981). This refers to standardizing common elements of development such as streetscape and street block design, and using the same materials for paving or building. Tell me about the use of consistent and repeated units during the development of Berry-University Urban Village, Six Points Urban Village, Berry and Riverside Urban Village and Near East Side Urban Village.

The procedures which will involve key informants as research participants following these steps:

1. Interviewees were given an introduction about the research.
2. Four interview questions were read to interviewee by investigator.
3. Interview questions were printed on paper and handed to interviewee.
4. Interviewees were able to read interview questions on paper and respond to these questions when they were ready.

The interviews were audio recorded. After the interview, the tape is transcribed, which means these records are typed exactly as it was recorded, word-for-word, by the researcher.

3.5. Data Analysis

The second step is to individually analyze the master plan documents of the four selected sites. This is done because each site has its own special site conditions and resources. Lynch's four methods of increasing adaptability are also individually analyzed in each site. This is done because each method has its individual way to be analyzed.

At the beginning of each site's analysis, an introduction from the urban villages master plan documents is summarized. Each introduction includes the plan purpose and existing conditions. The changes between the proposed master plan documents and the

existing conditions before the Urban Villages program started are analyzed according to Lynch's four methods of increasing adaptability of city form. This analysis reveals how Lynch's four methods of increasing adaptability supported these changes in city form.

Excess capacity is one of the methods to increase the adaptability of city form (Lynch, 1981). There are three types of empty land: the empty land that has been leveled off but with nothing built on it, parking lots, and nature areas that have not been developed. There are three types of developed land: the land developed for buildings, the land developed for parking, and the land developed for parks or open spaces. The developed land and the types of land use before and after development are measured in square feet. Two maps are created for each urban village that identifies changes in land uses between before and as depicted in master plan document of the urban village areas.

Improved access afforded by transportation is another method to increase adaptability of city form (Lynch, 1981). Access refers to the ease of reaching city resources by multiple means of transportation. Urban villages are designed as a place where people can access multiple resources in a centralized area. Therefore, the method for measuring improved access for urban village areas is to measure how many resources have been added and to measure how accessibility has been improved. In this thesis, to analyze the method of improved access, the differences in the modes of transportation between before and as depicted in master plan document of the urban villages are identified. In addition, the streetscapes design before and after development, as an important way to improve access is studied. The capacity or total area of parking, as an important element to provide access to cars, is calculated. The places where public transportation can be accessed are illustrated on maps. Finally, the resources that the developed urban village areas offer are identified by types of land use: mixed-use, retail, commercial, office, residential, park, or open space.

Reduced interference between parts is another method to increase adaptability of city form (Lynch 1981). The urban village development changes Fort Worth's city form. The edges of the urban village areas should reduce the negative impact this development could have on its surrounding areas, and even may provide benefits to the surrounding areas. In this thesis, the conditions of the edges are separated into two major places: outside the edge lines and inside the edge lines. These two places are illustrated following an edge line that presents the conditions on both sides of that part of urban village area. The edge lines of the urban village areas are divided into different sections, with each edge line running north to south or east to west. In each section, the length of the different types of land uses along the edge line, such as parking, commercial areas, parks, and mixed use, are measured. Parks, open spaces, and parking are illustrated by the shapes of those areas. Mixed-use areas, retail areas, single family, and multiple-family are illustrated by length along the edge and number of floors.

Using consistent and repeated units is the final method to increase the adaptability of city form (Lynch, 1981). To analyze this method in Fort Worth's Urban Villages program, the block design of the urban village areas, the zoning code used for development, and the streetscape design are studied. The analysis of block design focuses on the size of the blocks, land use, and building placement. The length and width of the blocks is measured in feet. The changes in block design are illustrated on maps. In addition, the changes in the foot print of buildings in the block are also illustrated on the maps. In this section, the streetscape analysis, different from the analysis in the method of improved access, focuses on the similarities in streetscape design throughout the urban village area. The consistent and repeated streetscapes throughout the urban village areas are illustrated.

The information from the records of interviews from five key informants are compared with the findings of four selected urban village master plan documents analysis. The analysis of interview data focuses on looking for the similarities and differences between urban village master plan documents analysis and interview data. The similarities and differences are summarized in Chapter 5.

3.6. Limitations

The first limitation regards the secondary data. The master plan documents of the four urban villages come from the City of Fort Worth. These documents have changed with the urban villages' development. Also, these documents are focused on the beginning stages of urban village development. Due to these facts, these documents may not provide the most up-to-date information for analysis. In order to limit these disadvantages, the interviews of key informants are taken into consideration.

The second limitation is human error and bias. This research requires the interviewees to have knowledge about both Lynch's city form theory and the urban villages in consideration. Some interviewees have knowledge about Lynch's city form theory and Fort Worth's Urban Village program; however, they have very little concern about the connection between them. It is possible that during these interviews was the first time they made this connection. This limitation should be taken into consideration in the analysis of the interview data.

3.7. Summary

The chapter details the methodology that is used in this thesis. A diagram is presented to illustrate the process of this research. The methods of study site selection, secondary data analysis, and interview data analysis are further explained. Following the methods, the data are analyzed in Chapter 4.

Chapter 4

Analysis and Findings

4.1. Introduction

This chapter contains data and maps from the analysis of Fort Worth's Urban Villages program and key findings related to Lynch's four methods of increasing adaptability of city form. In section 4.2, the existing conditions of the four selected urban villages are reviewed and presented in tables. The urban villages' existing conditions are divided into two areas: the urban village areas and surrounding areas. In section 4.3, the development of the four selected sites is analyzed to identify how Lynch's four methods of increasing adaptability supported their development. In section 4.4 interview data are analyzed and organized by key informants. Section 5.1 summarizes both maps and interview data analysis and findings.

4.2. Study Sites

Based on the methodology of site selection, the characteristics of the four selected sites need to be representative of the major characteristics of the site conditions and surrounding environments of the sixteen Fort Worth urban villages. Table 3 identifies the characteristics of the site conditions of the urban village areas. These characteristics are listed horizontally on the top of the table, and the sixteen sites are listed vertically on the left of the table. "Yes" means the urban village has the characteristics. "No" means it does not have. The characteristics include:

- Urban Village Fabric, which identifies whether the old fabric of the urban village area fits urban village development.
- Public Transportation, which identifies whether the urban village area has public transportation stops on site.
- Mixed Use

- Office
- Commercial
- Residential
- Parking
- Park and Open Space
- Community or Government Facility, which identify whether the urban village area has this particular type of land use on site.
- Safety, which identifies the amount of crime in the village. “Common” means safety is not a problem in that urban village area. “Not Good” means the safety of that urban village needs to be improved.
- Identity, which represents whether the urban village has a clear demarcation with its surrounding environment. The levels of identity of urban village areas are divided into three levels. “High” means the urban village area can be easily identified from its surrounding environment. “Low” means it is hard to find the urban village. “Common” means the level between “High” and “Low”.
- Historic Quality

Table 3: Site Conditions of Urban Villages

Village Name																
	Urban Village Area Condition	Urban Village Fabric	Public Transportation	Mixed-use	Office	Commercial	Residential	Parking	Park/Open Space	Community or Government Facility	safety	Identity	Historic Quality			
Six Points	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Not Good	Low	Yes				
Polytechnic/Wesleyan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Common	High	Yes				
Oakland Corners	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Common	Common	Yes				
Historic Handley	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	Common	Low	Yes				
Berry/Stalcup	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	Not Good	Common	No				
Near East Side	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Common	High	No				
Evans and Rosedale	Yes	No	No	No	Yes	No	Yes	Yes	Yes	Common	High	No				
Berry/Riverside	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Not Good	Common	No				
South Main	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Not Good	High	Yes				
Magnolia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Common	High	No				
Hemphill/Berry	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Common	Low	No				
Bluebonnet Circle	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Common	High	Yes				
Berry/University	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Common	High	Yes				
Ridglea	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Common	Common	Yes				
West Seven	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Common	Low	Yes				
Historic Marine	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Common	High	Yes				

Table 4 identifies the characteristics of the environment surrounding the urban villages that help distinguish each other. These characteristics are listed horizontally on the top of the table, and the sixteen sites are listed vertically on the left of the table. The surrounding environment influences how the urban village is developed. The characteristics of the surrounding environment include:

- Highway, which identifies whether the urban village area has convenient highway access nearby
- Natural water feature, which identifies whether the urban village area has, for example, a lake or a stream nearby
- Park and Open Space
- Mixed Use
- Commercial
- Church
- Office
- Hospital
- Educational Institution
- Light Industrial, which identifies whether industrial use areas is near the listed urban villages

Table 4: Conditions Surrounding Urban Villages

Village Name	Surrounding Area Condition									
	Highway	Nature	Park/Open Space	Mixed-use	Commercial	Church	Office	Hospital	Education Institution	Light Industrial
Six Points	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Polytechnic/Wesleyan	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Oakland Corners	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Historic Handley	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No
Berry/Stalcup	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Near East Side	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Evans and Rosedale	No	No	Yes	No	Yes	Yes	No	Yes	Yes	No
Berry/Riverside	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
South Main	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Magnolia	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Hemphill/Berry	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Bluebonnet Circle	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Berry/University	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Ridglea	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	No
West Seven	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Historic Marine	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes

According to Table 3

- All of the urban villages can fit into the urban fabric;
- All except for Evans and Rosedale have public transportation;
- All of them except for Evans and Rosedale have office areas on the site;
- Half of the urban villages do not have enough commercial areas to serve projected future development;
- Nine of the urban villages do not have enough or do not have residential areas for future development;
- Four of urban villages do not have enough parking areas for their projected future development;
- Six urban villages do not have parks or open spaces;
- Four urban villages have safety issues;
- Only eight urban villages can be clearly differentiated from their surrounding areas.

According to Table 4,

- Six urban villages do not have convenient access to highways;
- Five urban villages have a natural water feature within one mile;
- Only two urban villages do not have parks or open spaces or mixed-use land within one mile;
- All of the urban villages have commercial land and churches in their surrounding areas;
- Four urban villages are close to hospitals;
- Eleven urban villages have educational institutions or light industrial land use nearby.

Four sites been selected for deeper analysis. The major characteristics of the sixteen urban villages are included in the four selected urban villages. They are Six Points Urban Village, Berry and University Urban Village, Berry and Riverside Urban Village, and Near East Side Urban Village. These four urban villages' site conditions and their surrounding environment are characterized in following two tables.

Table 5: Site Conditions of Four Selected Urban Villages

Village Name														
Six Points	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Not Good	Low	Yes		
Near East Side	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Common	High	No		
Berry/Riverside	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Not Good	Common	No		
Berry/University	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Common	High	Yes		

Table 6: Conditions Surrounding Four Selected Urban Villages

Village Name														
Six Points	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes				
Near East Side	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Berry/Riverside	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes			
Berry/University	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No			

4.3. Study Sites Analysis and Findings

4.3.1. *Six Points Urban Village*

4.3.1.1. Introduction

The Six Points Urban Village is located northeast of downtown Fort Worth. Six Points has a commercial core area surrounded by residential neighborhoods. The core area is about 33.5 acres. Six Points has many historical buildings, but lacks identity because most of the buildings have similar features. The city form was designed as an urban village with small blocks. Six Points has convenient access to Airport Freeway and Belknap Street, which directly connect to downtown Fort Worth. In addition, the Six Points is within a quarter of a mile to a highway, the Trinity River, and several churches.

The purpose of the urban village development at Six Points is to revive the Six Points historical area (Six Points Urban Village Master Plan, 2007). The city form of Six Points follows the mixed-use (MU-1) zoning code. The MU-1 zoning code combines residential, office, retail, and selected light industrial uses together. According to the Six Points Urban Village Master Plan (2007, p. 5), the values and principles for the development of Six Points include:

- Celebrating the area's historic values and traditions;
- Living for working-class residents;
- Entertainment environment for residents and visitors;
- Music and culinary Mecca;
- Mixed uses while preserving single family base;
- Pedestrian-friendly;
- Main street/deco-themed urban design;
- Texas oasis of landscape design.

The master plan of Six Points Urban Village was designed based on these values and principles (see Figure 2). Four maps are used to analyze how Lynch's four methods of increasing adaptability support the development of Six Points Urban Village development. These maps are the master plan for development, the urban village map in 2001, the existing land use map, and the proposed land use map.



Figure 2: Six Points Urban Village Master Plan

(Six Points Urban Village Master Plan, 2007)



Figure 3: Six Points Urban Village in 2001

(Pre-development)

4.3.1.2. Excess Capacity

The development of the Six Points Urban Village incorporates new land uses and zoning codes. Several new buildings for mixed-use development and commercial development are to be placed in the area. New open spaces and parks are included in the development plan. In addition, more space for parking, bike trails, and wider sidewalks are included in the development plan. According to Lynch (1981), the method of excess capacity helps to adapt the existing site condition to the master plan. In order to identify how the method of excess capacity supports the development of Six Points Urban Village, the master plan of Six Points Urban Village and the urban village area map from 2001 are compared with each other. The results are illustrated in Figure 4 and Figure 5.

The entire area of Six Points Urban Village is 1,461,650 square feet (33.55 acres). As seen in Figure 4, the existing buildings in 2001 are illustrated by black blocks, and the empty spaces from the same time are illustrated by red blocks. According to the master plan document, 98,000 square feet of empty space is dedicated to developing parks; 142,600 square feet is dedicated to developing mixed-use; and about 138,000 square feet is dedicated to parking. In addition, according to the master plan document, the streets are to be narrowed down to two lanes to provide space for wider sidewalks, on-street parking, and bike lanes. The empty places shown in Figure 4 provide the opportunity for this new development in Six Points Urban Village area.

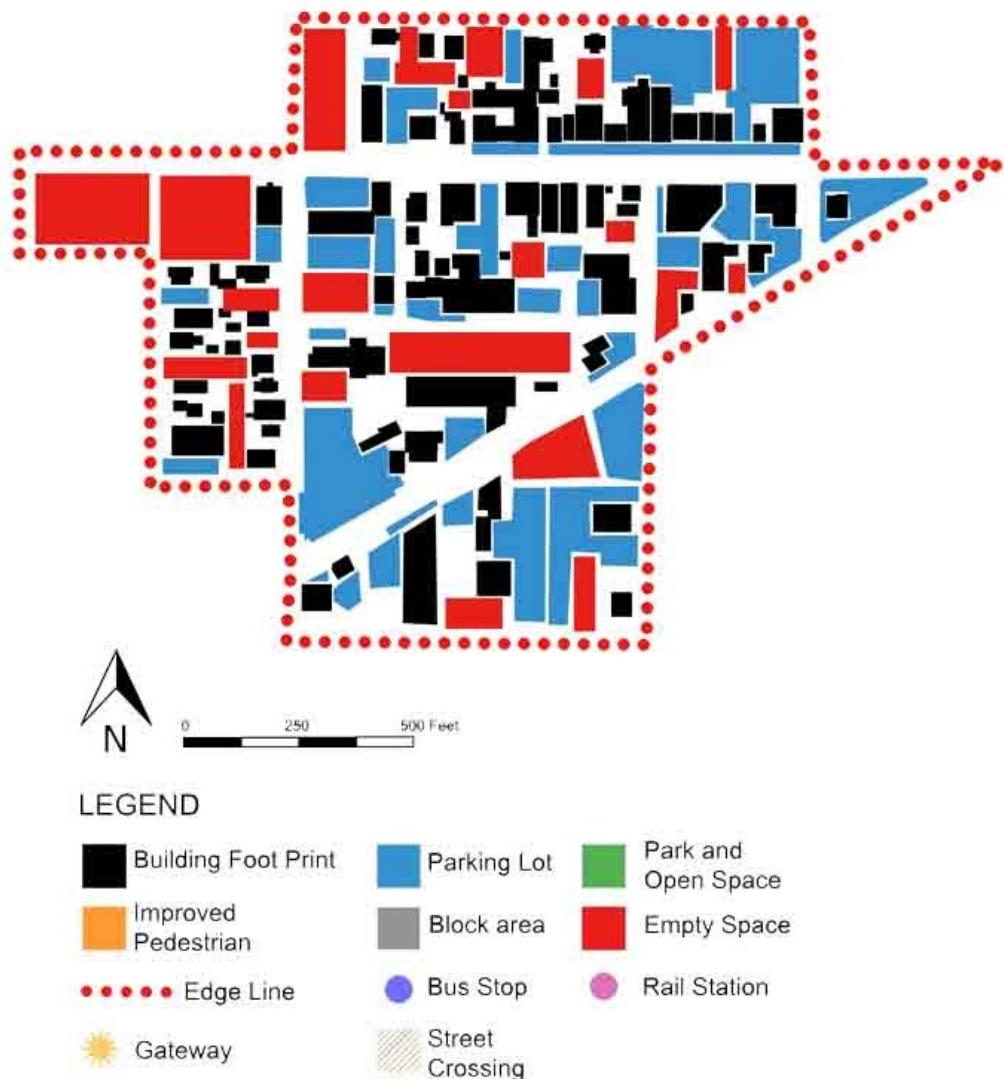
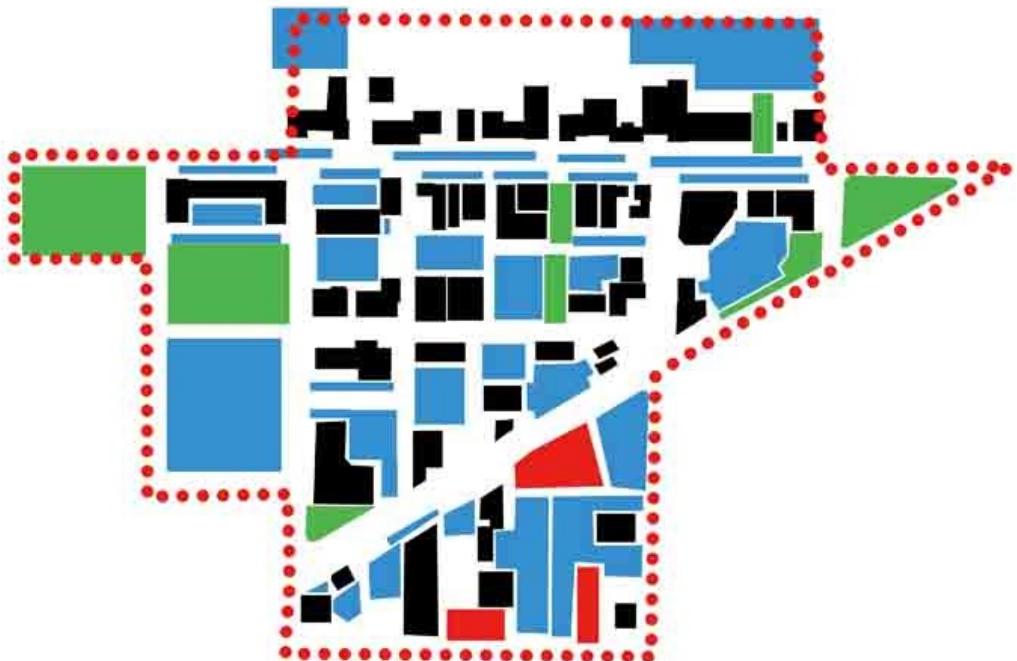


Figure 4: Six Points Urban Village Excess Capacity Analysis
(Before the Development)



LEGEND

	Building Foot Print		Parking Lot		Park and Open Space
	Improved Pedestrian		Block area		Empty Space
•••••	Edge Line	●	Bus Stop	●	Rail Station
◆	Gateway				Street Crossing

Figure 5: Six Points Urban Village Excess Capacity Analysis

(As Depicted in Master Plan Document)

4.3.1.3. Improved Access

According to Lynch (1981), the method of improving access means people are able to reach more resources by faster and more comfortable ways. The Six Points Urban Village Master Plan provides more city resources for the community. Six Points is using the MU-1 zoning, and on the north side of Race Street, entertainment areas, restaurants, hotels, and offices are to be developed. On the south side of Race Street, a plaza, new parking lots, and community parks are being developed. In addition, the new residential areas consist of two or three stories of medium to low density development and are designed inside and around the urban village core area. According to the master plan document, the Six Points Urban Village area includes 60,000 square feet of office space and 50,000 square feet of retail space. In addition, 50 apartment units, 25 single family detached units, and 60 condos for residential development are included in the master plan (Six Point Urban Village Master Plan 2007).

The accessibility and mobility improvements of Six Points Urban Village start from the development of Race Street. Two gateways are designed on both the east and west sides of the street. Bike lanes and buses connect Six Points to downtown Fort Worth. For the people who access Six Points with their cars, the increased on-street parking and number of parking lots has made this urban village a convenient destination for them. The streetscape of Race Street is designed to accommodate wider sidewalks, angled parking, and bike lanes. The major transportation improvement is the enhancement of pedestrian amenities throughout the urban village area that extend into the surrounding communities (see Figure 6). Pedestrian amenities are a primary physical characteristic supporting the mixed-use development in Six Points Urban Village, and the key pedestrian improvements include the following (Six Points Urban Village Master Plan 2007, p. 22):

- Village-wide sidewalk improvements;
- Village-wide pedestrian crosswalks;
- Consistent and appropriate landscape;
- Six Points unique street/pedestrian lighting;
- Overhead to underground utility conversion;
- Uniform signage.

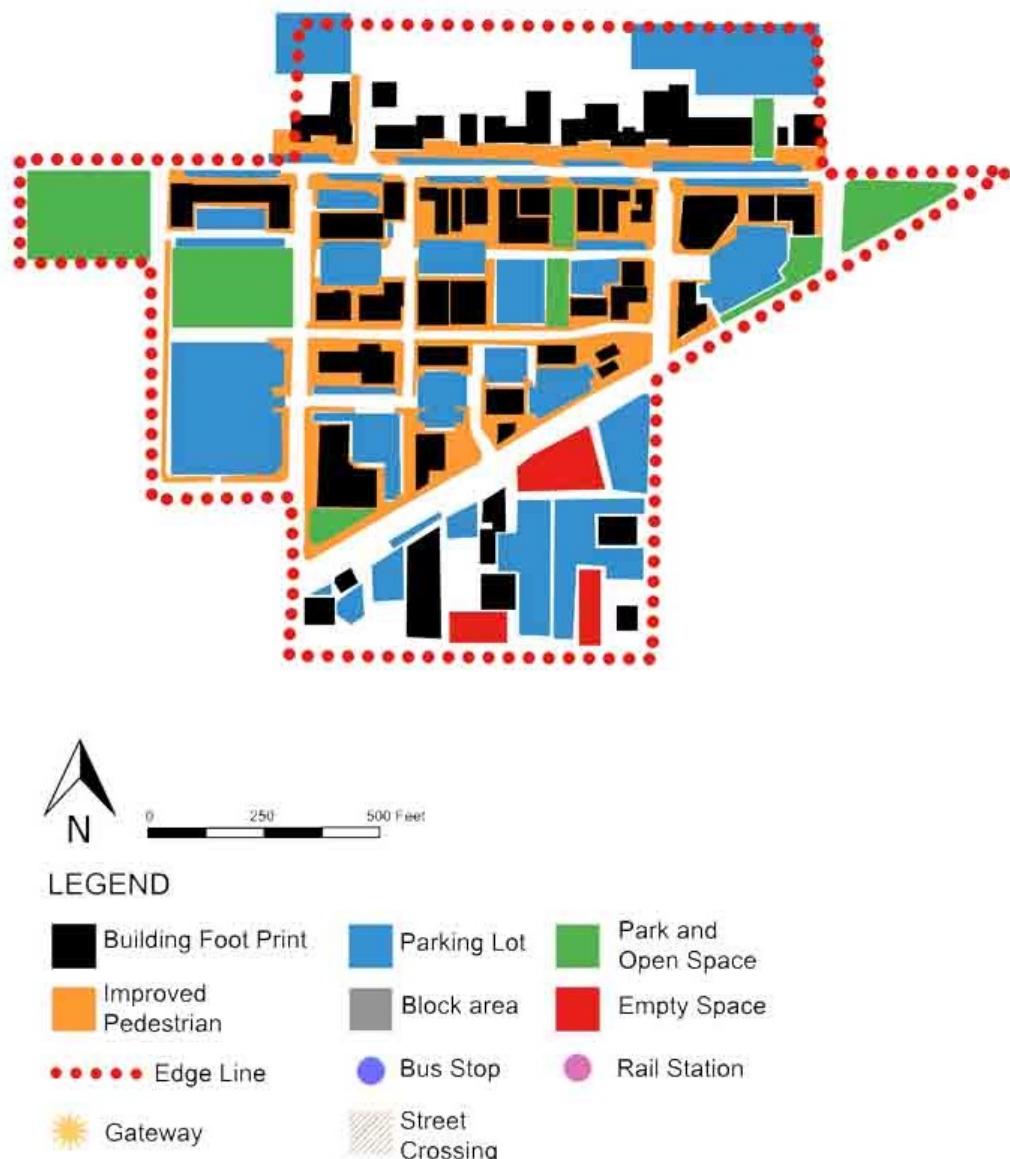


Figure 6: Six Points Urban Village Pedestrian Improvement

4.3.1.4. Reduced Interference Between Parts

For the surrounding area, the development brings more people and more traffic into Six Points Urban Village. In order to reduce the interference between the urban village core area and its surrounding community, the majority of the core area is separated by roads, parks, and parking lots. According to the master plan document of Six Points Urban Village, the land uses next to edge are varied. The edge line of Six Points Urban Village core area is 7,522.62 feet long. The length of edge as road is 5,750.32 feet. Of this, 756.32 feet is fifty-foot wide road. Along the inner side of the edge line, there is 1,925.62 feet of parks and open spaces, 929.46 feet of parking lots, and the remainder is mixed used. Along the outer side of edge line, there is 569.10 feet of industrial areas, 1,187.73 feet of residential areas, 479.71 feet of community structure, and remainder is mixed use.

Figure 7 illustrates the entire edge line of Six Points Urban Village. Three points are marked in this Figure in order to segment the line for further analysis. The entire edge line divided into three segments, with each segments connecting two of the points demarcated in Figure 7. Figure 8, Figure 9, and Figure 10 include three types of horizontal lines to indicate three types of edges. The widest lines represent the fifty-foot wide roads. The medium-wide lines represent the thirty-foot wide streets. The thinnest lines represent the edges that divide blocks. Above these lines, colored blocks indicate the land use outside the urban village core area. Below these lines, colored blocks indicate the land use inside the urban village core area. The number of colored blocks above or below the edge line represents the number or floors of that particular land use; in other words, two blocks above the edge line indicates a two-story building. The red dash lines are road turns.

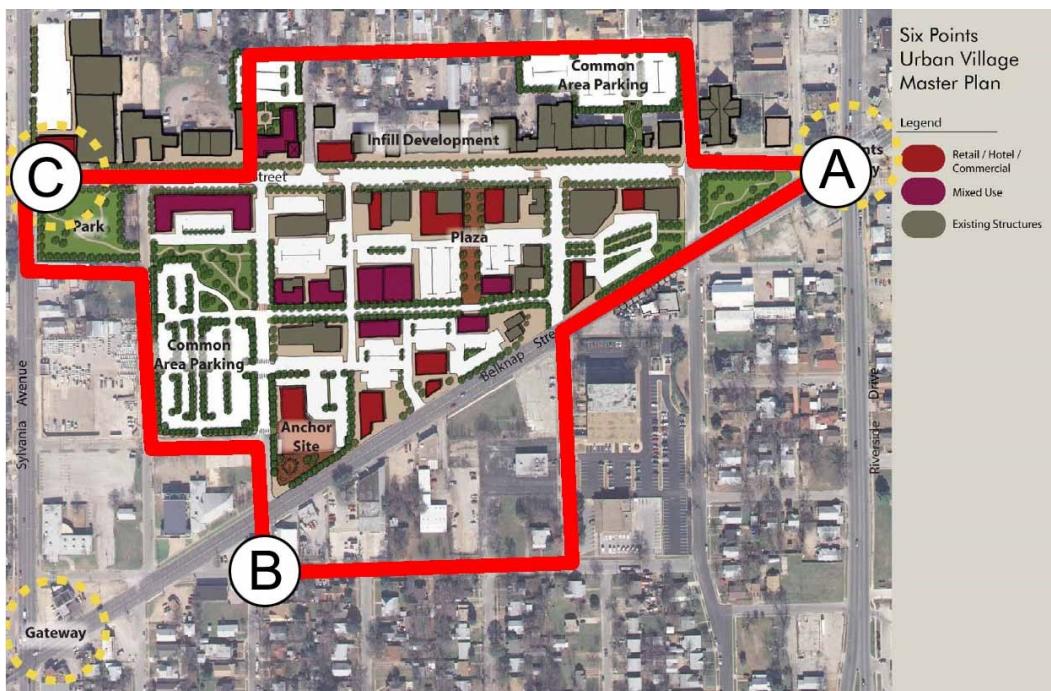
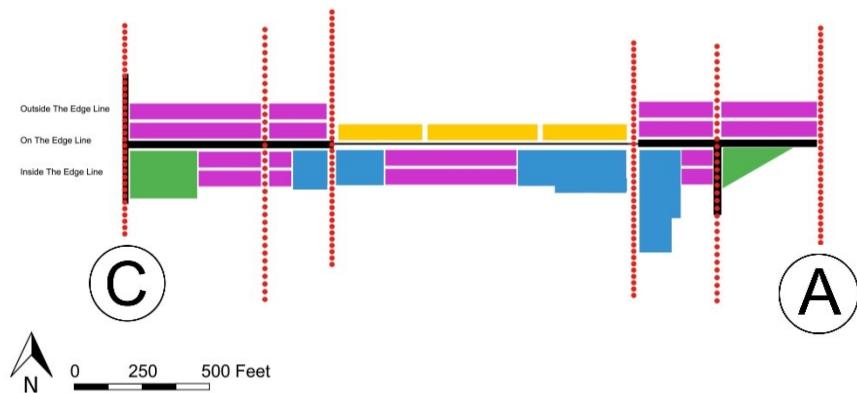


Figure 7: Six Points Urban Village Edge Line Divide Map



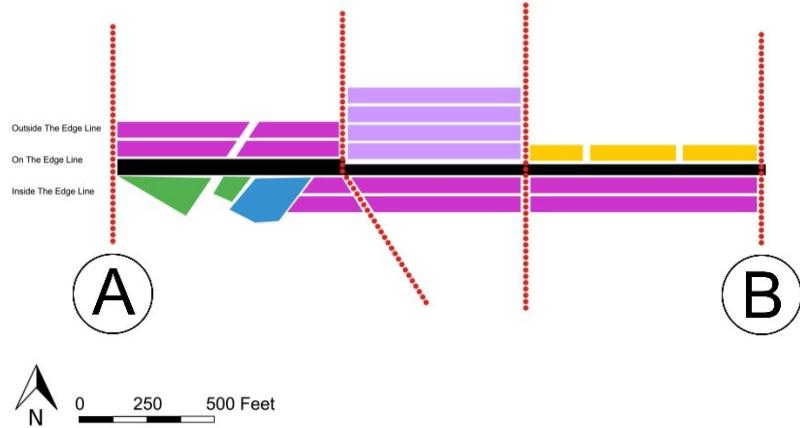
LEGEND

— Land use next to each other	■ Commercial
— Road 30 feet wide	■ Light Industrial
— Road 50 feet wide	■ Park and Open Space
— Highway	■ Parking
..... Edge line turning point	■ Mixed-use
— Railway	■ Residential
	■ University Campus

Figure 8: Six Points Urban Village Edge Condition Analysis

Point C to Point A

Figure 8 illustrates the edge condition of the north side of Six Points Urban Village. At the west and east ends, the edge is 30 feet of wide road. On both sides of the road, the land use is comprised of two-story low-density mixed-use, parking, and open space. The section in the middle that divides a block is merged with the land uses of parking, two-story low-density mixed-use, and single family residential.



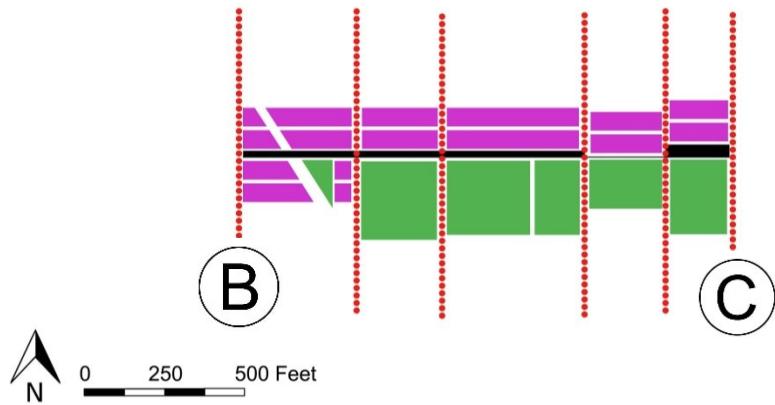
LEGEND

— — — Land use next to each other	■ Commercial
— — — Road 30 feet wide	■ Light Industrial
— — — Road 50 feet wide	■ Park and Open Space
— — — Highway	■ Parking
• • • • Edge line turning point	■ Mixed-use
— — — Railway	■ Residential
	■ University Campus

Figure 9: Six Points Urban Village Edge Condition Analysis

Point A to Point B

As seen in Figure 9, the southeast side edge is road. On one side of the road, the land use is two-story mixed-use. On the other side of the road, the land uses are open spaces, parking, four-story light industrial, and one-story single family.



LEGEND

— Land use next to each other	Commercial
— Road 30 feet wide	Light Industrial
— Road 50 feet wide	Park and Open Space
— Highway	Parking
..... Edge line turning point	Mixed-use
— Railway	Residential
	University Campus

Figure 10: Six Points Urban Village Edge Condition Analysis

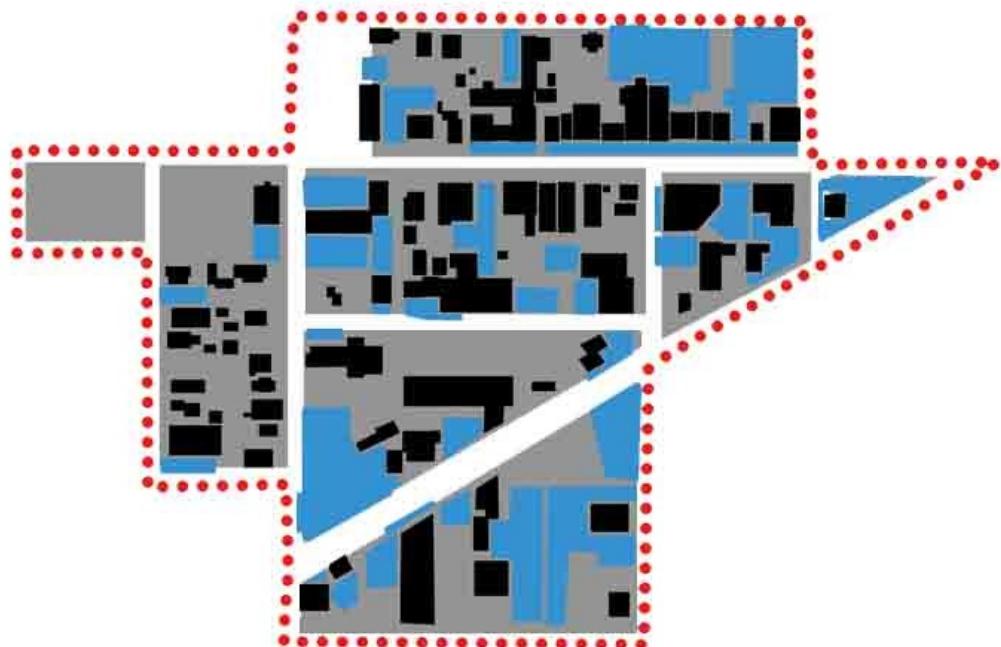
Point B to Point C

In Figure 10, the edge on southwest side of Six Points Urban Village. Majority of the edge is 30 feet wide road. Only two kinds of land uses next to the edge: two floors low density mixed-use outside of the edge and open space inside the edge.

4.3.1.5. Using Consistent and Repeated Units

The consistent and repeated units that help Six Points Urban Village adapt to its master plan are blocks units, streetscape, building foot prints and zoning code. The size of the blocks of Six Points Urban Village did not change during the development of the

master plan. However, inside the blocks, the function and land use have been changed to fit the development plan. The newly developed buildings have been used to infill empty spaces between existing buildings. New open spaces, parking lots, and parks have been designed to fit in the original blocks. In Figure 11 and Figure 12, the gray areas indicate the blocks inside the Six Points Urban Village core area, the black areas indicate buildings, and the blue areas indicate parking lots. In addition, using consistent and repeated units is seen in the streetscape improvement as the repeated units include the pedestrian amenities and the wide sidewalk design throughout the urban village area. This is done to create a consistent pedestrian-friendly environment in Six Points Urban Village area. The building foot prints of old and new buildings are varied; however, the sides of buildings that face the streets are commonly 40 feet wide.



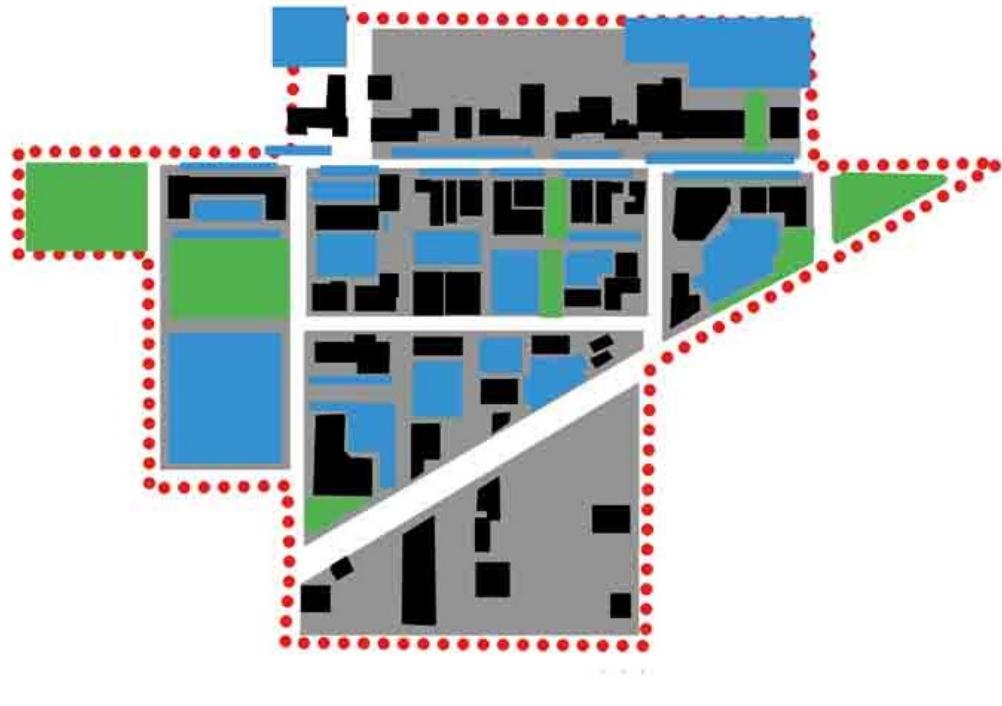
0 250 500 Feet

LEGEND

■ Building Foot Print	■ Parking Lot	■ Park and Open Space
■ Improved Pedestrian	■ Block area	■ Empty Space
•••• Edge Line	● Bus Stop	● Rail Station
● Gateway	■ Street Crossing	

Figure 11: Six Points Urban Village Block Analysis

Before The Development



LEGEND

	Building Foot Print		Parking Lot		Park and Open Space
	Improved Pedestrian		Block area		Empty Space
••••• Edge Line		●	Bus Stop	●	Rail Station
◆ Gateway			Street Crossing		

Figure 12: Six Points Urban Village Block Analysis

(As Depicted in Master Plan Document)

4.3.2. Berry and Riverside Urban Village

4.3.2.1. Introduction

The Berry and Riverside Urban Village is located in the southeast part of Fort Worth. This urban village is about 81 acres. East Berry Street and Riverside Drive go through the center of this urban village. Sycamore Creek forms the east edge line of Berry and Riverside Urban Village area. According to the Berry and Riverside Urban Village Master Plan document, there is no residential development inside the urban village area; however, there is a 232 affordable-home development outside the northwest urban village edge. Highway I-35W is two miles west of this urban village. There are three primary schools within one mile of Berry and Riverside. The surrounding area of this urban village is rich in parks and open spaces. Five parks are located within one mile. In addition, a transit center is being developed in the southeast corner of Berry and Riverside (Berry/Riverside Urban Village Master Plan, 2007).

The development of Berry and Riverside Urban Village needs to adapt the original city form to the development master plan. The original city form of Berry and Riverside Urban Village was based on the zoning code that allows for heavy industrial development. The new development master plan envisions a general commercial area, including retail, services, offices, entertainment, and mixed uses. According to the master plan document for Berry and Riverside, this urban village area is divided into seven zones. These zones are named from A to G, and each zone has its own existing site condition and development direction.



Figure 13: Berry and Riverside Urban Village Concept Master Plan
(Berry/Riverside Urban Village Master Plan, 2007)



Figure 14: Berry and Riverside Urban Village Area Map in 2001
(Pre-development)

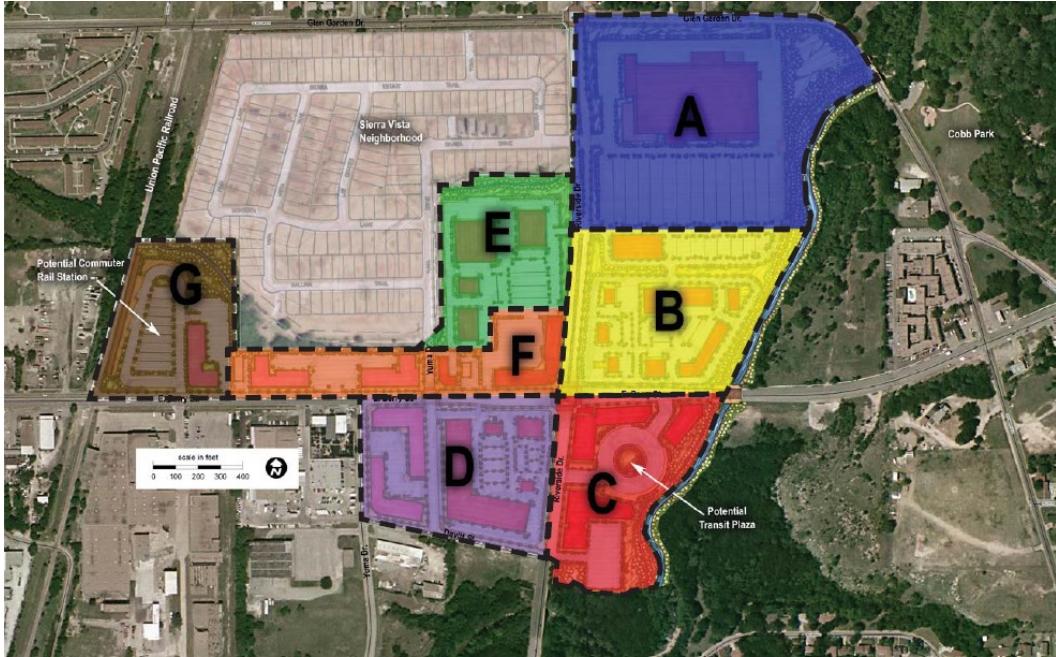


Figure 15: Berry and Riverside Urban Village Divided Zones

(Berry/Riverside Urban Village Master Plan, 2007)

4.3.2.2. Excess Capacity

The method of excess capacity is analyzed by comparing the master plan document for Berry and Riverside Urban Village (Figure 13) with the map of this same area from before the development of this urban village started in 2005 (Figure 14). In the seven zones divided for development, zones A, C, E, and G are undeveloped land. The empty space in this urban village is about 49.82 acres. Of this empty space, about 39.14 acres has the potential for development. Zones A, B, and C, which are on the east side, have some natural areas that are being developed. Especially in zone C, the planned development of Transit Plaza pushed the edge line of trees back to Sycamore Creek. The majority of land for new development comes from the land that is empty and unpaved. Berry and Riverside Urban Village is different from the other sites because it is next to Sycamore Creek, and a small part of the land for new development comes from

natural land. In Figure 16, buildings are illustrated by black blocks, parking is illustrated by blue blocks, and empty spaces that have not been used are illustrated by red blocks. Thus, according to map analysis, the master plan for this urban village provides excess capacity through the provision, as shown in Figure 17, of various resources that are planned to be added into this village. These include 98,000 square feet (2.25 acres) of the empty area to be developed into parks, 13,000 square feet to be developed into commercial use, and 25,000 square feet to be developed as mixed-use.

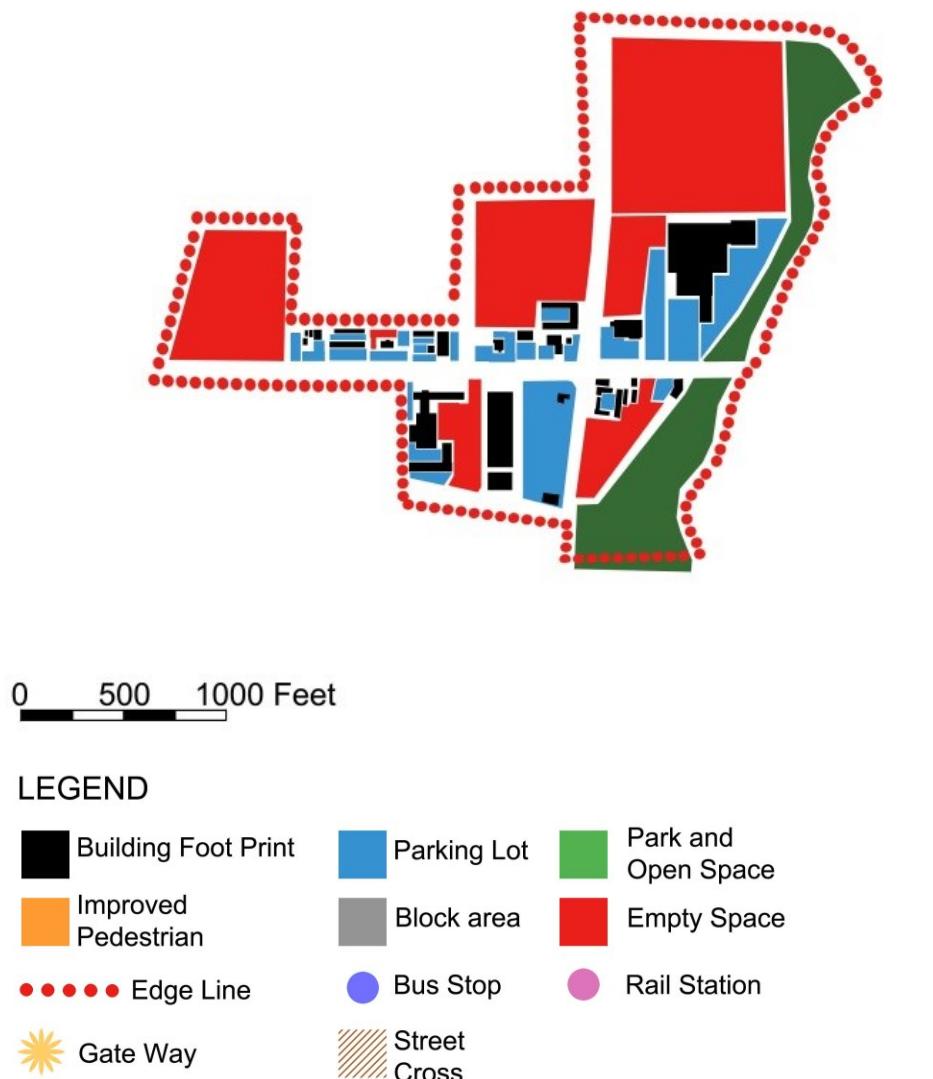


Figure 16: Berry and Riverside Urban Village Excess Capacity Analysis

(Before the Development)

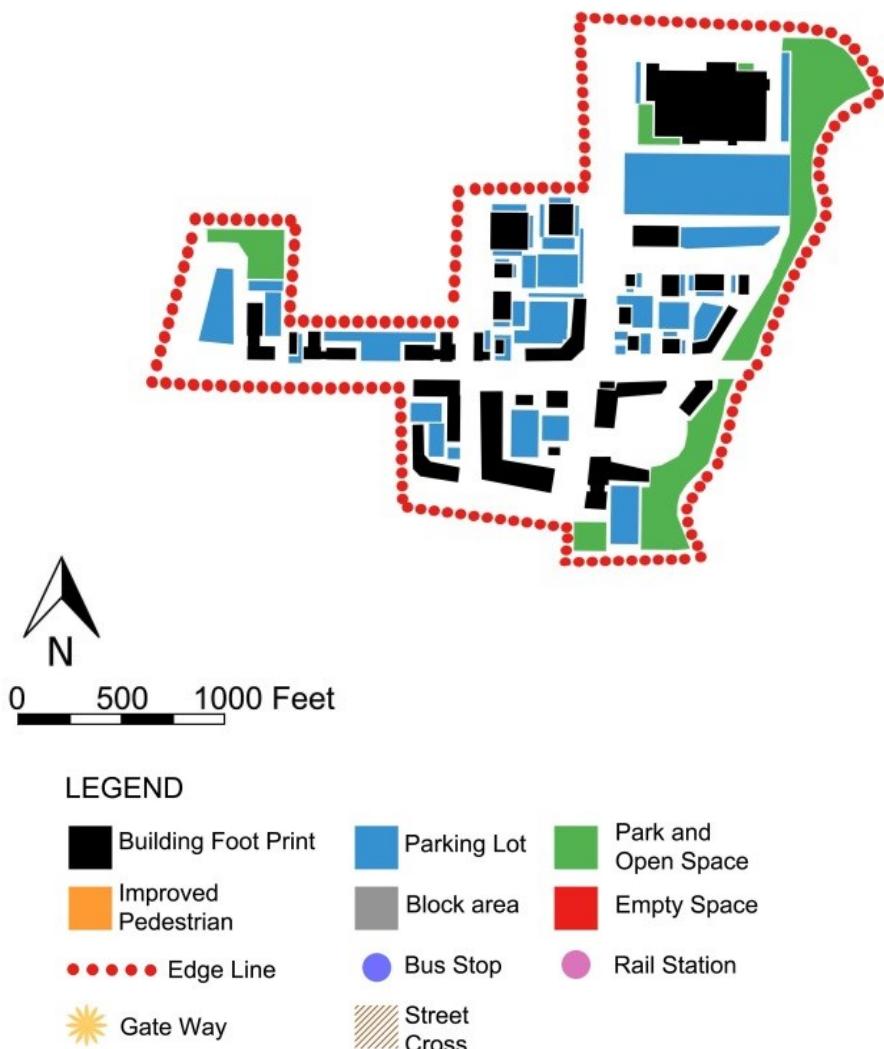


Figure 17: Berry and Riverside Urban Village Excess Capacity Analysis

(As Depicted in Master Plan Document)

4.3.2.3. Improved Access

The improvements of access, as identified by Lynch (1981), in Berry and Riverside Urban Village are divided into two types. The first type is that the urban village itself offers value for people as a destination. The value that Berry and Riverside offers includes:

- A “big box” style store in zone A;
- A loose grouping of small and middle size commercial buildings as the type of retail in zone B;
- A Fort Worth Transportation Authority transit plaza with commercial buildings nearby in zone C;
- New mixed-use development for retail, commercial, and residential areas in zones D, E, and F;
- A rail station with a parking lot with mixed-use development nearby in zone G;
- And an improved bike trail along Sycamore Creek.

The development of Berry and Riverside Urban Village offers 280,400 square feet of mixed-use area and 368,500 square feet of commercial or retail area.

For the second type of improvement of access, accessibility and mobility, the master plan of this urban village focuses on three major recommendations:

1. Improve the access to the park in the east side of the urban village;
2. Create opportunities for people to access public transportation;
3. Improve the streetscape for a better walking experience.

These recommendations are detailed into the development of each zone. According to the master plan document, zones A, B, and C should be developed to have more access to connect to the bike trail in the east. In addition, the transportation center

and rail station to be developed in zones C and G are to provide a public transportation oriented development. Street trees, brick paved intersections, ADA compliant ramps, and wide sidewalks to create a pedestrian-friendly environment for people are to be developed throughout the urban village (see Figure 18). In addition, for the automobile accessibility, 1,696 parking spaces have been designed in the urban village area along with an improved streetscape including new asphalt paving, roadway lighting, and street trees. The main streets that connect the urban village to the nearby highway and downtown Fort Worth are to be expanded to four and five lanes to manage the heavy traffic.



LEGEND

	Building Foot Print		Parking Lot		Park and Open Space
	Improved Pedestrian		Block area		Empty Space
•••••	Edge Line	●	Bus Stop	●	Rail Station
★	Gate Way		Street Cross		

Figure 18: Improvement of Access in Berry and Riverside Urban Village

4.3.2.4. Reduced Interference Between Parts

The development of Berry and Riverside includes one rail station and a transit center, which brings a lot of passing traffic and people into this urban village. However, the majority of land uses are low density uses, and the majority of the edge line is on rail,

Sycamore Creek, and wide roads. The section of the edge line on the north running along a new residential area has a narrow green belt to reduce the interference.

Berry and Riverside Urban Village has Sycamore Creek as the east side edge line. This part of the edge line makes the findings of the edge analysis different from other urban villages. The analysis of the edge line shows various conditions on both sides of the edge. The edge line of Berry and Riverside Urban Village is about 11,770 feet. Of this, about 5,430 feet is road. The length of edge created by Sycamore Creek on the east side is about 3,200 feet. On the inner side of the edge line, there are 1,240 feet of parks and open spaces, 1,200 feet of parking lots, and 9,363.41 feet of mixed-use development. The remainder of the line is general commercial use. On the outer side of the edge line, there are about 3,650 feet of industrial areas and 8,400 feet of residential areas. The remainder of this line is also general commercial use. Figure 19 illustrates the entire edge line of Berry and Riverside Urban Village. Three points are marked in this Figure in order to segment the line for further analysis. Figures Figure 20 and Figure 21 illustrate the entire edge line divided into two segments, with each segment connecting two of the points demarcated in Figure 19: Berry and Riverside Urban Village Edge Line Divide Map. For Berry and Riverside, only edge segments A to C, and C to B are analyzed because segment A to B is created by Sycamore Creek, meaning both sides of this edge are green spaces.

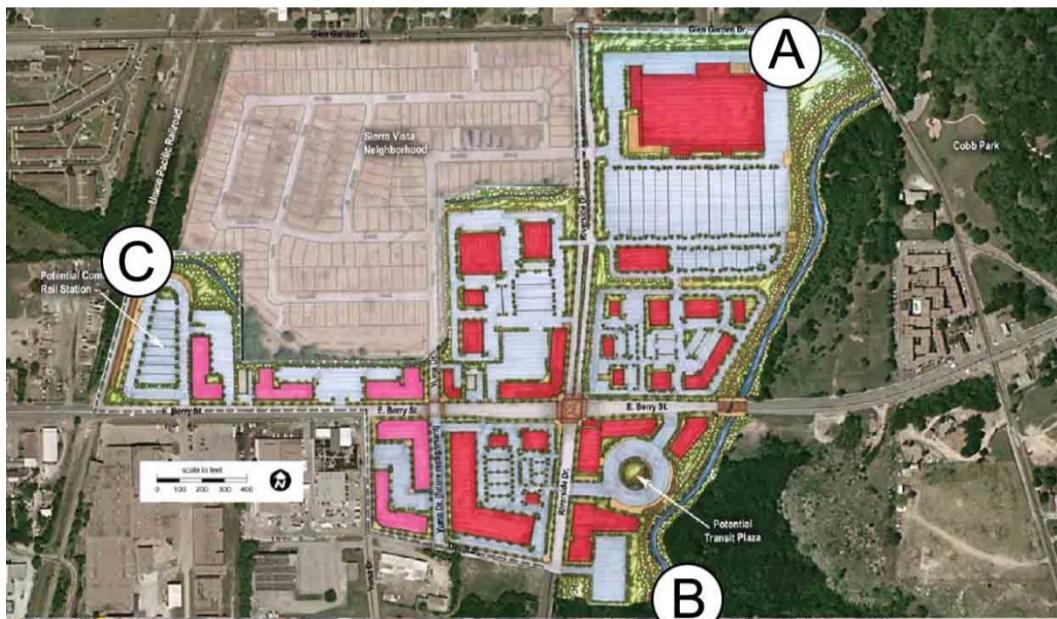
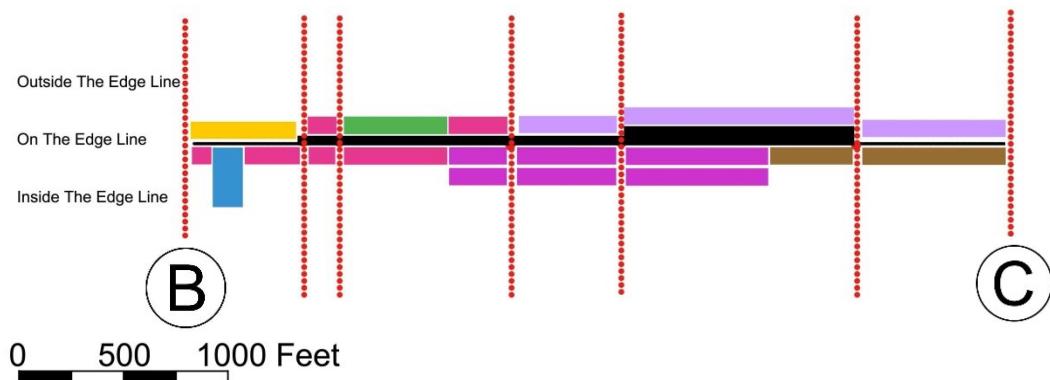


Figure 19: Berry and Riverside Urban Village Edge Line Divide Map



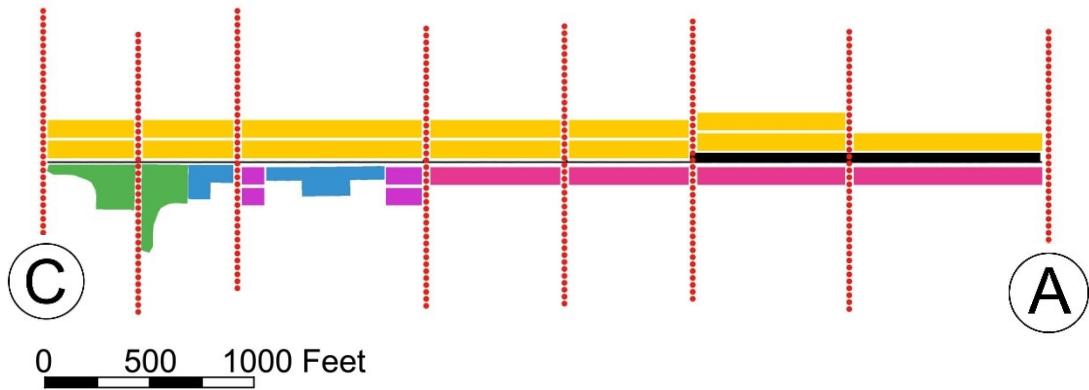
LEGEND

———	Land use next to each other	■	Commercial
———	Road 30 feet wide	■	Light Industrial
———	Road 50 feet wide	■	Park and Open Space
———	Highway	■	Mixed-use
•••••	Edge line turning point	■	Residential
=====	Railway	■	University Campus

Figure 20: Berry and Riverside Urban Village Edge Condition Analysis

Point B to Point C

As shown in Figure 20, there are three types of edges: 50 foot wide road, 30 foot wide road, and two land uses merged together. The land uses next to this section of edge are various. These land uses include four land uses inside the edge and four different land uses outside the edge. To reduce the interference between the urban village and the surrounding areas, all of the land uses are low density and the buildings are not higher than two stories.



LEGEND

— Land use next to each other	Commercial
— Road 30 feet wide	Light Industrial
— Road 50 feet wide	Park and Open Space
— Highway	Parking
..... Edge line turning point	Mixed-use
— Railway	Residential
	University Campus

Figure 21: Berry and Riverside Urban Village Edge Condition Analysis

Point C to Point A

Figure 21 illustrates the section of edge that is next to the new residential development. The land use on the outside of the edge is one or two story single family residential. The land uses on the inside of the edge are mostly one story commercial land use, and a section of mixed open space, parking, and two story mixed-use together. The edge where two land uses merge together is all low density development.

4.3.2.5. Using Consistent and Repeated units

The consistent and repeated units used in Berry and Riverside Urban Village development are blocks, streetscape, and zoning code. The new development places new buildings, parking lots, and green spaces inside the original blocks. Consistent streetscapes on the major streets go through the entire urban village area. The commercial use building foot prints are various, from 40 feet by 60 feet to 300 feet by 550 feet. These variously sized foot prints allow new developments to fit to different types of commercial uses, like grocery stores, restaurants, and retail. The foot prints in zones D and F, which are low density mixed-use, are mostly 60 feet wide.

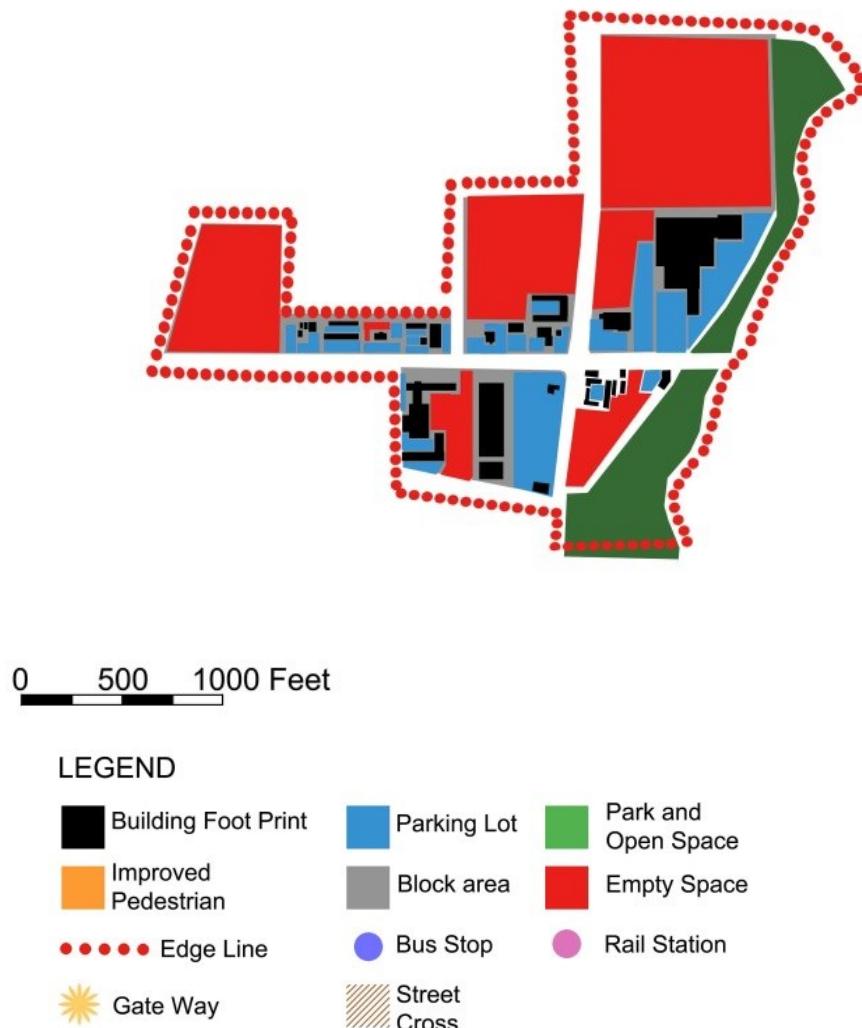


Figure 22: Berry and Riverside Urban Block Analysis

Before The Development

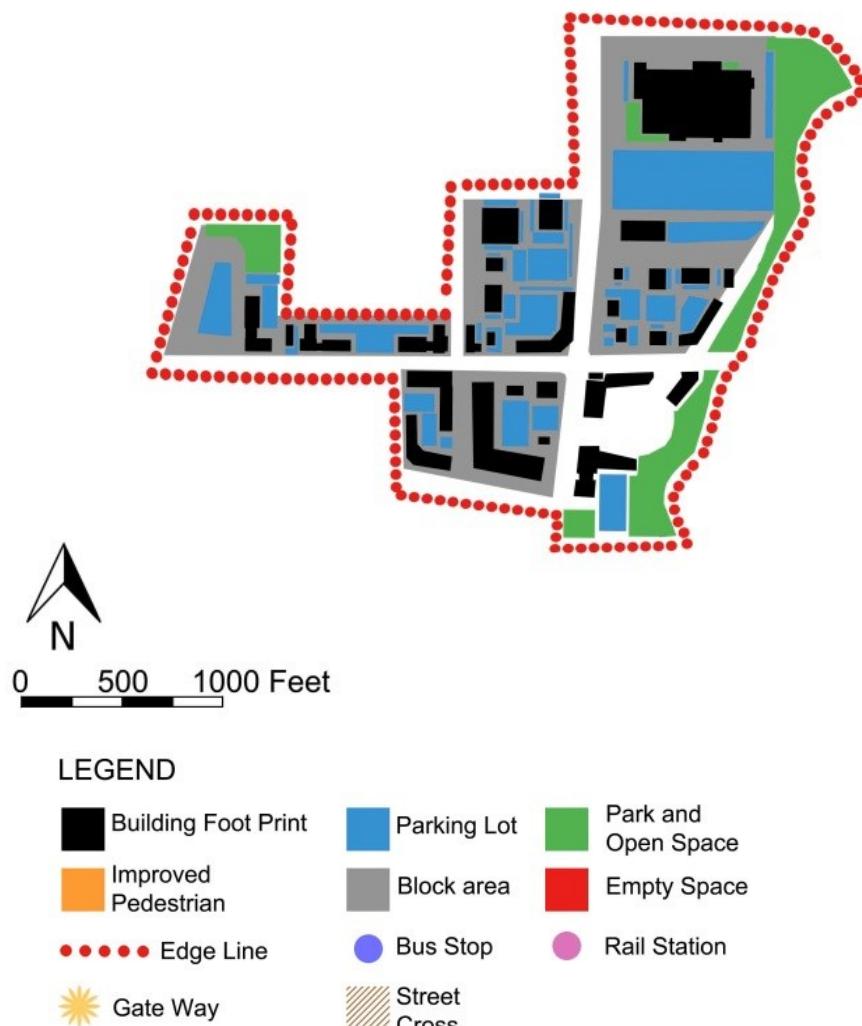


Figure 23: Berry and Riverside Urban Block Analysis

(As Depicted in Master Plan Document)

4.3.3. Berry and University Urban Village

4.3.3.1. Introduction

The area for the development of Berry and University Urban Village was identified in 2002 by the Commercial Corridors Taskforce. This village is located southwest of downtown Fort Worth. Berry Street runs through the heart of this urban village. This village is bounded by Bowie Street on the north, Devitt Street on the south, Rogers Avenue on the west, and Forest Park Avenue on the east. Texas Christian University (TCU) creates the north edge of Berry and University Urban Village. TCU provides a large population that can access this village area. By the summer of 2007, Berry and University Urban Village was developed with 244 apartments and 30,000 square feet of retail and office spaces. In addition, the streetscape of Berry Street is a model of pedestrian-oriented development (Fort Worth Urban Villages Berry/University Final Summary Report, 2007).

According to the master plan document of Berry and University Urban Village, the zoning in the south of this urban village is for single and two family residential development. Inside the edge of this urban village along the south side of Berry Street is zoned for commercial use and multi-family, and the north side is zoned for a community facility and two-family development. According to the master plan document, the new zoning in Berry and University is the MU-1 and the MU-2. The high density mixed-use development detailed by the development of townhouse, mixed-use type A for Commercial and loft use, type B for commercial and residential or office uses. The new development plan also extended the east edge of urban village to the Cleburne Street, to provide the urban village an opportunity to combine a rail station as a part of new development. The development concept plan divides the urban village into four areas.

Each area has different development recommendations based on the location and existing site conditions of the area.



Figure 24: Berry and University Side Urban Village Concept Master Plan
(Fort Worth Urban Villages Berry/University Final Summary Report, 2007)

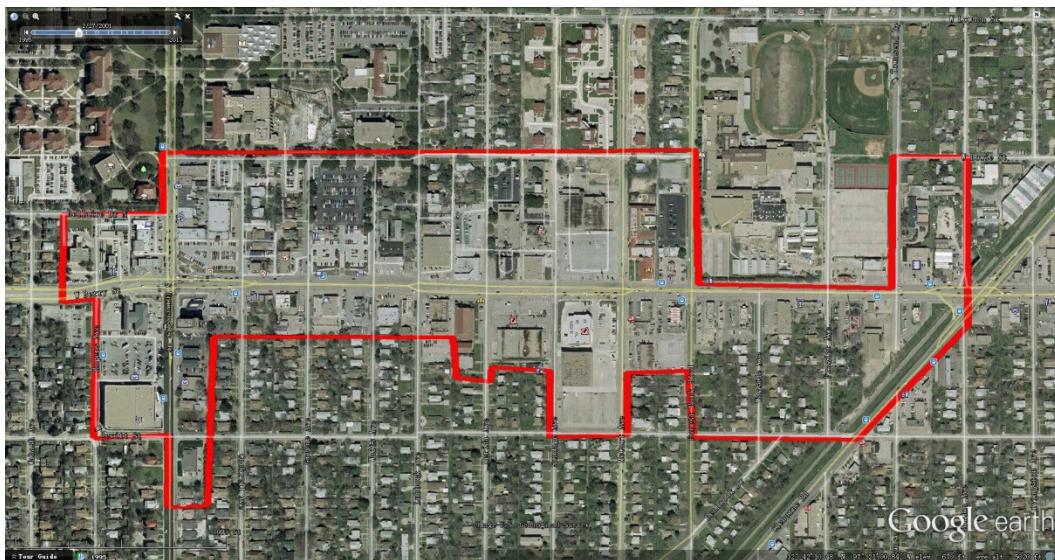
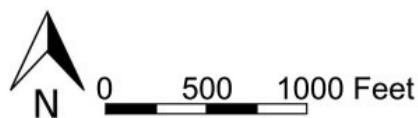
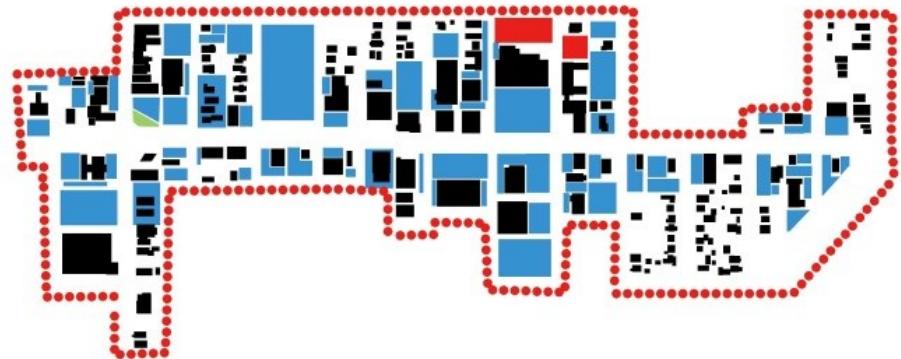


Figure 25: Berry and University Side Urban Village Area Map in 2001
(Pre-development)

4.3.3.2. Excess Capacity

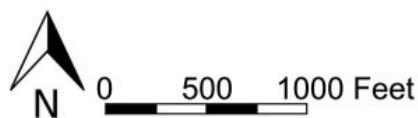
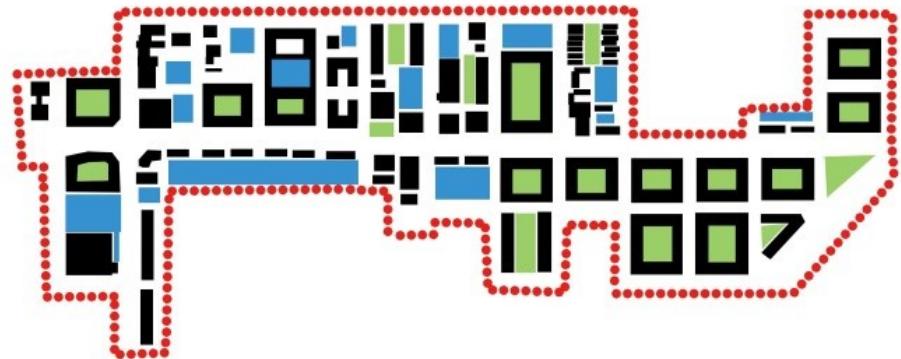
The zoning code of Berry and University Village did not change with the new development plan. According to the new development plan, 1,246 residential units, 522,381 square feet of commercial space, and 277,678 square feet of office space are to be built in this urban village. The development of Berry and University Urban Village differs from the development of other urban villages because Berry and University has few empty spaces that can be developed. Because this urban village is located right next to TCU, it has a high density zoning code, and most of the land in Berry and University has been developed into different density levels. The majority of extra spaces for new structures come from the redevelopment of parking lots. 391,440 square feet of parking area was involved for new structures redevelopment. The map of this urban village area in 2001 and the Master Plan document of Berry and University Urban Village are analyzed. In Figure 26, the buildings are illustrated by black blocks, parking is illustrated by blue blocks, and empty spaces that have not been used are illustrated by red blocks.



LEGEND

■ Building Foot Print	■ Parking Lot	■ Park and Open Space
■ Improved Pedestrian	■ Block area	■ Empty Space
•••• Edge Line	● Bus Stop	● Rail Station
★ Gate Way	▨ Street Cross	

Figure 26: Berry and University Urban Village Excess Capacity Analysis
(Before the Development)



LEGEND

■ Building Foot Print	■ Parking Lot	■ Park and Open Space
■ Improved Pedestrian	■ Block area	■ Empty Space
•••• Edge Line	● Bus Stop	● Rail Station
★ Gate Way	▨ Street Cross	

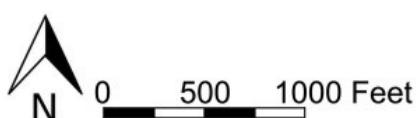
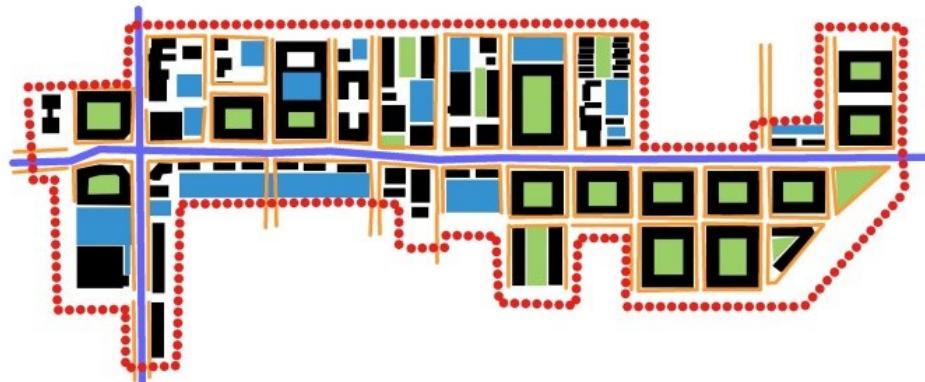
Figure 27: Berry and University Urban Village Excess Capacity Analysis

(As Depicted in Master Plan Document)

4.3.3.3. Improved Access

The development plan provides more value and accessibility to the Berry and University Urban Village area. This urban village is divided into four zones. According to the development recommendations, zone 1 uses the MU-2 zoning to provide high density mixed-use development; zones 2 and 3 use the MU-1 zoning to provide a low density of mixed-use including retail, commercial, and office space development; and zone 4 uses a transit-oriented development (TOD) to develop the ability for Berry and University to be a transition center. In this way, Berry and University Urban Village offers many choices for its residents, visitors, and surrounding community.

The improvement of accessibility and mobility focuses on the mobility of pedestrians. The streetscape offers wider sidewalks, brick paving for crosswalks and mid-block crossing improved pedestrian level lighting, ADA standard ramps, and street furniture. Public transportation is improved by adding bike lanes to the streets and a train station on the east side. On-street parking and parking structures are planned to adapt to the needs for more parking. The streetscape on Berry Street and South University Drive is improved to allow smooth and slow traffic. The areas of improvement, including the streetscape, bus station, and rail station, are illustrated in Figure 28.



LEGEND

Building Foot Print	Parking Lot	Park and Open Space
Improved Pedestrian	Block area	Empty Space
••••• Edge Line	Bus Stop	Rail Station
★ Gate Way	Street Cross	

Figure 28: Improvement of Access in Berry and University Urban Village

4.3.3.4. Reduced Interference Between Parts

According to the Master Plan document of Berry and University Urban Village, the development of this area is sensitive to the impact of its development on its surrounding areas. The high density and tall building development in Zone 1 creates a distinctive edge between the north side of Berry and University and TCU's campus, which

can bring people into the urban village. The development of Zone 2 includes the MU-1 zoning, which fits into the existing low density mixed-use development and thus creates less interference with its single family residential surrounding community. Zone 3 is designed as a transitional area with low density mixed-use development to merge with the existing single family development.

According to the master plan document of Berry and University Urban Village, there are multiple land uses next to edge. The edge includes 12,890 feet of road, of which 970 feet is fifty-foot wide road. The edge also includes 930 feet of railway. The inner side of the edge line consists of 370 feet of parks and open spaces, 2,420 feet of parking lots, and 2,380 feet of residential areas. The remainder of the inner edge is mixed-use development. The outer side of the edge line consists of 4,984 feet of TCU campus. 6,450 feet of the outer side of the edge line is residential development, and the remainder is mixed-use.

Figure 29 illustrates the entire edge line of Berry and University Urban Village. Four points are marked in this Figure in order to segment the line for further analysis. Figure 30, Figure 31, Figure 32, and Figure 33 illustrate the entire edge line divided into four segments, with each segment connecting two of the points demarcated in Figure 29.

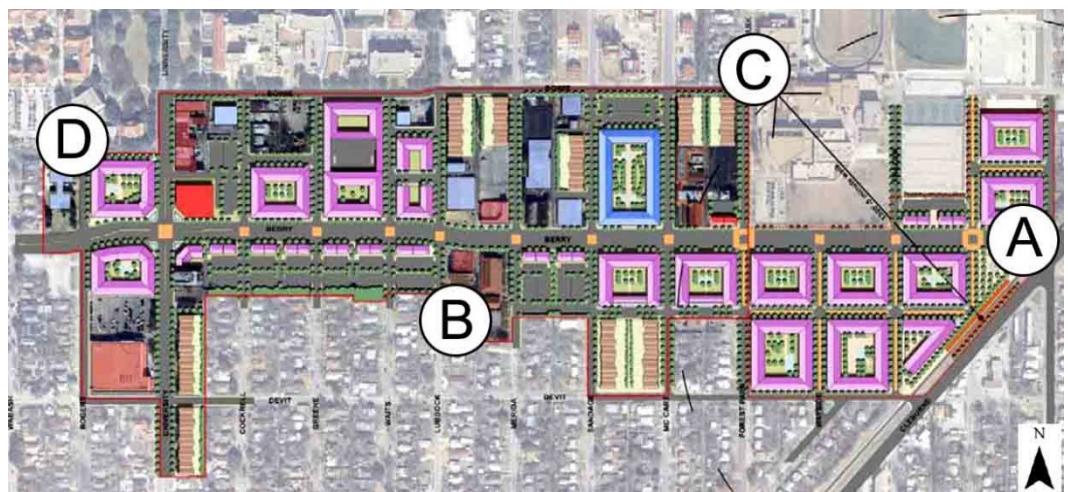
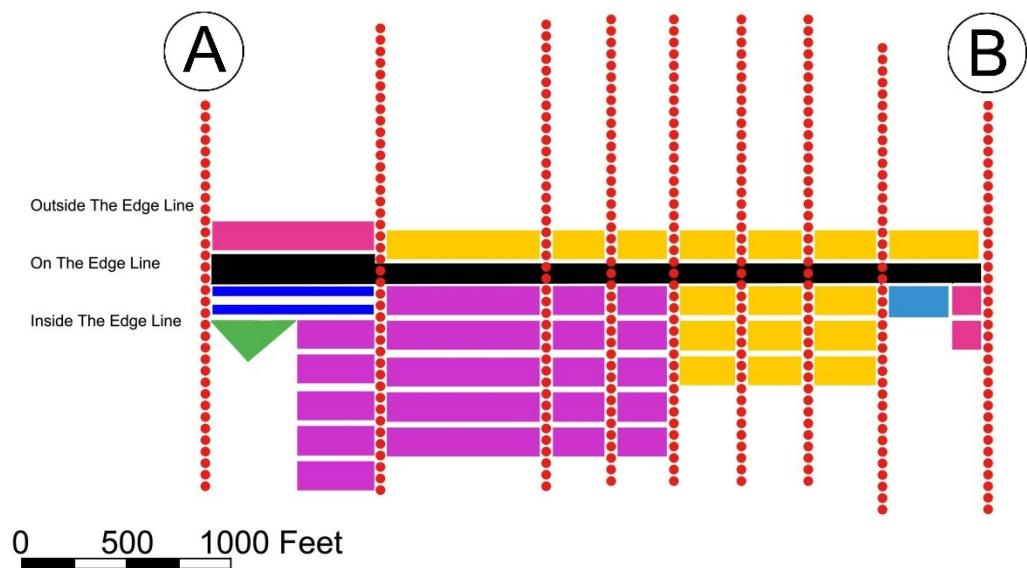


Figure 29: Berry and University Urban Village Edge Line Divide Map

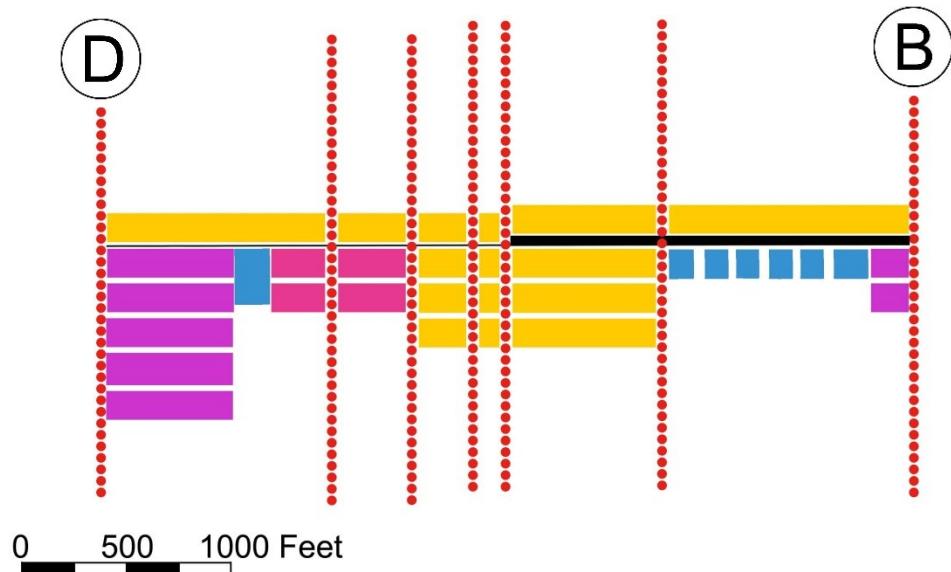


LEGEND

—	Land use next to each other	■	Commercial
—	Road 30 feet wide	■	Light Industrial
—	Road 50 feet wide	■	Park and Open Space
—	Highway	■	Parking
•••••	Edge line turning point	■	Mixed-use
—	Railway	■	Residential
		■	University Campus

Figure 30: Berry and University Urban Village Edge Condition Analysis

Point A to Point B



LEGEND

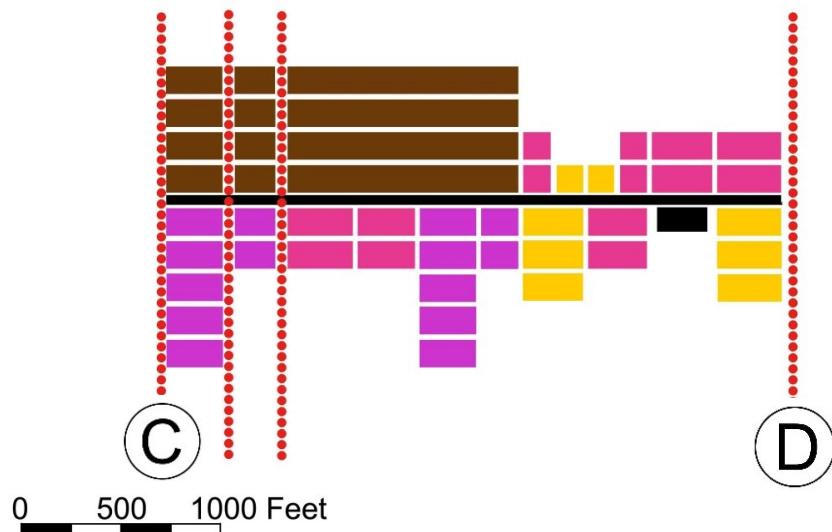
—	Land use next to each other	■	Commercial
—	Road 30 feet wide	■	Light Industrial
—	Road 50 feet wide	■	Park and Open Space
—	Highway	■	Parking
•••••	Edge line turning point	■	Mixed-use
—	Railway	■	Residential
		■	University Campus

Figure 31: Berry and University Urban Village Edge Condition Analysis

Point D to Point B

Figure 30 and Figure 31 illustrate the south edge of Berry and University Urban Village, which is next to a low density single family residential area. About one fourth of the edge is roads. Inside the edge, the section where land uses merge together includes low density commercial use, high density mixed-use of retail and residential, and multi-

family use. Other land uses that are next to roads are multi-family, parking, low density mixed-use, high density mixed-use of retail at ground floor and residential above it, railway, and open space.

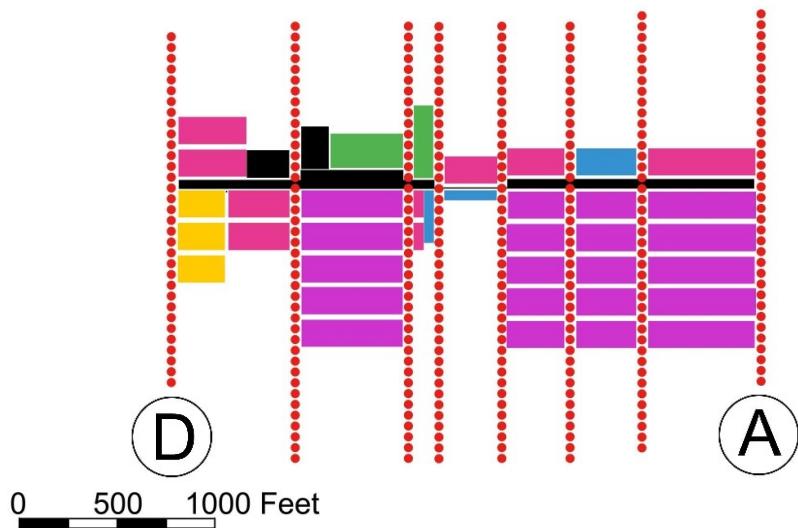


LEGEND

—	Land use next to each other	■	Commercial
—	Road 30 feet wide	■	Light Industrial
—	Road 50 feet wide	■	Park and Open Space
—	Highway	■	Parking
.....	Edge line turning point	■	Mixed-use
—	Railway	■	Residential
		■	University Campus

Figure 32: Berry and University Urban Village Edge Condition Analysis

Point C to Point D



LEGEND

—	Land use next to each other	■	Commercial
—	Road 30 feet wide	■	Light Industrial
—	Road 50 feet wide	■	Park and Open Space
—	Highway	■	Parking
.....	Edge line turning point	■	Mixed-use
—	Railway	■	Residential
		■	University Campus

Figure 33: Berry and University Urban Village Edge Condition Analysis

Point D to Point A

The north side of edge is illustrated in Figure 32 and Figure 33. In order to connect to the high density land use of TCU campus, the majority of land uses next to the north edge are high density land uses of mixed-use and residential with four or five story buildings.

4.3.3.5. Using Consistent and Repeated Units

The consistent and repeated units used in the development of Berry and University Urban Village are blocks, streetscape, and zoning code. The blocks size in Berry and University Urban Village did not change according to the development of the master plan. However, inside the blocks, the function and land use are changed to fit the development plan. The newly developed buildings infill existing buildings' empty spaces. Open spaces, parking lots, and parks are developed inside the original blocks. In Figure 34 and Figure 35, the gray areas represent the blocks inside Berry and University, the black areas represent the buildings, and the blue areas represent the parking lots. The streetscape improvements include the pedestrian and wide sidewalk design throughout the entire urban village area, which is used to create a consistent pedestrian-friendly environment in Berry and University Urban Village area. The building foot prints in this urban village show three types of building units that have been used in the master plan. The building unit for low density commercial use is a two story building with surface parking behind the structure. There are multiple buildings with this same architectural style; therefore, there is a strong relationship between the buildings and the street, and a pedestrian-friendly environment. The building unit for high density residential is a three story attached townhouse, which also creates a strong relationship between the building and the street, and a pedestrian-friendly environment. The building unit for high density mixed-use is a three to five story building. The building line is immediately next to the sidewalk and occupies the entire street block with an open space surrounded by building in the middle of the block. The ground story is for commercial use and the upper stories are for residential or office use. Parking is structured inside the building. The style of architecture reads as one building. Also, the building has a strong relationship between

the building and the street, and a pedestrian-friendly environment. These units unify the urban village environment, making the urban village easier to be identified and built.



Figure 34: Berry and University Urban Village Block Analysis

Before The Development



Figure 35: Berry and University Urban Village Block Analysis
 (As Depicted in Master Plan Document)

4.3.4. Near East Side Urban Village

4.3.4.1. Introduction

Near East Side Urban Village is located less than one mile east of downtown Fort Worth. According to the master plan document, the vision for the development of Near East Side Urban Village is as a major transportation corridor and center. I-30 highway is the north edge of this urban village, and I-35W highway creates the west edge. East Lancaster Avenue and Pine Street run through the center of the village. Near East Side

Urban Village is about 81 acres. Near East Side Urban Village uses the MU-2 zoning, which provides for higher density development than the MU-1 zoning. Surrounding this urban village are two schools and four parks located less than one mile away. In addition, the Fort Worth Transportation Authority runs bus lines through Near East Side Urban Village (Near East Side Urban Village Master Plan, 2007).

The existing zoning is high density mixed-use development. The land uses for this zoning code include commercial, institutional, and selected light industrial development. The existing land uses need to adapt to the vision provided by the master plan document for Near East Side Urban Village, which includes providing compact urban land development and offering a concentration of jobs, housing, public facilities, and recreational open spaces. The development vision is to achieve “a lively urban environment that is pedestrian-oriented, accessible to public transportation, and embodies a strong sense of place” (Near East Side Urban Village Master Plan, 2007, p. 21). The master plan divides the urban village into five zones, named from A to E.



Figure 36: Near East Side Urban Village Area Concept Master Plan
(Near East Side Urban Village Master Plan, 2007)



Figure 37: Near East Side Urban Village Area Map in 2001

(Pre-development)

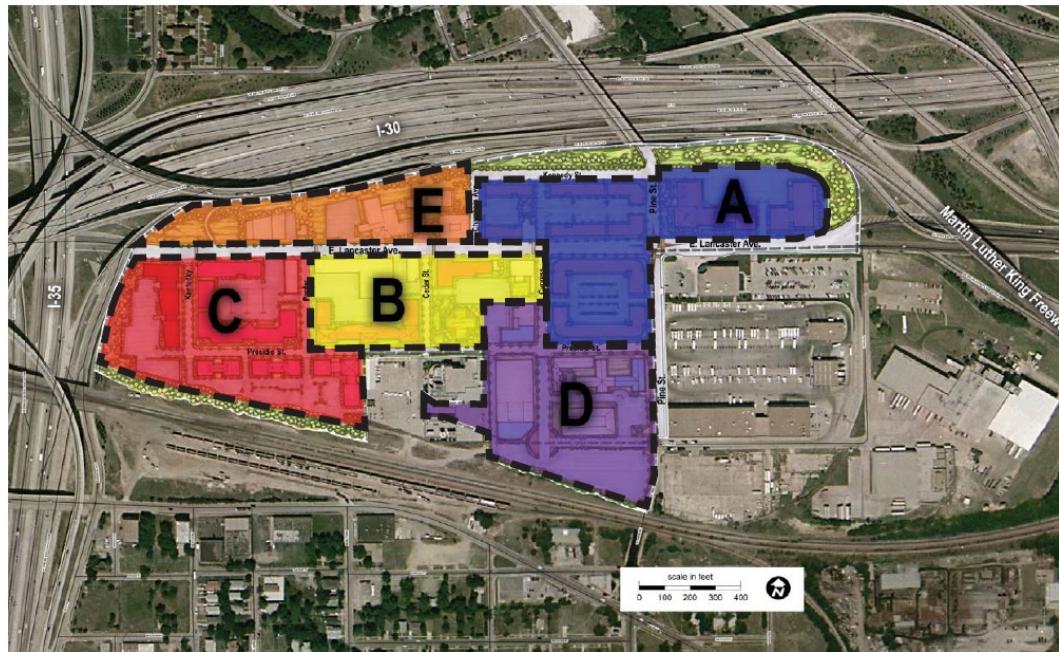
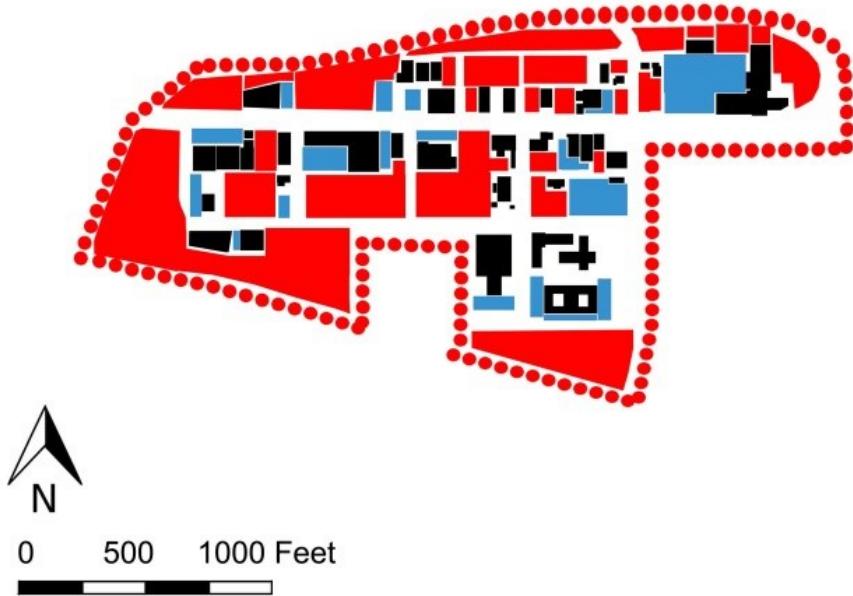


Figure 38: Berry and River Side Urban Village Divided Zones

4.3.4.2. Excess Capacity

According to the Mater Plan document of this urban village, the development of Near East Side Urban Village includes about 1,163,800 square feet of high density mixed-use, 630,700 square feet of residential space, 52,000 square feet of commercial use, and 2,055 parking spaces. The high density zoning allows the buildings to take vertical space to adapt to the master plan. New buildings and new parking lots are mostly built on undeveloped spaces, which are represented as red blocks in Figure 39. Except for zone E, which is occupied by existing buildings, all of the other zones achieve the development recommendations by using undeveloped spaces and existing parking lots. These empty spaces provide excess capacity by allowing for new buildings, parking lots, open spaces, and parks to be fit into the old blocks. These empty spaces support the new development to create new values for this urban village area, and help the existing city form more easily achieve the new master plan.

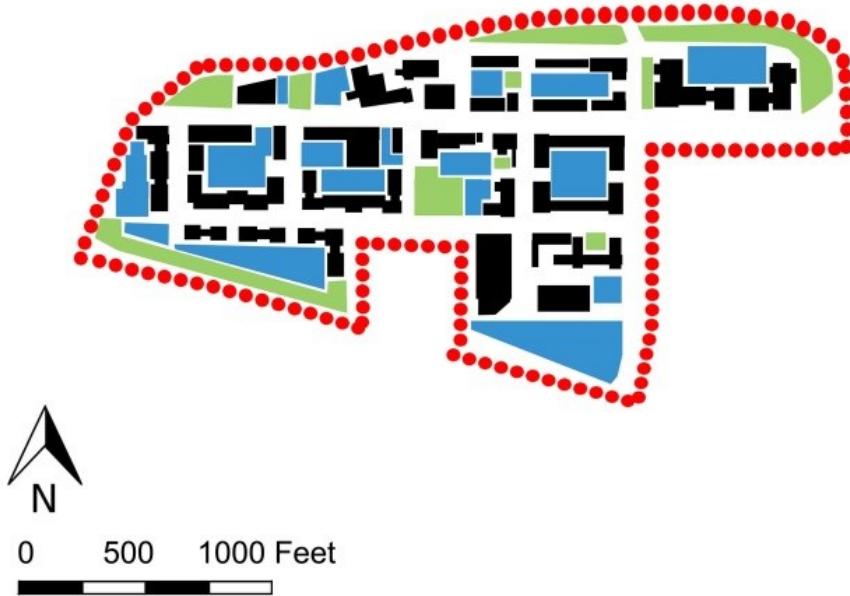


LEGEND

■ Building Foot Print	■ Parking Lot	■ Park and Open Space
■ Improved Pedestrian	■ Block area	■ Empty Space
••••• Edge Line	● Bus Stop	● Rail Station
★ Gate Way	▨ Street Cross	

Figure 39: Near East Side Urban Village Excess Capacity Analysis

(Before the Development)



LEGEND

Building Foot Print	Parking Lot	Park and Open Space
Improved Pedestrian	Block area	Empty Space
Edge Line	Bus Stop	Rail Station
Gate Way	Street Cross	

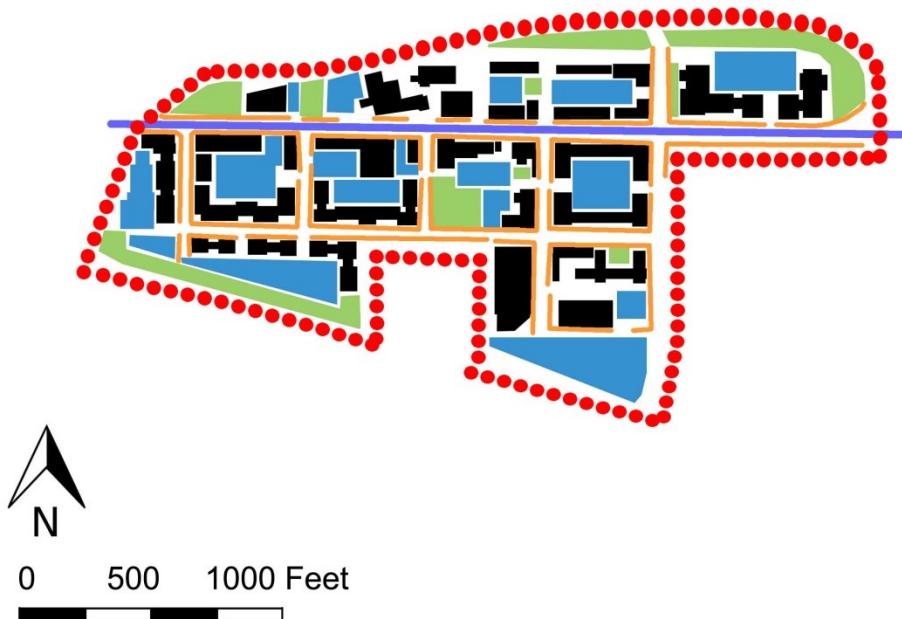
Figure 40: Near East Side Urban Village Excess Capacity Analysis

(As Depicted in Master Plan Document)

4.3.4.3. Improved Access

Near East Side Urban Village is located next to two main highways and is less than one mile from downtown Fort Worth. The improvements of accessibility in this urban

village include reconstruction of East Lancaster with gateways on both ends, new brick crosswalks, sidewalks that extend into surrounding communities, added pedestrian and traffic lighting, and a new bus stop for public transportation.



LEGEND

	Building Foot Print		Parking Lot		Park and Open Space
	Improved Pedestrian		Block area		Empty Space
• •	Edge Line	●	Bus Stop	●	Rail Station
★	Gate Way				Street Cross

Figure 41: Improvement of Access in Near East Side Urban Village

4.3.4.4. Reduced Interference Between Parts

The edge line of Near East Side Urban Village is not created by any residential areas. The north and west edges are created by highways I-30 and I-35. The majority of south edge line is created by railway. The remainder of the edge line is created by light industrial use areas. On the outside of the edge, the edge conditions are not as complex as other urban villages. The entire edge line is 8,950 feet long. The edge created by highway is about 3,900 feet. The edge created by railway is 1,800 feet. Along the inner side of the edge line are 5,000 feet of green belt, 1,130 feet of parking lots, 1,700 feet of mixed-use, and 800 feet of industrial use.

Figure 42 illustrates the entire edge line of Near East Side Urban Village. Three points are marked in this Figure in order to segment the line for further analysis. Figure 43, Figure 44, and Figure 45 illustrate the entire edge line divided into three segments, with each segment connecting two of the points demarcated in Figure 42.

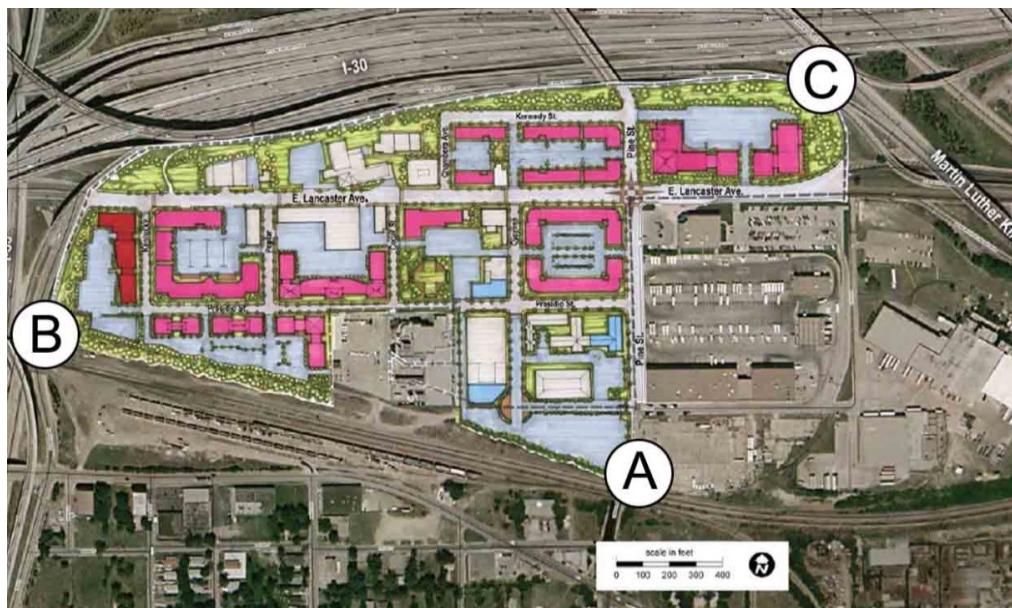
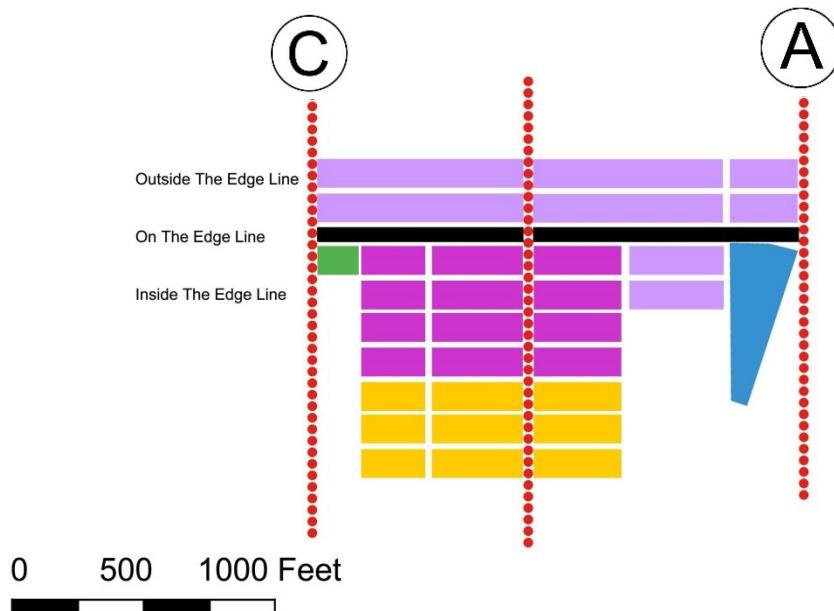


Figure 42: Near East Side Urban Village Edge Line Divide Map



LEGEND

—	Land use next to each other	■	Commercial
—	Road 30 feet wide	■	Light Industrial
—	Road 50 feet wide	■	Park and Open Space
—	Highway	■	Parking
•••••	Edge line turning point	■	Mixed-use
—	Railway	■	Residential
		■	University Campus

Figure 43: Near East Side Urban Village Edge Condition Analysis

Point C to Point A

Figure 43 illustrates the edge section C to A on the southeast side of Near East Side Urban Village. The edge is 30 foot wide road. As shown in this figure, the outside edge line is next to light industrial land use. The land uses inside the edge are open

space, parking, light industrial, and a high density mixed-use of commercial use for the lower four stories and residential use for the upper three stories.

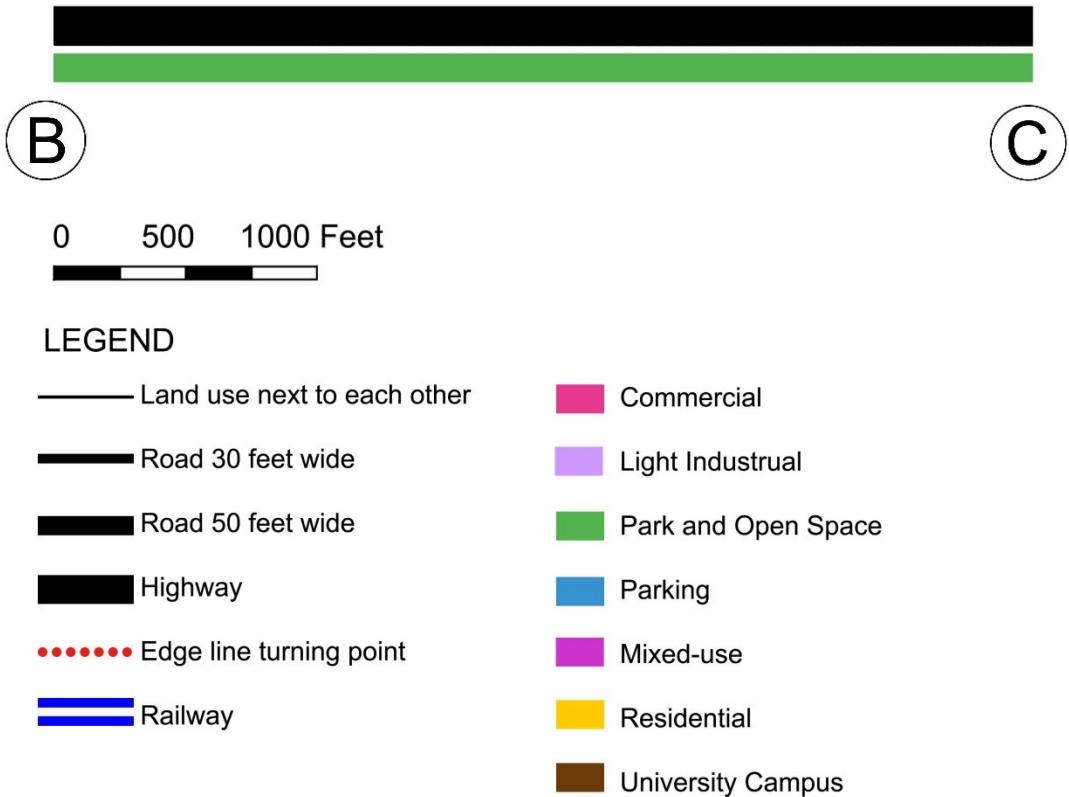
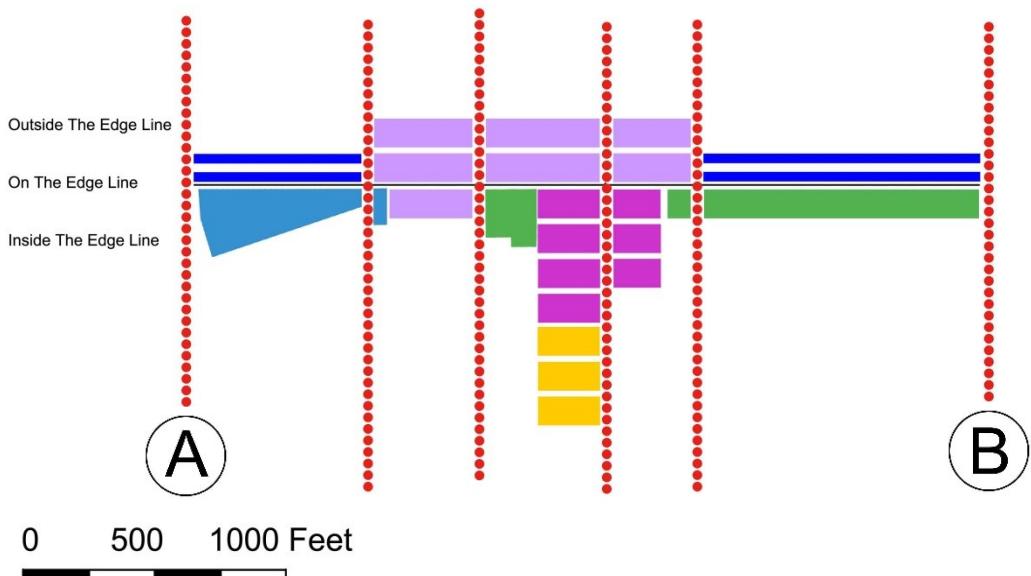


Figure 44: Near East Side Urban Village Edge Condition Analysis

Point B to Point C

In Figure 44, the condition of the north and northwest edge of Near East Side Urban Village is very simple. Outside this edge is highway with high speed traffic, which creates loud noise. A green belt inside the edge helps to reduce the interference between the highway and the urban village.



LEGEND

— — — Land use next to each other		Commercial
— — — Road 30 feet wide		Light Industrial
— — — Road 50 feet wide		Park and Open Space
— — — Highway		Parking
• • • • • Edge line turning point		Mixed-use
— — — Railway		Residential
		University Campus

Figure 45: Near East Side Urban Village Edge Condition Analysis

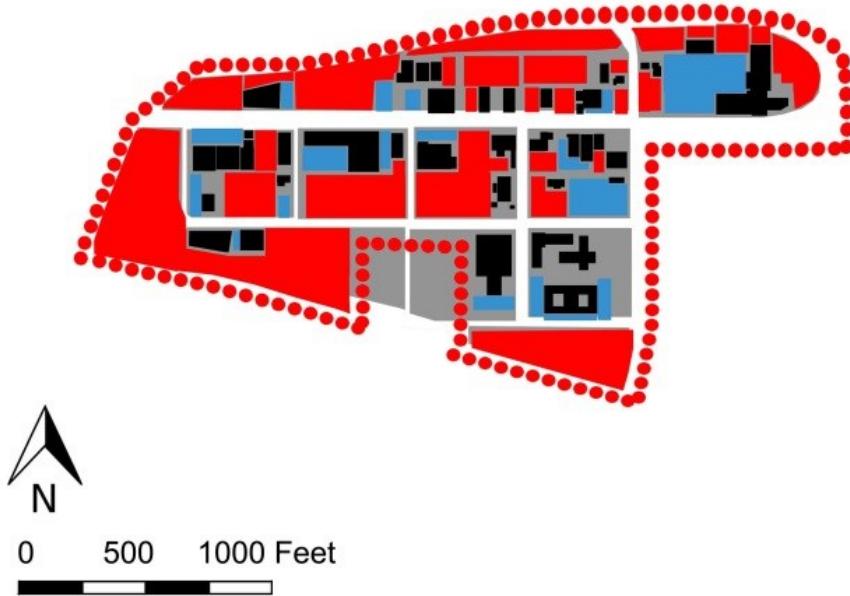
Point A to Point B

As illustrated in Figure 45, the land uses inside the edge that is next to the railway are open space and parking to create a distance between the railway and high density mixed-use. Light industrial land uses on the outside of the edge are merged with

high density mixed use, open space, parking, and light industrial land uses on the inside of the edge.

4.3.4.5. Using Consistent and Repeated Units

The consistent and repeated units that help Near East Side Urban Village adapt to its master plan are blocks, streetscape, and zoning code. The original block size in Near East Side Urban Village did not change in the development of the master plan. However, inside the blocks, the function and land use are changed to fit the MU-2 zoning code. The newly developed buildings fill into existing buildings. Open spaces and parking lots are developed inside the original blocks. In Figure 46 and Figure 47, the gray areas represent the blocks inside the Near East Side Urban Village area, the black areas represent buildings, and the blue areas represent parking lots. The streetscape improvements include the pedestrian and wide sidewalk design throughout the entire Near East Side Urban Village area to create a consistent pedestrian-friendly environment in this area. The high density mixed-use building foot prints generally have the same width of about 60 feet. Although the entire length of the buildings may be different, most of the building units extend about 100 feet along the street. This pattern provides a strong connection between the buildings and the sidewalks. Parking lots are set behind the building structures.



LEGEND

■ Building Foot Print	■ Parking Lot	■ Park and Open Space
■ Improved Pedestrian	■ Block area	■ Empty Space
••••• Edge Line	● Bus Stop	● Rail Station
★ Gate Way	▨ Street Cross	

Figure 46: Near East Side Urban Village Block Analysis

Before The Development



Figure 47: Near East Side Urban Village Block Analysis

(As Depicted in Master Plan Document)

4.4. Interview Data Analysis

This section summarizes the interviews of five key informants. The responses to the four main interview questions are organized by the questions themselves. Lynch's four methods of increasing adaptability of city form are identified by these key informants.

Also, how these methods were manipulated in the development of Fort Worth's Urban Villages program is explained.

4.4.1. Demographics

Five key informants are selected based on the standards in section 3.6. These key informants include two females and three males. Three key informants are professional landscape architects and two work at the Fort Worth Planning and Development department. Table 7 presents the characteristics of each key informant.

Table 7: Key Informants Demographic Information

	A	B	C	D	E
Gender	Female	Female	Male	Male	Male
Have basic knowledge about city form or urban form	Yes	Yes	Yes	Yes	Yes
Have a general understanding of the whole city form of Fort Worth	Yes	Yes	Yes	Yes	Yes
Have knowledge of Fort Worth's Urban Village program	Yes	Yes	Yes	Yes	Yes
Involved in Fort Worth's Urban Village Program	No	Yes	Yes	Yes	Yes
Work for City Fort Worth	No	No	Yes	Yes	No
Number of selected sites involved in	0	2	4	4	1

4.4.2. Excess Capacity

Key informant A divided the method of excess capacity into two main aspects. The first aspect is the capacity of new structures. According to informant A, the urban village areas had been centers of economic opportunities in the past. These urban village areas were underutilized and emptied out. Because of this, Fort Worth identified the top sixteen areas to put new economic development into in order to revive them. The second aspect is traffic capacity. She said that these urban villages were designed to allow for heavy traffic: "The urban villages were planning for excess growth."

According to key informant B, Berry and Riverside and Near East Side Urban Villages had excess capacity. There was “plenty of existing empty land for new structures” and “none of these corridors are overcrowded from a transportation perspective.” Informant B pointed out that the goal of development is to infill the empty spaces between existing buildings, vacant land, and underutilized land. Finally, informant B said that there were not many improvements to transportation as a method of excess capacity. For informant B, excess capacity is more about how to make transportation more multimodal.

Key informant C described the method of excess capacity in terms of the densities of the selected urban villages. The mixed-use zoning code allows the urban village areas to have higher density development. This means the urban village areas could have more capacity than what the zoning code in use prior to their development allowed. Finally, according to informant C, “The zoning code the MU-1 and the MU-2 give the excess capacity to the areas.”

In the interview with key informant D, he pointed out the urban villages were initially identified as the land with capacity for new structures and traffic. According to him, the development of the urban village areas was accomplished by infilling, reusing, or demolishing the existing buildings. For example, the development of Berry and University Urban Village used parking lots and underutilized buildings to create more space for new structures.

According to key informant E, “In Berry and University, the area was much underutilized based upon today’s standards of what could be developed in the area.” As he said, most of the underutilized lands identified for development were parking lots because too much space was devoted to automobile parking. Informant E explained that the development focused on maximizing the lot space that was available to increase the

square footage of building floor plates and accommodate the parking in a more efficient way.

4.4.3. Improved Access

According to key informant A, access was improved by improving the highway system of Fort Worth. Although the city did not plan the traffic system to specifically improve automobile access to each urban village, the improved highway system did improve the access to the urban villages. In addition, informant A reported that the design for improving access of the urban villages focused on the improvement of pedestrian accessibility.

Key informant B pointed out that the biggest aspect of improving access in the development of Near East Side Urban Village was the improvement to the pedestrian environment. According to her, although there are two highways next to the edge of this urban village, they only increased the visual access to Near East Side. The access between this urban village and the highways was not convenient. For Berry and Riverside Urban Village, the biggest improvement of access was building the transit center for public transportation. In addition, informant B reported that the pedestrian level access to the park and trail system next to Berry and Riverside was improved.

Key informant C discussed the process of improving access to the urban villages. According to him, the pedestrian environment of the urban villages is the most important aspect to be improved with development. As he said, a pedestrian-friendly environment is the basic element that supports the success of mixed-use development. Informant C pointed out that while most of the urban villages have not started to infill new structures, the improvements of wider sidewalks and street crossings have been completed. These improvements for pedestrians, he asserted, triggered the rebuilding of streetscapes to control the speed of traffic and increased the modes of transportation.

Key informant D identified the improvement of access as a focus on slowing down traffic and creating a pedestrian-friendly environment. According to him, these urban villages were the center of economic development. Most of these urban villages have good accessibility for automobiles; however, they did not have good accessibility for pedestrians. Therefore, as informant D said, the development of these urban villages is focused on providing wider sidewalks, more street furniture, increased on-street parking, and improved cross walks to make the environment more walkable and attract more businesses. Informant D also pointed out that the development encourages the use of multiple modes of public transportation, such as bikes, busses, and trains.

The method of improving access identified by key informant E is to decrease the use of the automobile and to develop in a way that allows for improved pedestrian access, bicycle access, and increased mass transit. According to informant E, the focus of transportation improvement should be on improving the pedestrian-friendly environment and identifying linkages to future rail stations, in order to create mass transit linkage.

4.4.4. Reduced Interference Between Parts

According to key informant A, the development of the urban villages created very little interference between the urban village areas and their surroundings. As she said, instead of creating interference, the urban villages created numerous benefits for the surrounding communities. The streetscape design and improvements to the sidewalks made the walking environment better for the surrounding communities, especially for Six Points Urban Village, which is surrounded by residential land use.

Key informant B reported that the major way of reducing interference was to provide better access to the urban villages' surrounding areas. According to her, for Near East Side Urban Village, the existing land uses inside the urban village needed to stay in

the urban village or be moved to a location nearby. For example, the social services land uses in the southwest districts of Near East Side needed to stay in that location because there is a hospital located on the outer edge of this district. However, the land uses of the east side of this urban village were recommended to be changed in order to smooth the transition between industrial land use and high density mixed-use. In addition, informant B pointed out that for Berry and Riverside Urban Village, the land uses surrounding the urban village were recommended to be changed to fit the urban village development. The land uses inside the edge were designed to fit into their surrounding land uses, like residential or park.

For the method of reduced interference between parts, key informant C provided an overview of how Fort Worth's Urban Village program influenced its surrounding areas, especially the areas between the urban villages and the Fort Worth downtown area. According to informant C, the urban villages did not compete with the downtown area; in fact, the development of the urban villages supported the development of the downtown area. The areas between the urban villages and the downtown area were developed to increase the connection between them. Therefore, informant C reported that different parts of city are better connected because of the development of the urban villages.

According to key informant D, the ways of reducing interference are creating value for the surrounding communities and using the Urban Residential (UR) zoning code to create a transition zone surrounding the urban village. As informant D pointed out, the land value of the residential area at south edge of Berry and University Village increased, which benefits the owners there. In addition, he reported that the students who live there are happy about the convenience that mixed-use zoning provides for them. In addition, informant D said that because the surrounding areas of Six Points Urban Village are

single families, the development plan recommended changing the zoning code to create a high density residential transition area next to the urban village edge.

Key informant E pointed out that most of the single family buildings are renter occupied. The development of mixed-use increases the value of these properties. In addition, the student lifestyle in these single family buildings and around TCU campus is very supportive of the mixed-use development there. The land uses next to single family buildings are lower density land uses. The land uses next to TCU campus are higher density land uses.

4.4.5. Using Consistent and Repeated Units

According to key informant A, following the form based codes of the City of Fort Worth unified the development of the urban villages. The block sizes remained the same to respect the history of the local districts. Also, maintaining the original block size helped to continue the historical vision of the urban villages. It helps the new structures to fit into local city form.

According to key informant B, to keep the old block is important for a general sense of new development. However, Berry and River Side Urban Village had bigger blocks that designers wanted to break down to small blocks because of the vision the land owners already had.

The method of using consistent and repeated units identified by key informant C is the zoning code. According to the zoning code for urban villages, all urban villages should have consistent but not the same streetscapes. The zoning code also provided a standard mixed-use building style. As informant C pointed out, this zoning code allows different uses to take place in the same style of buildings. The blocks remain the same to maintain the identity of the old districts and to fit into the old city form better.

According to key informant D, the consistent and repeated units used were the streetscape and the successfully developed urban villages. Informant D discussed similar details about how to use streetscapes as consistent and repeated units as the other informants. However, in contrast to the other informants, informant D believes the successfully developed urban village, such as West Seventh, is also a unit. As he said, other urban villages can repeat this successful development to increase their adaptability.

Finally, according to key informant E, the methods of using consistent and repeated units are the style of architecture and mixed-use zoning.

4.4.6. Conclusions of Interview Data Analysis

Five key informants provided their responses based on their understandings of Lynch's (1981) four methods of increasing adaptability. The findings of interviews data support the findings of map analysis. In addition, the findings of interviews show several other ways to increase adaptability. Section 5.1 provides more details for both maps and interviews data analysis.

Chapter 5

Conclusions

5.1. Introduction

This chapter summarizes the relationship between Lynch's (1981) four methods of increasing adaptability and Fort Worth's Urban Villages program. The city form change of Fort Worth's Urban Villages program is supported by Lynch's four methods of increasing adaptability. The four methods identified by Lynch helped these urban villages adapt to their master plans more easily. In addition, the interviews found several additional ways of increasing adaptability different from Lynch's four methods. It connects Lynch's four method of increasing adaptability to the real world.

5.2. Summary of Findings

5.2.1. *Excess Capacity in Four Selected Sites*

The analysis of the excess capacity shows how this method supports the adapting of new development plans into the four urban villages studied in this thesis. The major characteristic of excess capacity is the empty spaces that are developed for new structures and the capacity for managing increased future traffic. The empty spaces occupied about 26% of the urban village area in Six Points Urban Village, 60% in Berry and Riverside Urban Village, 10% in Berry and University Urban Village, and 35% in Near East Side Urban Village. The major source of empty space is undeveloped land, vacant land, underutilized land, and parking lots. The use of empty space did not have special preference, meaning their uses followed the vision of that specific urban village master plan. In addition, if the urban village needs to have high density development, higher buildings allow for new spaces to grow vertically.

5.2.2. Improved Access in Four Selected Sites

The analysis of improving access shows how this method supports the adapting of new development plans into the four urban villages studied in this thesis. The improvement of access in these urban villages is focused on creating a pedestrian-friendly environment and multiple ways of transportation. All four urban village master plan documents recommend wider sidewalks, ADA ramps, pedestrian level lighting, and street furniture. To better control the traffic in each urban village, the streetscapes of the streets that run though the center of the urban village were improved. These improvements are focused on slowing down the speed of traffic. All four urban villages use a traffic claiming system to improve the streetscape. Two of them, Six Points Urban Village and Near East Side Urban Village, narrow the streets down to two lanes to provide spaces for bike lanes, on street parking, and wider sidewalks. The other two urban villages do not narrow their streets because they have a transit center or a rail station on their sites, which require faster traffic. The improvements of access in these four urban villages also include enhancing the gateway feeling of entering the urban village and pedestrian extensions into their surrounding communities.

Urban villages require access to the resources of their surrounding environment. Six Points Urban Village is surrounded by residential communities, so the extension of its sidewalks is a net that sprawls a quarter of a mile away from the urban village core area. Berry and River Side Urban Village is next to Sycamore Creek. The master plan shows at least five ways to access the trail next to the creek. Berry and University Urban Village is next to TCU. The development uses the high buildings in the urban village area to create a visual access from the university campus. Near East Side Urban Village plans to reconstruct the access to the highway and improve pedestrian level access to the Fort Worth downtown area.

5.2.3. Reduced Interference Between Parts in Four Selected Sites

The analysis of reduced interference between parts shows how this method supports the adapting of new development plans into the four urban villages studied in this thesis. The four urban villages have different surrounding environments and edge conditions. In Six Points Urban Village, 76% of the edge is road, which is a hard edge used to separate this village from its surrounding environment. Also, 25% of the edge is parking or open spaces. The edge that divides street blocks merges low density land use and single-family residential use together. In Berry and Riverside Urban Village, 46% of the edge is road. The entire west edge is created by Sycamore Creek, which is more than 27% of the entire edge line. The edge that merges with new residential areas on the northwest side is next to low density mixed-use development. An important consideration for the issue of interference in Berry and University Urban Village is the fact that TCU campus is on the northern edge and residential housing is on the southern edge. The land use next to residential areas is low density mixed-use, and the land use next to TCU campus is high density mixed-use to continue the high density environment. In addition, only about 2,500 feet of the edge is not road, which means 80% of the edge is road. Near East Side Urban Village is isolated by surrounding highways and railways. This development creates value in the area and connects it to the surrounding communities. A green belt on the west and north side of the urban village area reduces the interference between the urban village and highway traffic.

The common solution to reduce interference is to use similar density or types of land use in the merged areas. Roads are commonly identified by the development as a boundary to separate an urban village away from its surroundings. The Urban Village program helps to reduce the interference between the communities in Fort Worth.

5.2.4. Using Consistent and Repeated Units in Four Selected Sites

According to Lynch (1981), the method of using consistent and repeated units to increase adaptability relates more to design details like building design and the types of materials used. On the master plan level, block sizes and zoning codes are the elements that relate to consistent and repeated units. The block sizes remain the same in the site condition maps and the development master plans in all of the selected sites. The zoning codes for the urban villages are the MU-1 and the MU-2 for low and high density mixed-use development. This unifies the urban village with the same streetscape, building height, and land use. Consistent architecture style is recommended in all of the master plan documents.

5.2.5. Beyond Lynch's methods

The findings of interviews show several different ways that could increase adaptability of city form for urban village development. They are summarized as follows:

- Select the site that provides the potential for the development. All urban village areas were planned centers for Fort Worth's future growth. They had excess of capacity of space and traffic. In the development of Berry and University Urban Village, a Berry Street Initiative group had improved the streetscape for Berry Street before the development of the urban village.
- Maximizing the usage of site's surrounding environment. This could mean better access to the surrounding environment, like the high density population of TCU for Berry and University Urban Village, or the trail next to Berry and Riverside Urban Village.
- Use the excess capacity as a way to reduce interference between parts. The urban village development provides a great opportunity to create

value for its surrounding communities. The changes of city form do not interfere with the existing city form around the urban villages. The changes of city form influence people's lives in the urban villages' surrounding areas in both positive and negative way. If the value that urban villages create is much more than the interference, like Berry and University Urban village, the interference can be ignored.

- Better communication with local communities and property owners also increases the adaptability of city form. The City of Fort Worth staff educated property owners and communities to understand the form-based code that was used in Fort Worth's Urban Village program. After they understood the value that the development could provide them, these people started to support mixed-use development because they understood it is highly predictable. Also, city and local groups provided services to develop their properties following the zoning code.
- Use the development-created funds for its development. Money is a major issue for Fort Worth's Urban Villages program. The vision of each urban village is clear according to their master plan documents. However, most of the urban villages have to wait for funds for their development. In the successfully developed urban villages, planners found that if the early-stage of development could increase the value of pay back and raise the property value, the development could create a fund for itself from the early-stages and attract new funds into the development.
- Give some politic rights to the local communities. The local communities have ways to slow the development down if they believe it is grotesque

or not going to work with the neighborhood. In the development of Fort Worth's Urban Villages, one existing community used their right to slow down the development. They adapted the project to create a better fit of architectural style with the neighborhood and the land use next to the urban village edge.

- A market study can give the development a true market sense. The development can have a clear development direction. Looking at it from market viability, the vision of development will provide a better fit for the local community and the whole vision of city.

5.3. Conclusions and Discussion

This thesis found that Lynch's four methods of increasing adaptability do support city form change in Fort Worth's Urban Villages program. The method of providing excess capacity provides more space for new structures or new land uses, for example, by using over built wide streets in the urban village areas to widen sidewalks and to provide on-street parking. The method of improved access helps to more conveniently reach the resources of an area in multiple ways. The improvement of the pedestrian environment plays an important role in Fort Worth's Urban Village program. This is because a pedestrian-friendly environment not only provides the convenient access to urban villages on the walking level, but also enhances the ambience of an urban village. The method of reduced interference between parts provides a hard edge or an edge that merges two similar land uses together to help the new development fit into its surrounding environment. In the development of Fort Worth's Urban Villages Program, the hard edges are roads, highways, parks, railways, or water. In addition, the soft edges in Fort Worth's Urban Villages program come from merging different types of land uses such as high density mixed-use and a university campus, or low density mixed-use and

single family residential areas. For the method of using consistent and repeated units, the units that have been identified in Fort Worth's Urban Villages program are blocks, building foot prints, streetscape, and zoning code and form-based code. The blocks consistently remain the same shape before and as depicted in master plan document. The streetscape design, size of the building foot prints, and mixed-use zoning code create a uniform landscape in each urban village area.

5.4. Implications for Landscape Architecture

Landscape architects can use the four methods of increasing adaptability identified by Lynch and the other methods identified through interviews with key informants to increase adaptability of city form during their design work. The analysis and findings of this research help designers make decisions during the process of creating master plans. Designers should consider the method of excess capacity and keep empty space for site development and site selection. The method of improved access increases the convenience with which the new development can be accessed. The method of reduced interference between parts increases the ease with which surrounding communities can accept the new development. Finally, using consistent and repeated units helps to reduce the cost of future changes and unifies the entire development area.

This research highlights the importance of adaptability for landscape architects. The results show a different way to understand the process of development: a way that includes a better understanding of the evolving site condition and not just the future vision for the development. This research also shows the connections between city forms and their functions and the human behaviors that drive those functions.

In addition, this thesis reinforces the concept of the urban village development as a solution to urban sprawl development. It provides a better understanding about the form of an urban village and how to adapt to it. Finally, from the interviews, this research

shows the differences between the theory of city planning and the planning process in the real world.

5.5. Future Research

The opportunities of future research can be divided into two major directions. One direction is adaptability of city form in real world projects. Another direction is development of urban villages. Both of these directions, like open ended questions, can have endless answers.

This thesis shows an example of how to analyze Lynch's (1981) four methods of increasing adaptability in real world projects. However, better data would result in more thorough analysis. For example, maps showing how new structures been added into vacant land could provide more useful information about how to identify and develop vacant land. In addition, if more sites with different amounts of vacant land are studied, researchers may be able to find more connections between the sizes and appropriate usages of vacant land. There is considerable valuable information contained within city form maps. With the help of these maps, landscape architects can identify more methods of increasing adaptability that can be used in the design process for different types of development.

This research shows several detailed methods that increase adaptability for the development of urban villages. Fort Worth's Urban Villages program is not yet fully realized. This research uses master plan documents to analyze changes in city form. These master plan documents are the beginning process of urban village development. The master plans may or may not change significantly during the development of the Urban Villages program. Some of the master plans have already been changed, for example, the change in location of the transit center in Berry and Riverside Urban Village. Why did these changes happen? Why at that time? Why did the same elements in other

urban villages not change? Research that follows the process of urban village development in the real world, and/or research that focuses on one element in multiple sites could help designers have a more clear understanding about how to design urban villages.

Finally, future research can focus on connecting Lynch's four methods of increasing adaptability and the real world development process. Lynch's theory does not include property value and their ownership or the political landscape of urban neighborhoods. This direction of research will make Lynch's methods not just seem functional; it will create avenues for them to be more thoroughly used in the design process.

Appendix A
IRB Approval Documentation



Office of Research Administration
Regulatory Services

817-272-3723

regulatorservices@uta.edu

<http://www.uta.edu/research/administration>

**Institutional Review Board
Notification of Exemption**

March 17, 2014

Chiyang Xu
Dr. Pat Taylor
School of Architecture

Protocol Number: 2014-0140

Protocol Title: *THE RELATIONSHIP BETWEEN LYNCH'S FOUR METHODS OF INCREASING ADAPTABILITY AND FORT WORTH'S URBAN VILLAGE PROGRAM*

EXEMPTION DETERMINATION

The UT Arlington Institutional Review Board (IRB) Chair, or designee, has reviewed the above referenced study and found that it qualified for exemption under the federal guidelines for the protection of human subjects as referenced at Title 45CFR Part 46.101(b)(2).

- (2)Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:(i) information obtained is recorded in such a manner that human subjects can be identified, either directly or through identifiers linked to the subject; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

You are therefore authorized to begin the research as of **March 17, 2014**.

Pursuant to Title 45 CFR 46.103(b)(4)(iii), investigators are required to, "promptly report to the IRB any proposed changes in the research activity, and to ensure that such changes in approved research, during the period for which IRB approval has already been given, are **not initiated without prior IRB review and approval** except when necessary to eliminate apparent immediate hazards to the subject." Please be advised that as the principal investigator, you are required to report local adverse (unanticipated) events to the Office of Research Administration; Regulatory Services within 24 hours of the occurrence or upon acknowledgement of the occurrence. All investigators and key personnel identified in the protocol must have documented Human Subject Protection (HSP) Training on file with this office. Completion certificates are valid for 2 years from completion date.



Office of Research Administration
Regulatory Services

817-272-3723

regulatoryservices@uta.edu

<http://www.uta.edu/research/administration>

The UT Arlington Office of Research Administration; Regulatory Services appreciates your continuing commitment to the protection of human subjects in research. Should you have questions, or need to report completion of study procedures, please contact Robin Dickey at 817-272-9329 or robind@uta.edu. You may also contact Regulatory Services at 817-272-3723 or regulatoryservices@uta.edu.

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PRINCIPAL INVESTIGATOR

Name: Chiyang Xu
Department: School of Architecture, Landscape Architecture Program
Cell Phone: 817-480-6053
Email: chiyang.xu@mavs.uts.edu

FACULTY ADVISOR

Name: Pat D. Taylor
Department: School of Architecture, Landscape Architecture Program
Email: pdt@uta.edu

TITLE OF PROJECT

THE RELATIONSHIP BETWEEN LYNCH'S FOUR METHODS OF INCREASING
ADAPTABILITY AND FORT WORTH'S URBAN VILLAGE PROGRAM

INTRODUCTION

You are being asked to participate in a research study about Fort Worth Urban Villages program. Your participation is voluntary. Refusal to participate or discontinuing your participation at any time will involve no penalty or loss of benefits to which you are otherwise entitled. Please ask questions if there is anything you do not understand.

PURPOSE

The purpose of this thesis is to identify the relationships between the four methods of increasing adaptability and the change in city form in Fort Worth's Urban Village program.

DURATION

Participation in this study will last approximately 60 minutes.

NUMBER OF PARTICIPANTS

The number of anticipated participants in this research study will not exceed 30.

PROCEDURES

The procedures which will involve you as a research participant include:

1. You will be given a introduction about the research.
2. Four interview questions will be read to you by investigator.
3. Each question will be written on a card and handed to you.
4. You will able to read each interview questions on cards and respond to these questions when you are ready.

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The interview will be audio recorded. After the interview, the tape will be transcribed, which means it will be typed exactly as it was recorded, word-for-word, by the researcher. The tape will be destroyed after transcription.

POSSIBLE BENEFITS

The results of this research are used to identify the relationship between Lynch's (1981) four methods of increasing adaptability and the change in city form of Fort Worth's Urban Village program. This research result helps urban designers apply them to design new cities or redeveloping cities. Finally, this research initiates a corpus of data on city form change, especially in relation to the four methods of increasing adaptability, which can provide a useful template for city planners and landscape architects.

POSSIBLE RISKS/DISCOMFORTS

There are no perceived risks or discomforts for participating in this research study. Should you experience any discomfort please inform the researcher, you have the right to quit any study procedures at any time at no consequence.

COMPENSATION

There is no compensation will be offered for participation in this study

ALTERNATIVE PROCEDURES

There are no alternative procedures offered for this study. However, you can elect not to participate in the study or quit at any time at no consequence.

VOLUNTARY PARTICIPATION

Participation in this research study is voluntary. You have the right to decline participation in any or all study procedures or quit at any time at no consequence.

CONFIDENTIALITY

Every attempt will be made to see that your study results are kept confidential. A copy of this signed consent form and all data collected [including transcriptions/tapes if applicable] from this study will be stored in University of Texas at Dr. Taylor's office after the end of this research. The results of this study may be published and/or presented at meetings without naming you as a participant. Additional research studies could evolve from the information you have provided, but your information will not be linked to you in anyway; it will be anonymous. Although your rights and privacy will be maintained, the Secretary of the Department of Health and Human Services, the UTA Institutional Review Board (IRB), and personnel particular to this research have access to the study records. Your records will be kept completely confidential according to current legal requirements. They will not be revealed unless required by law, or as noted above. The IRB at UTA has reviewed and approved this study and the information within this

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consent form. If in the unlikely event it becomes necessary for the Institutional Review Board to review your research records, the University of Texas at Arlington will protect the confidentiality of those records to the extent permitted by law.

CONTACT FOR QUESTIONS

Questions about this research study may be directed to Chiyang Xu at chiyang.xu@mavs.uta.edu or Professor Taylor at pdt@uta.edu. Any questions you may have about your rights as a research participant or a research-related injury may be directed to the Office of Research Administration; Regulatory Services at 817-272-2105 or regulatoryservices@uta.edu.

As a representative of this study, I have explained the purpose, the procedures, the benefits, and the risks that are involved in this research study:

Signature and printed name of principal investigator or person obtaining consent _____ **Date**

CONSENT

By signing below, you confirm that you are 18 years of age or older and have read or had this document read to you. You have been informed about this study's purpose, procedures, possible benefits and risks, and you have received a copy of this form. You have been given the opportunity to ask questions before you sign, and you have been told that you can ask other questions at any time.

You voluntarily agree to participate in this study. By signing this form, you are not waiving any of your legal rights. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue participation at any time without penalty or loss of benefits, to which you are otherwise entitled.

SIGNATURE OF VOLUNTEER _____ **DATE**

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Appendix B
Interview Participation Letter

Dear Participant:

My name is Chiyang Xu. I am a student of The University of Texas at Arlington in the program of Landscape Architecture.

I am writing a thesis about change in city form, which focuses on four methods of increasing adaptability of city form. These methods come from Lynch's "Good city form" theory. City form represents the physical layout and urban design of the city. The four methods of increasing adaptability are: improved access especially in terms of transportation; reduced interference between parts; use of standardized units; and increased space.

I want to use Fort Worth's Urban Village Program as an example to observe how these characteristics support urban form change.

Because of your knowledge of the Urban Villages Program, I want to invite you to be a participant in my research. A one hour interview will be a great help in the data collection for my research.

If you are interested, please respond with a time and place that will work for you.

If you know anyone who may interest to participate my research, I will very honor to contact with he/she to be a part of my research.

Thank you very much!

Chiyang Xu

Chiyang.xu@mavs.uta.edu

The University of Texas at Arlington, School of Architecture
Program in Landscape Architecture

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Biographical Information

Chi yang Xu was born in Hangzhou, Zhejiang, China. He always has the interest in the connection between nature and artificial environment. He received his bachelor's degree of Art and Design from Nanjing University of Science and Technology in 2009. After half year working experience in Landscape Architecture firm in Nanjing, Chi yang Xu came to the United States in 2010 to study Landscape Architecture at the University of Texas at Arlington. He studied in the Program of Landscape Architecture for four years for the purposes of obtaining his master's degree. He is looking forward to continually working in this field to make high quality design for people.