DAYTON TRANSPORTATION PLAN 2040

CITY OF DAYTON, OHIO | DECEMBER 2016

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CHAPTER 1: INTRODUCTION

In 2015 the City of Dayton sought a visionary plan that would serve as a guide for the design of transportation projects for the next 25 years - Dayton Transportation Plan 2040. While the City continues to embrace its industrial past, growth in the healthcare, education, and business sectors are diversifying its economy. Historic population loss has plateaued, and Dayton's centers of higher learning are attracting and retaining a bright young workforce in search of urban living. These economic and population changes are just some of the trends that have led to a reduction in automobile travel demand and an increase in excess roadway capacity. Alternative and active modes of transportation are growing across the country, and many cities are turning to a new concept in roadway design that accommodates the needs of all modes, including walking, bicycling, and transit. Recognizing the importance of this trend for its economic growth and vitality, Dayton decided that embracing the principles of Complete Streets would best suit its needs over the coming decades.

1.1 What are Complete Streets?

Complete Streets welcome all users. They make it easy to cross the street, take the bus, bicycle to work or school, and deliver freight. They also acknowledge the importance of private automobiles, and maintain access for motorists while increasing space for these other modes. Complete Streets are designed to enable safe and convenient access regardless of age, ability, or mode of transportation.

Complete Streets are context sensitive and come in many shapes and sizes depending on the surrounding land use. Some common elements that many Complete Streets share are sidewalks, bicycle facilities, traffic calming elements such as narrowed lanes or median islands, and green infrastructure, like street trees and bioswales.

1.1.1 Complete Street Policies

Smart Growth America's report on The Best Complete Streets of 2014 lists over 70 jurisdictions, four of them in Ohio. In total, there are 16 active Complete Streets policies in Ohio, including the Miami Valley Regional Planning Commission and Riverside, a suburb of Dayton.

Over 700 jurisdictions have Complete Streets policies across the country, from municipalities and regional planning organizations to states, counties, and transportation authorities. The National Complete Streets Coalition looks for the following elements when judging the quality of Complete Streets policies:

1. Vision
2. All users and modes
3. All projects and phases
4. Clear,accountable exceptions
5. Network
6. Jurisdiction
7. Design guidance
8. Context sensitivity
9. Performance measures
10. Implementation steps

For more information on these elements, please visit Smart Growth America's website at http://www.smartgrowthamerica.org/complete-streets.

Questions and concerns regarding design guidance and context sensitivity arose during discussions with Dayton Transportation Plan 2040 stakeholders. These categories are described in more detail below.

1.1.2 Design Guidance

It is not necessary to start from scratch when developing Complete Street design guidelines. Communities can use nationally recognized design standards developed by groups like the American Association of State Highway Officials, Institute of Transportation Engineers, Americans with Disabilities Act, the Public right-of-way Accessibility Guidelines, Model Design Manual for Living Streets, and state Departments of Transportation:

> *...The City will generally follow accepted or adopted design standards when implementing improvements intended to fulfill this Complete Streets policy but will consider innovative or non-traditional design options where a comparable level of safety for users is present.*
> *(Rochester, MN)*

> *The latest design guidance, standards, and recommendations available will be used in the implementation of Complete Streets, including the most up-to-date versions of...*
> *(Salem, MA)*

The Complete Street Design Guidelines developed for Dayton Transportation Plan 2040 are based on nationally recognized standards from organizations including the

Figures 1.1-1.2: Street life in Dayton, past and present (Downtown E Third Street, left, E Fifth Street in the Oregon District)

Federal Highway Administration, National Association of City Transportation Officials, American Association of State Highway and Transportation Officials, and on a survey of Complete Street plans from cities including Cleveland, Boston, and San Francisco.

1.1.3 Context Sensitivity

A Complete Streets policy must be developed and implemented in a context-sensitive method. Robust polices address neighborhood character, existing and future land use, and the prevalence of different travel modes.

The Complete Streets Local Policy Workbook, published by Smart Growth America, recommends the following:

> *An effective Complete Streets policy must be sensitive to the type of neighborhood and the land uses along roadways...Including a statement about context can help align transportation goals and land-use planning goals, creating livable, strong neighborhoods.*

The workbook refers to Dayton's Livable Streets Policy as a prime example of incorporating these ideas:

> *The implementation of this Policy shall reflect the context and character of the surrounding built and natural environments, and enhance the appearance of such.*

1.2 Dayton Transportation Plan 2040

Design guidance and context play leading roles in Dayton Transportation Plan 2040. Guidance on Complete Street design is at the heart of the plan, and Dayton's Complete Street Typologies, which classify the City's entire street network, are context-sensitive, defined primarily by adjacent land use.

This plan also incorporates existing transportation policies and plans, including Dayton's Livable Streets Policy, Zoning Code, Greater Downtown Plan, 2025 Bicycle Action Plan, and CitiPlan Dayton: 20/20 Vision.

Chapter One explains how, through public involvement, research, and analysis, the goals and objectives from these policies and plans inform the vision for Dayton Transportation Plan 2040.

Chapter Two describes the Planning Process. During this phase, the project team conducted a Needs Assessment that took a comprehensive inventory of Dayton's existing transportation network and demographic composition. Growth and development patterns, demographic trends, and economic indicators were analyzed to understand who uses Dayton's transportation network and how.

The project team also surveyed a selection of the City's existing street network to find examples of Complete Streets within Dayton. This exercise revealed what a Complete Street in Dayton currently looks like, relative to the rest of the network, and it identified streets that support high-density, multimodal activity as well as streets that offer opportunities for improvement. This exercise revealed the transportation network's strengths and weaknesses. It also provided a baseline evaluation of the network, against which future progress may be compared.

Chapter Three examines the Complete Street design elements that Dayton and other cities have used to incorporate complete streets elements in their roadways. Design elements are divided into six categories:

In **Chapter Four**, the Complete Street elements are formed into a set of Design Guidelines and applied to Dayton's Complete Street Typologies. The guidelines show what kinds of roads will benefit from different design elements. They are based on existing and planned land uses, roadway classifications, existing right-of-way requirements, and design standards for green and sustainable streets. The project team defined 13 Complete Street Typologies for Dayton:

① **Pedestrian Facilities**

② **Bicycle Facilities**

③ **Transit**

④ **Traffic Calming**

⑤ **Streetscape**

⑥ **Green Infrastructure**

1. Very Large Mixed Use
2. Large Mixed Use
3. Medium Mixed Use
4. Small Mixed Use
5. Very Large Commuter
6. Large Commuter
7. Very Large Industrial
8. Large Industrial
9. Medium Industrial
10. Small Industrial
11. Large Neighborhood
12. Medium Neighborhood
13. Small Neighborhood

Existing conditions, opportunities for improvement, and challenges for each street typology are identified, and graphic renderings demonstrate how the Complete Street Design Guidelines can reshape Dayton's roadways into more active, livable environments.

Chapter Five addresses overall implementation of the plan, including implementation principles and considerations for near-, mid-, and long-term projects. It also reviews the steps that individual Complete Street projects follow, and provides a methodology for prioritizing projects.

This plan is not only a guide, but a tool. It provides the methodology and recommendations needed to assure that Dayton's streets will accommodate changing land use and shifts in travel behavior over the coming years. As Dayton implements Dayton Transportation Plan 2040, it will enhance already successful streets and transform opportunity roadways into vibrant corridors that complement surrounding land uses, promote economic development and create a safer, more efficient transportation system that accommodates the needs and desires of all users.

CHAPTER 2: PROJECT BACKGROUND

Dayton Transportation Plan 2040 began with a review of Dayton's existing policies and plans. This process helped the project team understand how and why the City decided to undertake a comprehensive transportation plan, what accomplishments have been attained and what obstacles remain.

Incorporating existing policies and plans into Dayton Transportation Plan 2040 allows the City to build upon already-identified assets, needs, and goals. The project team integrated existing plans and their visions, goals, and objectives during a two-step process. Step One consisted of an internal analysis of the City's plans, with thorough review and annotation of a number of plans and policies, centered primarily around these four documents:

- Greater Downtown Plan
- 2025 Bicycle Action Plan
- CitiPlan Dayton: 20/20 Vision
- Livable Streets Policy

Analysis of these plans' visions and objectives revealed one overarching goal. Dayton continues to strive towards a multimodal transportation network that accommodates all roadway users: pedestrians, bicyclists, public transit users, freight, and motorists. This goal is divided into specific objectives in Dayton's existing plans. For example, the 2025 Bicycle Action plan proposes to increase the City's League of American Bicyclists Bicycle Friendly Community status from Bronze to Platinum by 2025; and CitiPlan 20/20 encourages the expansion of adequate and affordable regional public transportation, as well as an active pedestrian environment throughout the City. Dayton Transportation Plan 2040 seeks to balance these goals with provisions for motorists and other roadways users who are unable to use modes of active transportation (i.e. biking, walking, and transit).

While these plans cover a wide range of objectives, from education to evaluation and enforcement, Dayton Transportation Plan 2040 focuses primarily on infrastructure and physical improvements to the roadway network.

2.1 Public Involvement

During Step Two, the project team sought public input to validate or modify analysis of the existing plans. Meetings were organized to seek input from the general public and from stakeholders.

- Stakeholder Meeting 1: September 10, 2015 Presented project background, introduced project team, and identified stakeholder roles and responsibilities.
- Public Involvement Meeting 1: October 15, 2015 Presented project background, Complete Streets principles, and road map for Dayton Transportation Plan 2040.
- Public Involvement Meeting 2: October 27, 2015 Presented project background, Complete Streets principles, and road map for Dayton Transportation Plan 2040.
- Stakeholder Meeting 2: December 10, 2015
  Update on public involvement efforts. Presented draft of Visions, Goals, and Objectives; Benchmark Case Studies; Transportation Needs Assessment; and Methodology for Project Prioritization.

Beyond the meeting room, team members conducted walk and bike audits with neighborhood residents throughout the City, assessing conditions for pedestrians, bicyclists, transit riders, and other road users. Residents identified problem areas and assets in their neighborhoods, allowing the team to gain an on-the-ground perspective of Dayton's existing transportation system.

- Field work: October 2, 2015 Documented existing conditions for Transportation Needs Assessment
- Public Involvement Fieldwork: October 24, 2015
  Led bike and walk audits and post-audit discussion.
- Public Involvement Fieldwork: October 27, 2015
  Led walk audit and post-audit discussion.
- Field Work: October 29, 2015 Documented existing conditions for Transportation Needs Assessment
- Field Work: February 27, 2016 Documented existing rights-of-way to determine street typology dimensions.
- Field Work: June 5, 2016 Documented examples of Complete Street treatments in Dayton.

Online and social media platforms were also used to reach the public, primarily through the City's website.

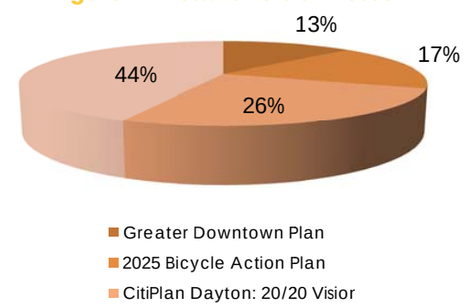
During stakeholder meetings, transportation-related visions, goals, and objectives from existing plans were divided into three categories:

1. Multimodal Transportation
2. Safety and Accessibility
3. Maintenance and Improvements

Stakeholders selected the goals and categories that they thought were most important to consider while developing an overarching vision for Dayton Transportation Plan 2040. Stakeholders represented groups such as the Miami Valley Regional Planning Commission, Bike Miami Valley, Greater Dayton Regional Transit Authority, University of Dayton, and various City of Dayton departments. 44 percent of stakeholders identified the goals of Dayton's Livable Streets Policy as essential building blocks for Dayton Transportation Plan 2040's vision (refer to Figure 2.1).

2.2 Livable Streets Policy

Figure 2.1: Stakeholder Votes



Dayton's Livable Streets Policy, developed in 2010, is guided by the following vision and goals:

2.2.1 Vision

All users of the surface transportation network, including motorists, pedestrians, bicyclists, mass transit, children, senior citizens, individuals with disabilities, freight carriers, emergency responders, and adjacent land users, will experience a visually attractive and functional environment while travelling safely and conveniently on and across all surface roadways within the City of Dayton.

2.2.2 Goals

- Ensure the needs of all users are balanced throughout the surface transportation network to the greatest reasonable measure.
- Incorporate the vision, purpose, and goals of this Policy into all aspects of the project development process for surface transportation projects.
- Create a balanced, comprehensive, integrated, fully interconnected, functional, and visually attractive surface transportation network.
- Promote the use of the latest and best "complete streets" design standards, principles, policies, and guidelines within the context of the community.
- The Livable Streets Policy provides a robust foundation for the current plan. While the vision and goals are clearly articulated, the steps needed to achieve them remain largely undefined. Dayton Transportation Plan 2040 provides detailed guidance to help Dayton attain its envisioned multimodal transportation network.

Greater Downtown Plan

- Continue to create a transportation network for the Greater Downtown that serves the needs of pedestrians, bicyclists, public transit users, and motorists, and stimulates future development
- Implement a Downtown Circulator by 2017
- Identify capital and operating funding plans for three priority projects identified in the Greater Downtown Dayton Riverfront Master Plan
- Double cycling mode share compared to 2014 levels in the Greater Downtown
- Increase the number of people renting canoes and kayaks for the downtown river by five times over 2012 levels
- Develop and implement a comprehensive signage and wayfinding system for the Greater Downtown

Goals and Objectives Themes

- **Multimodal Transportation**
- **Safety and Accessibility**
- **Maintenance and Improvements**

2025 Bicycle Action Plan

- Expand the network of dedicated off-street shared-use trails
- Expand the network of on-road bicycle facilities
- Provide yearly bicycle-related training to Civil Engineering Staff
- Support citizens in choosing bicycling for recreation and transportation
- Support bicycling for commuting, recreation, health, economic development, and tourism
- Continue Bike to Work and Bike to School events
- Bicycle Registration Program
- Increase bicycle mode share
- Improve the City's LAB Bicycle Friendly City Status
- Training: law enforcement personnel
- Implement programs for data collection and tracking
- Establish first-time offender diversion programs for bicyclists
- Continue enforcement of existing bicycle related traffic and zoning laws Increase officer visibility Crash Reporting
- Increase citizen knowledge of bicycling laws and etiquette
- Bicycle Plan Maintenance
- Improve maintenance of bicycle facilities

CitiPlan Dayton: 20/20 Vision

- Relate land use decisions to the existing urban service area and avoid further urban sprawl
- Direct the region's aviation-related resources to Dayton International Airport as the region's primary aviation facility
- Advocate for an Ohio "3-C" (Cincinnati-Columbus-Cleveland) high-speed rail route with a stop in downtown Dayton
- Encourage the availability of adequate, affordable public transportation to job sites, shopping areas, and other community resources locally and regionally
- Ensure that seniors, people with disabilities, and other special populations have access to our transportation system
- Improve the existing interstate system by redesigning the I-75/I-70 interchange and improving I-75 through Dayton
- Maintain our existing rail freight capabilities
- Focus available resources on the rehabilitation and reconstruction of the current roadway system

Livable Streets Policy

- All users of the surface transportation network, including motorists, pedestrians, bicyclists, mass transit, children, senior citizens, individuals with disabilities, freight carriers, emergency responders, and adjacent land users, will experience a visually attractive and functional environment while travelling safely and conveniently on and across all surface roadways within the City of Dayton
- Ensure the needs of all users are balanced throughout the surface transportation network to the greatest reasonable measure
- Incorporate the vision, purpose, and goals of this Policy into all aspects of the project development process for surface transportation projects
- Create a balanced, comprehensive, integrated, fully interconnected, functional, and visually attractive surface transportation network
- Promote the use of the latest and best "complete streets" design standards, principles, policies, and guidelines within the context of the community

CHAPTER 3: TRANSPORTATION NEEDS ASSESSMENT

Conducting a Needs Assessment is an important component of Dayton Transportation Plan 2040. During this step, the project team undertook a comprehensive inventory of Dayton's existing transportation network, land use patterns, and demographic composition. Growth and development patterns, demographic trends, and economic indicators were analyzed to understand who uses Dayton's transportation network and how. Data related to the transportation network's performance, capacity, infrastructure improvements, and other metrics were collected during site visits, interviews, review of existing plans and policies, walk and bicycle audits, and public meetings. Agencies such as the Miami Valley Regional Planning Commission (MVRPC) and the Greater Dayton Regional Transit Authority (RTA) also contributed data regarding local travel behavior, transit ridership, congestion, and more. Finally, the Needs Assessment uses federal sources, including the US Census, the National Household Travel Survey, and the Longitudinal Employer-Household Dynamics program to supplement local and regional data.

The project team also surveyed a selection of the City's existing street network to find examples of Complete Streets within Dayton. This exercise revealed what a Complete Street in Dayton currently looks like, relative to the rest of the network, and it identified streets that support high-density, multimodal activity as well as streets that offer opportunities for improvement. This examination of existing conditions within the study area revealed the transportation network's strengths and weaknesses. It also provided a baseline evaluation of the network, against which future progress may be compared. The Needs Assessment informed how Dayton's street network is classified (refer to Chapter 4) and what Complete Street features are appropriate for different street typologies.

This chapter is divided into two main sections: Community Profile examines characteristics of the public, and Travel Environment examines the way in which the public travels. Together, these sections describe the population in general, where people live, work, and recreate, and the relationship between the modes and travel routes they choose within the City.

3.1 Community Profile

3.1.1 Population

With an estimated population of 140,600 in 2015, Dayton is the sixth largest city in Ohio and the fourth largest metropolitan area. In 2010, Dayton's population was approximately 141,500 people, continuing a several decades' long decline from a population over 262,000 in the 1960's. Between 2000 and 2010 the population declined by over 24,000 people, at a rate of 13.5 percent. Since then, the decline has leveled off and the city saw a slight increase in population in 2011. Dayton is one of only four metropolitan regions in Ohio–the

Figures 3.1-3.2: Downtown living in Dayton

Figure 3.3: 2000 Population

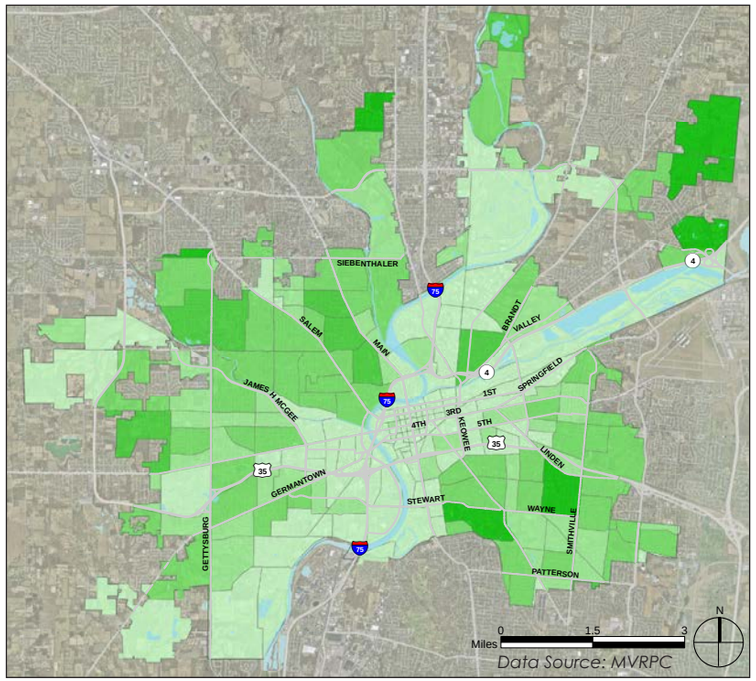


Figure 3.4: 2010 Population

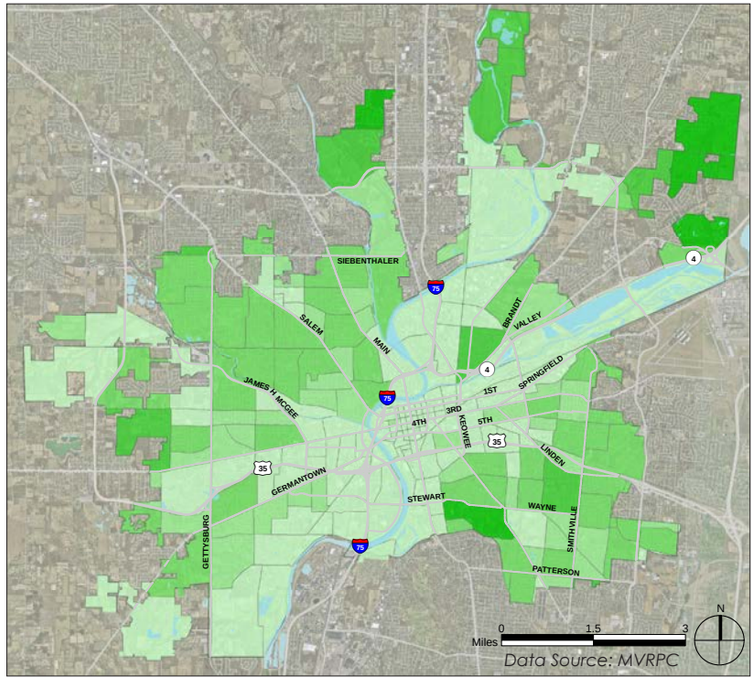
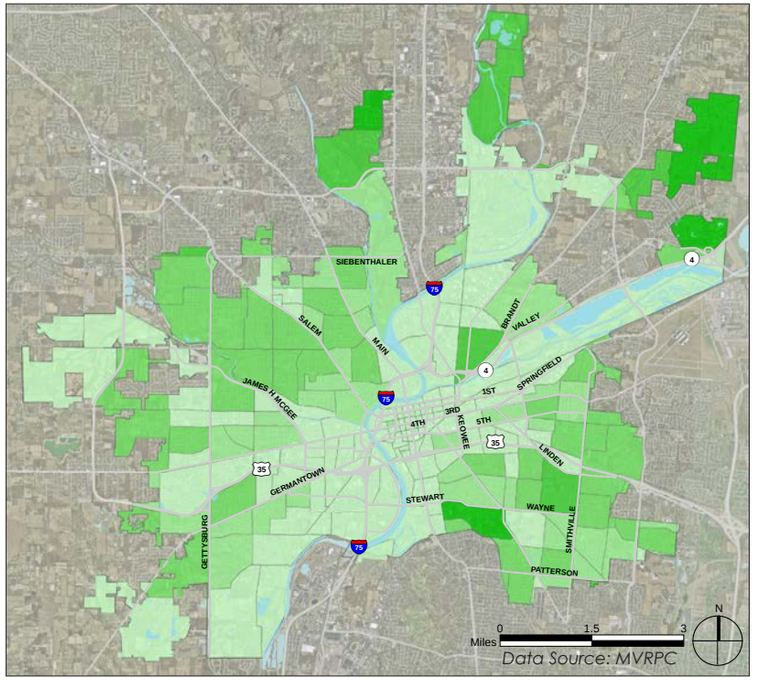


Figure 3.5: 2040 Population (projected)



others being Columbus, Cincinnati, and Akron—that have seen population increases over the last several years.

Several trends contribute to Dayton's above average performance compared to its peer cities in Ohio. Downtown Dayton and its surrounding neighborhoods offer the amenities of urban living without the increased cost found in bigger cities, such as Cincinnati and Columbus. More and more people seek urban experiences where they can live, work, and play in the same neighborhood, without relying on a car every time they go out. Over 2,000 people live Downtown, an increase in Downtown housing construction will continue to grow the number of people living Downtown, attracting people from the suburbs and other parts of the region who seek a more urban lifestyle.

Along with a growing Downtown population, the City has seen an influx of immigrants in recent years. Between 2010 and 2013 the foreign-born population increased by over 2,400 people, or 58.8 percent, compared to native-born growth of only 0.3 percent. Recognizing this trend as a valuable asset to Dayton's renascent economy, in 2011 the City launched Welcome Dayton, a community initiative that promotes immigrants' economic, social, and cultural integration into the greater Dayton region. Immigrants are drawn to Dayton's affordable cost of living (seven percent below the national average) and nationally acclaimed colleges and universities.

The City's growth can also be attributed to its role as a center of higher education. In 2015, CBS News ranked Dayton the third best up-and-coming town for college graduates in the country and in 2010 it was named one of the best cities for college graduates to find a job. There are 56 colleges within 50 miles of Dayton, and over 50,000 students enrolled in the three largest schools (Sinclair Community College, Wright State University, and University of Dayton). These institutions attract and retain a young, highly skilled workforce within the region. Over 24,000 University of Dayton alumni work within a 60 miles radius of Dayton.

Population and employment maps (Figures 3.3-3.8) use Traffic Analysis Zones (TAZ) to show changes over time. Population and job numbers are displayed for the years 2000, 2010, and 2040 (projected).

Residents by TAZ
- 0 - 600
- 601 - 1200
- 1201 - 2400
- 2401 - 3600
- 3601 - 6050
- Major Roads
- Corporation Boundary
- Water

Figure 3.6: 2000 Employment

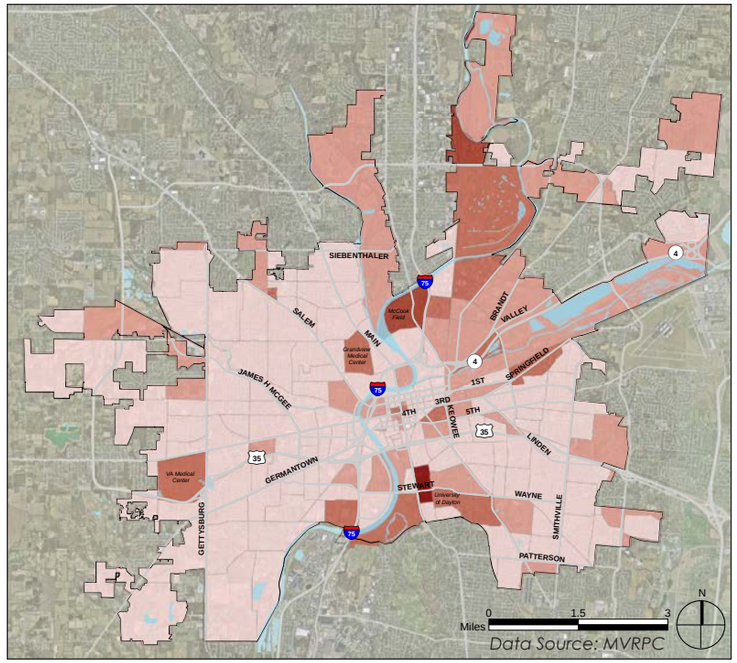


Figure 3.7: 2010 Employment

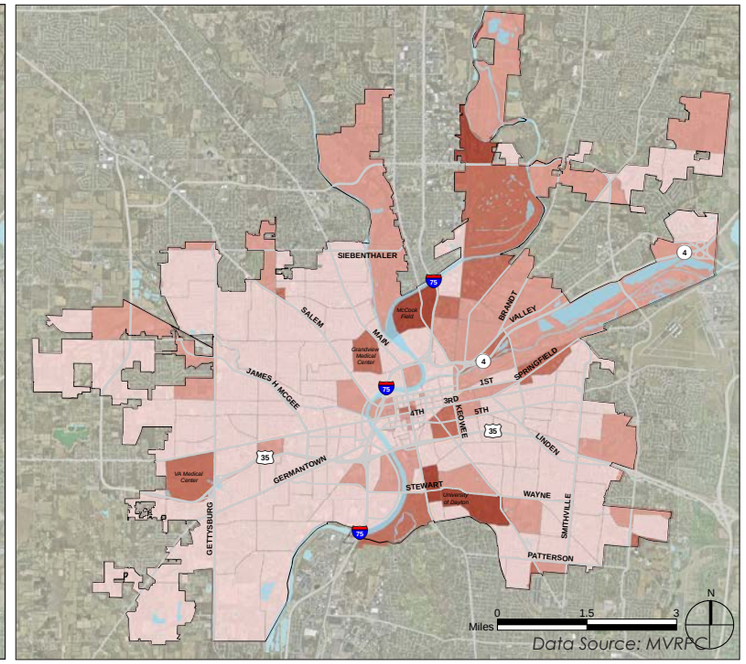
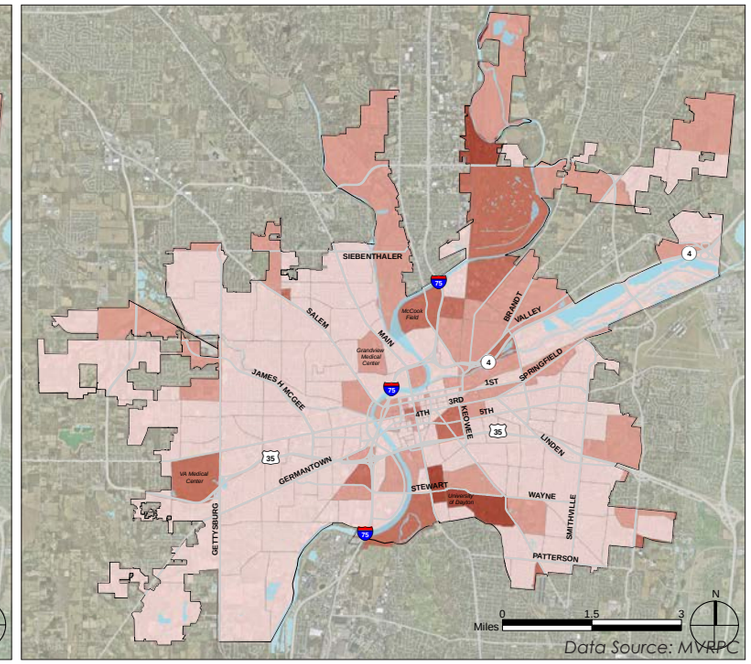


Figure 3.8: 2040 Employment (projected)



Although Dayton's population has fluctuated, its population density remained relatively stable between 2000 and 2010, as shown in Figures 3.3 and 3.4. The City's northwest and southeast quadrants (particularly around the University of Dayton) have the highest population density, together with several outlying neighborhoods such as Pheasant Hill in the northeast and Northridge Estates in the north central part of the City. The Central Business District claims fewer residents, and will continue to be less populated than residential neighborhoods through 2040, despite the expected increase in Downtown living. The City's southwest and near north areas will also remain sparsely populated relative to other neighborhoods, due in part to their industrial land uses.

3.1.2 Income

The City of Dayton's median 2010–2014 household income (in 2014 dollars) was $28,174. Median income for Dayton is considerably lower than that of Ohio ($48,849) and the United States ($53,482). Dayton also has a high proportion of people living in poverty, at 35.3 percent. Lower household income limits the transportation choices available to the traveling public, shifting preferences from costlier forms of travel such as private vehicles to less expensive modes (walking, bicycling, and transit). Households that continue to rely on private vehicles see a greater share of their expenses consumed by transportation.

3.1.3 Employment

In 2010, approximately 78,844 persons were employed in Dayton. Paralleling the decline in population, between 2005 and 2010, the City lost 20,396 jobs at a rate of 20.6 percent over the five-year period. However, from 2010 to 2013, Dayton gained approximately 7,000 jobs, a 9 percent increase in three years, and a faster rate of employment growth than the region as a whole.

There are several major employment centers within Dayton's city limits, as shown in Figures 3.6-3.8. Thousands of employees work at major institutions in the City, including the University of Dayton (3,055 employees), the VA Medical Center (2,200 employees), Sinclair Community College, and Grandview Medical Center.

In addition to education and healthcare jobs, manufacturing and logistics account for much of Dayton's employment—and economic—activity.

Workers by TAZ
- 0 - 500
- 501 - 1500
- 1501 - 3000
- 3001 - 6000
- 6001 - 9000
- Major Roads
- Corporation Boundary
- Water

Figure 3.9: Bicycle Facilities on Brown Street near University of Dayton

Figure 3.10: Main entrance to VA Medical Center

Table 3.1: 2012 Work Trips

	Workers	Drove Alone	Carpool	Public Transit	Walked	Other Means	Worked at Home	0 Vehicle Households
City of Dayton	53,652	72.00%	10.50%	5.30%	8.10%	1.90%	2.20%	19.60%
State of Ohio	5,164,077	83.40%	8.10%	1.70%	2.30%	1.10%	3.50%	8.30%

Dayton International Airport, also within city limits, employs 2,500 people. Wright-Patterson Air Force Base sits just outside city limits, on Dayton's northeast side. It employs over 27,500 civilian and military personnel and creates an estimated 34,500 indirect jobs in the local economy . The financial industry maintains a strong presence in Dayton, with at least three major banks headquartered Downtown. Together, Healthcare, Education, Transportation, Business/ Finance, and Management account for over a third of Dayton's workforce, slightly higher than the national average .

Dayton Transportation Plan 2040 uses context-sensitive design to provide safe and convenient access to job centers across the City. A centrally located employment hub within a dense street grid such as the University of Dayton should focus more on commuters that bike or walk to work (Figure 3.9) than a remote location such as the VA Medical Center, which would likely prioritize transit and vehicle access (Figure 3.10). With wide sidewalks, high visibility crosswalks, bicycle lanes, and bike share stations, the University of Dayton in partnership with the City, has made great improvements to its multimodal infrastructure in recent years. At the VA Medical Center, the RTA operates service through and adjacent to the VA campus. Ample parking is available, although wayfinding signage and access management could be improved. Complete Streets can build upon these and other existing successes, and focus on areas that are in more urgent need of improvement.

Industrial job centers like McCook Field must balance worker access with freight movement and logistics operations. While most employees in these areas may drive to work, those who walk, bike, or take transit should be accommodated as well. Parking and access management pose fewer challenges than job sites like the University of Dayton or the Central Business District, which are more congested and serve high-density land uses. The Freight Movement section on page 16 explains how Complete Streets can benefit industrial sites and freight routes.

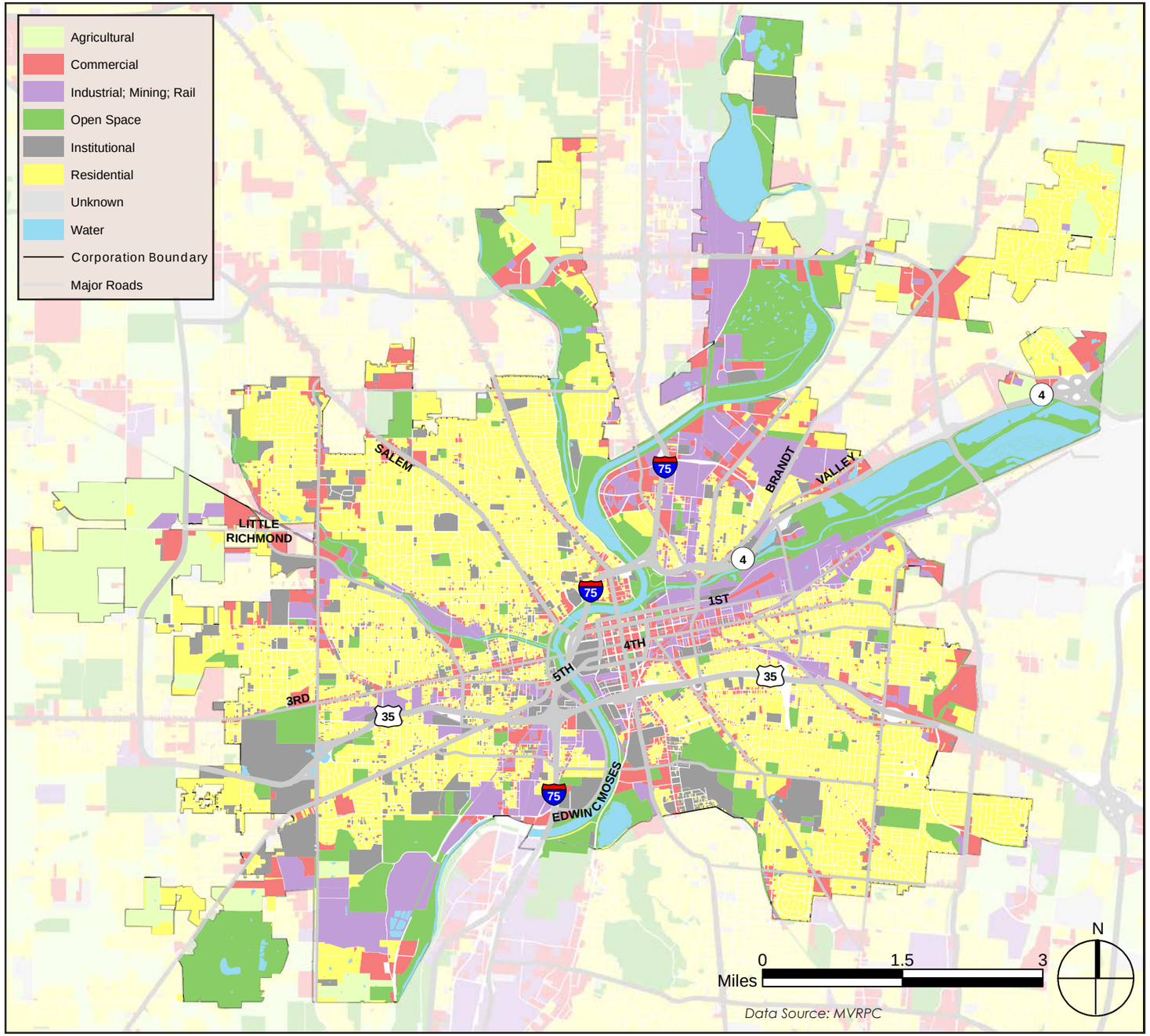
3.2 Travel Environment

This section examines various aspects of the travel environment, including how land use and roadway congestion affect Dayton's transportation network. It describes the City's current accommodations for freight, transit, pedestrians, and bicyclists, and explains how Complete Streets are used to balance the needs of these different groups. It also summarizes regional transportation investment and technology.

The distance between where people live and work often limits their choice of travel modes. The further people live from their place of work, the fewer the choices, with a greater impact on the transportation system. For instance, living more than a quarter mile to half a mile away often eliminates walking as a viable choice, leaving bicycling, driving, and public transit, if available. In auto-oriented suburban and rural areas, driving is often the only practical mode if there is no public transit. As Figure A.1 (Appendix A)shows, most Dayton workers live within the City, followed in descending order by Kettering, Beavercreek, and Moraine.

Like many Midwestern cities, Dayton remains auto-orieneted in layout. However, its alternative mode share is significantly higher than in the rest of the state as a whole (Table 2.1). The percentage of zero-vehicle households in Dayton is more than double the state-wide rate. Some of this difference between Dayton and Ohio may be due to large, sparsely populated rural areas, which have limited access to alternative modes.

Figure 3.11: Existing Land Use



3.2.1 Land Use

3.2.1.1 Primary Land Uses

Figure 3.11 shows Dayton's existing land use. Three uses occupy the majority of the City: residential, commercial, and industrial. Several of Dayton's Complete Street typologies, introduced in the Existing Conditions Inventory and discussed in detail in Chapter 4, are based on these land uses.

Residential land use occupies most of Dayton's land area. Most of these neighborhoods are located in the City's southeast and northwest quadrants, expanding out from Downtown. They support the highest population density in the City (3,000—5,000 and above per Census block group data in 2010). In northwest Dayton, a robust network of commuter streets connects residents to Downtown and other employment centers in Montgomery County, such as Dayton International Airport. James H McGee Boulevard, Salem Ave, Main Street, and Riverside Dr traverse Dayton's northwest neighborhoods. In the southeast, Wayne Ave, Linden Ave, and Smithville Road connect neighborhoods to Downtown Dayton and US-35. These roads form the backbone of Dayton's surface street network. While major roads carry high volumes of traffic, a dense grid of neighborhood streets throughout the City provides alternate routes to major roads and connections between neighborhoods.

The City's commercial land use is concentrated in Downtown Dayton. The highest density is in the Downtown core, while commercial mixes with industrial uses and extends from Keowee Street to Springfield Street along E Third Street. The University of Dayton area features the second highest concentration of commercial land use in the City. Certain neighborhood commercial corridors, such as Third Street, Main Street, and Wayne Avenue support economic activity, although some neighborhood business districts have lost population and jobs since the 1960's.

The I-75 corridor attracts the most industrial activity

in the region. In northeast Dayton, industrial centers are clustered along the interstate and are also well-served by SR-4 and surface streets, including Webster Street, Brandt Street, and Stanley Avenue. In Dayton, industrial centers were historically found east of Downtown and along the Mad River corridor, where there are still a number of active rail lines. While these areas continue to support industrial land use, certain sites like the Cannery and Water Street Flats have been converted to residential or mixed use. Intermodal industrial centers are also clustered in Southwest Dayton, along Nicholas Road and the rail corridor that follows the Great Miami River.

3.2.1.2 Other Land Uses

The University of Dayton, Sinclair Community College, Dayton International Airport, and the VA Medical Center account for most of the City's institutional land uses. Other hospitals and Dayton's K-12 schools make up the remainder. Dayton's open space and undeveloped land uses are made up of riparian corridors, trails, and parks. There is little agricultural land within city limits. Farmland is concentrated in Little Richmond on the far west side and Pheasant Hill in the northeast.

3.2.1.3 Land Use and Transportation

There is a reciprocal relationship between roads and land use. Roadway size and design are constrained by existing land use, while the type of use depends in part on the surrounding road network. Two primary elements shape the relationship between roads and land use: function and connectivity. While roadway width is important, it works in tandem with these other elements to accommodate adjacent land use.

Roads in fully developed areas have often been retrofitted to serve different needs as surrounding land use fluctuates over the years. For example, a road that once passed through farmland and now serves manufacturing and warehousing may be widened to accommodate heavy truck traffic. In contrast, roads in dense urban areas are increasingly being restriped within the existing pavement width to install bicycle facilities, as cities across the country see an increase in ridership. Most cities like Dayton already have a fully developed street network, the historic core of which was designed in the early 20th Century, when pedestrians, streetcars, and horse drawn vehicles dominated the roads. Suburbs built in the 1950's and later feature wider roads, as they were constructed after the proliferation of the automobile. Auto-oriented development such as sprawling single-family subdivisions, big box retail, and drive-thru restaurants require a great deal of pavement in the form of wide lanes, driveways, and parking lots. Conversely, centrally located historic neighborhoods such as the Oregon District allow people to walk, bike, or take transit and ride sharing services for many of their trips. Narrow brick roads and lack of parking discourage some motorists, while wide sidewalks with attractive landscaping, engaging storefronts next to the street, and many destinations within a short walk entice other roadway users. In this way, the form of the road follows the function of the adjacent land use.

Although size does matter, a wider road does not always correlate with increased activity. A small street can serve and generate a disproportionately high amount of development. For example, Brown Street has a pavement width of only 40 feet, but supports an active area, particularly during the school year. Adjacent institutional and commercial land uses, such as the University of Dayton, Miami Valley Hospital, and shops and businesses along Brown Street, attract a diverse group of roadway users. The surrounding street grid provides ease-of-access to Brown Street, and a variety of transportation options support the corridor's activity: wide, well-maintained sidewalks and crosswalks, bike lanes, bike share stations, and transit routes all fit within less than 70 feet of right-of-way.

In contrast, with a pavement width of roughly 50 feet and a comparable right-of-way, parts of Third Street on Dayton's west side are largely empty of street life. Vacant lots and abandoned buildings blight the corridor in some areas, and fast-moving traffic dominates the roadway. There is a lack of street level activity, due primarily to the built environment: deep setbacks, narrow sidewalks, and auto-scaled lighting deter non-motorists. Closer to Downtown, some businesses have reoccupied vaant properties along Third St and are encouraging further economic and social activity in the Wright-Dunbar Neighborhood.

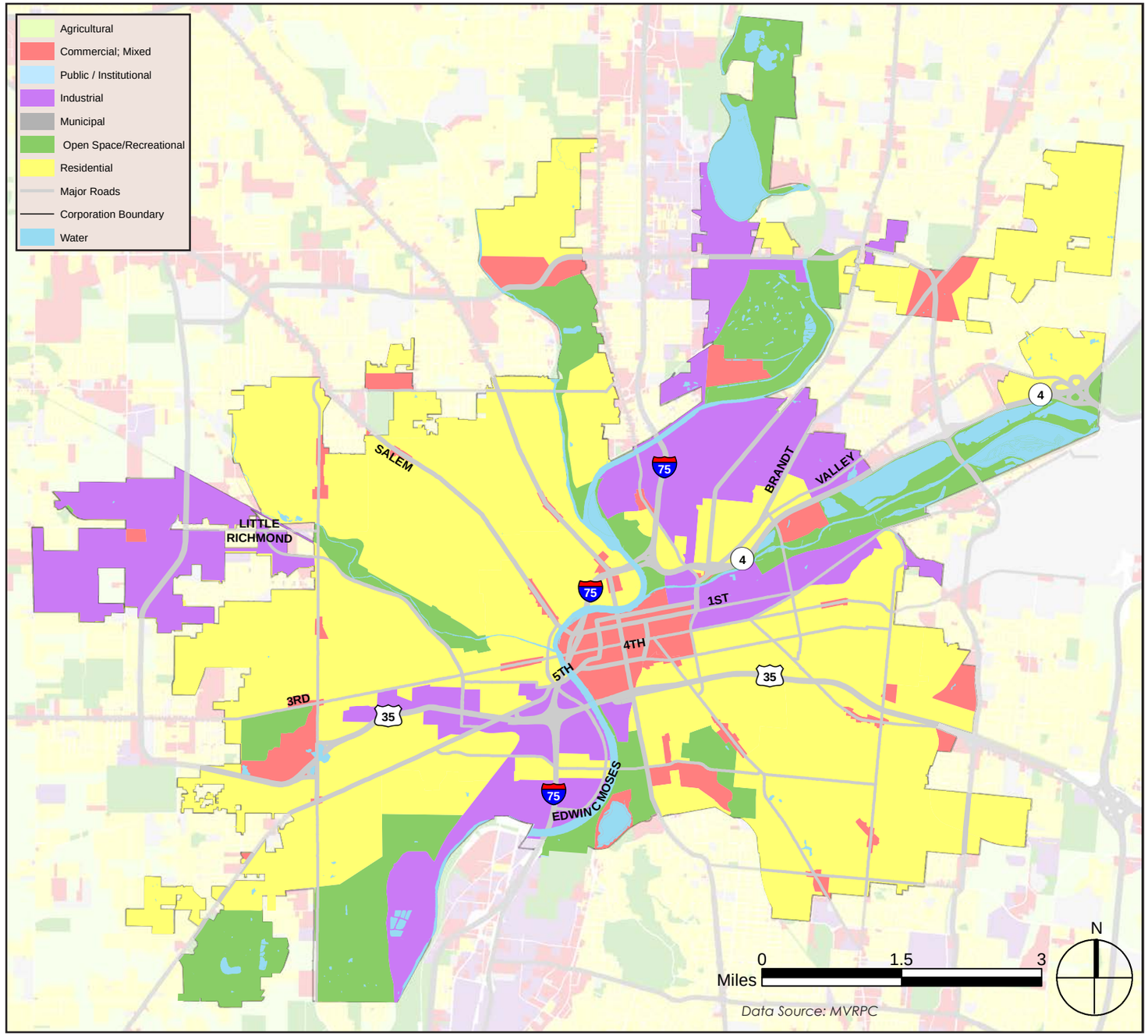
Even with the most concerted efforts, not all W Third Streets can reinvent themselves into Brown Streets. Many roads will continue to primarily serve automobiles, although not all of these roads experience the blight discussed above. However, in addition to economic development and community investment, roadway design can alleviate some of these problems, making roads like W Third Street more welcoming to all users and attractive to new development with a more diverse mix of uses. Complete Streets offer tools and principles to redesign roadways as inclusive, multimodal environments that are not only safe and convenient for all users, but act as lively community hubs that support businesses, residents, and visitors alike.

3.2.1.4 Future Land Use

Figure 3.12 shows Dayton's adopted future land use plan. On the far west side of the City agricultural uses change to industrial, commercial use expands slightly throughout the City, and residential use and open space remain largely unchanged.

In 2007, the Miami Valley Regional Planning Commission launched an initiative that would envision an ideal land use and development pattern through the year 2040. Going Places—An Integrated Land Use Vision for the Miami Valley Region—grew to a three phase, nine year project that involved stakeholders from across the region. Population, employment, and other data were used to project what the Miami Valley might look like if it focused development around regional assets with existing infrastructure. This Concentrated Development Vision would be a major change from the sprawling development trend of the past forty years, when the region experienced less than 1% in population growth but an 83% increase in developed land

Figure 3.12: Adopted Future Land Use



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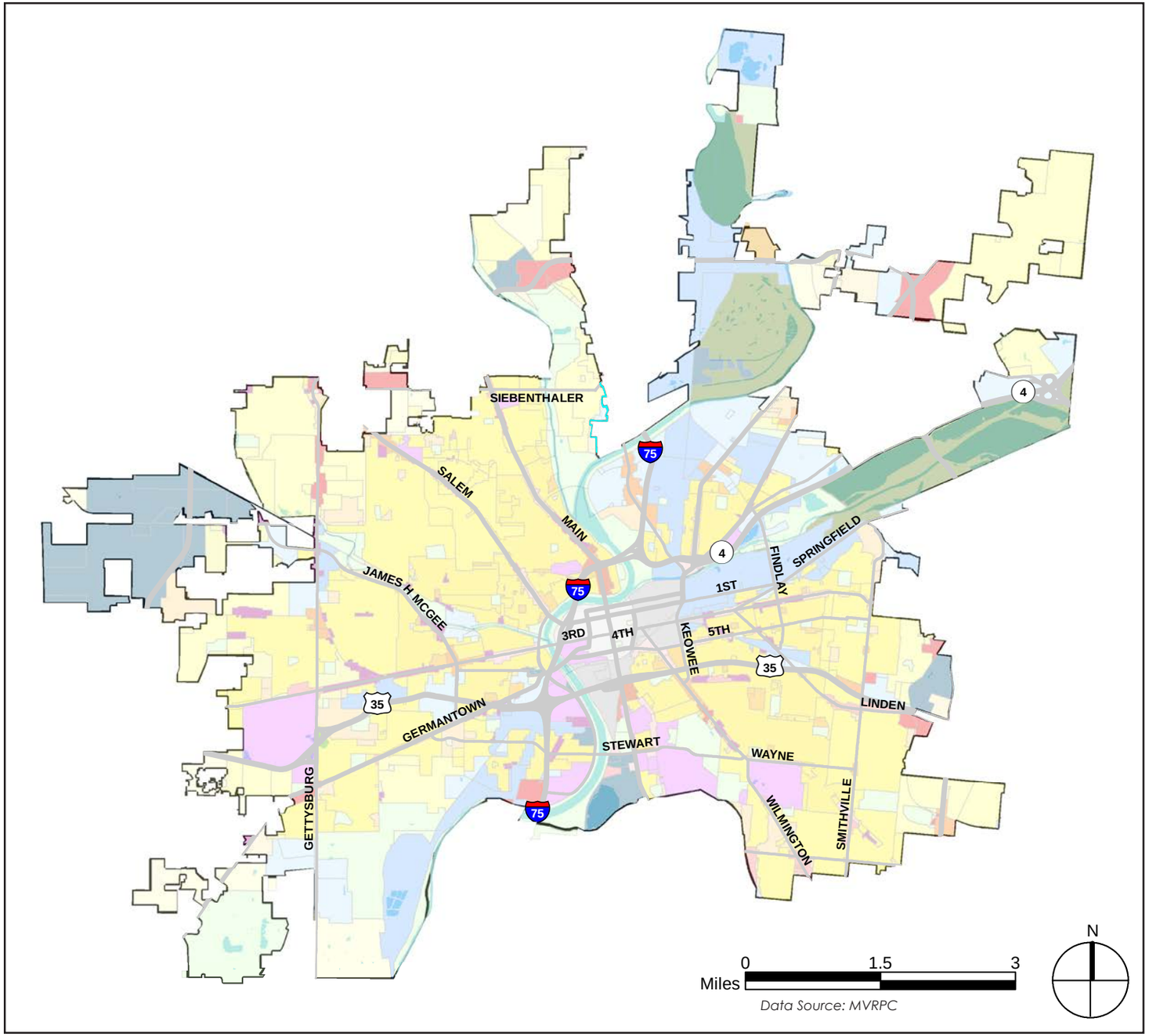
The Concentrated Development Vision would:

- Encourage the rehabilitation and repurposing of existing structures.
- Increase the number and quality of transportation options.
- Focus on the maintenance of existing infrastructure (roads, water, sewer, etc.).
- Locate any new development in areas with existing infrastructure.
- Encourage development around the Region's assets.
- Revive the Region's core city—the City of Dayton.

Compared to existing land use patterns, this vision would result in much more dense and diverse development in the region's urban cores and older communities, especially Dayton. Currently, future land use plans would result in growth at the edges of the region's urban areas, as opposed to already developed areas such as Downtown Dayton and Dayton International Airport. Under the Concentrated Development Vision, people's jobs and homes would be closer together than they are now or would be under previous future land use plans.

Although a scenario of extreme infill development and concentrated growth in established urban centers is unlikely, it reveals the region's—and Dayton's—dramatic potential to reshape its identity, including the transportation network. Infill development would likely result in more congestion due to a higher concentration of people and jobs in a few areas. Multimodal solutions like Complete Streets would be even more important in this scenario. Stopping and eventually reversing the region's sprawling development pattern would take a concerted effort and intense collaboration between many stakeholders. Dayton's commitment to Complete Streets over the coming decades will show a willingness to rethink transportation's role in the City's ongoing development, and to act as a regional leader in creative transportation solutions.

Figure 3.13: Zoning



3.2.2 Development Regulations

Figure 3.13 shows Dayton's current zoning districts, and provides a more detailed view of the City's development pattern than land use. A Complete Street creates safe and convenient spaces for bicyclists, pedestrians, and transit users, but its immediate effect is confined to the public realm, within the right-of-way. Changes

- Suburban Residential (SR-1)
- Suburban Residential (SR-2
- Eclectic Residential (ER-3)
- Eclectic Residential (ER-4)
- Mature Residential (MR-5)
- Suburban Multi-Family (SMF)
- Eclectic Multi-Family (EMF)
- Mature Multi-Family (MMF)
- Manufactured Home (MH)
- Central Business District (CBD)
- Urban Business District (UBD)
- Mature Neighborhood Commercial (MNC)
- Eclectic Neighborhood Commercial (ENC)
- Suburban Neighborhood Commercial (SNC)
- Mature General Commercial (MGC)
- Eclectic General Commercial (EGC)
- Suburban General Commercial (SGC)
- Transitional (T)
- Light Industrial (I-1)
- General Industrial (I-2)
- Business Park (BP)
- Campus-Institutional (CI)
- Well Head Operation (WO)
- Open Space (OS)
- Major Roads
- Corporation Boundary
- Water

in the private realm are equally important, and zoning and subdivision regulations play a key role.

3.2.2.1 Zoning

A zoning code that encourages multimodal development, such as parks, schools, shopping districts, and high-density development, can amplify the positive changes that Complete Streets make in the public realm, increasing the overall return on investment for Dayton's future Complete Street projects.

Dayton's zoning code, updated in 2006, is context-sensitive, providing design criteria for different districts based on the existing built environment. Under 150.310.10 Residential Contextual Regulations, for example, new building spacing must mirror that of nearby blocks to create contextually appropriate separations. Certain criteria affect how the public and private realms interact. In the same section, the following guidelines ensure public access to buildings from a front entrance, where, if there is a sidewalk, pedestrians would seek to enter, rather than from side or rear parking lots.

To provide a sense of enclosure and definition to the street, the front wall of the principal structure(s) shall be parallel to the public street or to its tangent, if the street is curved. There shall be at least one (1) entrance facing the public street and the principal windows of the building(s) shall also face this public street.

Other regulations, such as limiting the number of curb cuts and prohibiting off-street parking between corner lots and public streets, also influence how buildings relate to the public realm. The zoning code reflects the importance of multimodal design and efforts to encourage active transportation: pedestrians are mentioned over 100 times, with one section devoted to pedestrian design (Schedule 150.320.10 Pedestrian Oriented Design Principles). Bicycles and transit are mentioned 18 times and 29 ties, respectively.

Complete Streets will reinforce the emphasis on multimodal development from a different approach, in the public realm. These projects will be highly effective in innovative zoning districts such as Eclectic Neighborhood Commercial, which promotes commercial, pedestrian-oriented development near residential areas. Complete Streets projects should be prioritized in the following zoning districts, whose regulations and design criteria encourage high-density, multimodal-oriented development:

- Eclectic Neighborhood Commercial
- Mature Neighborhood Commercial
- Mixed-Use Hub
- Central Business District
- Urban Business District
- Campus Institutional

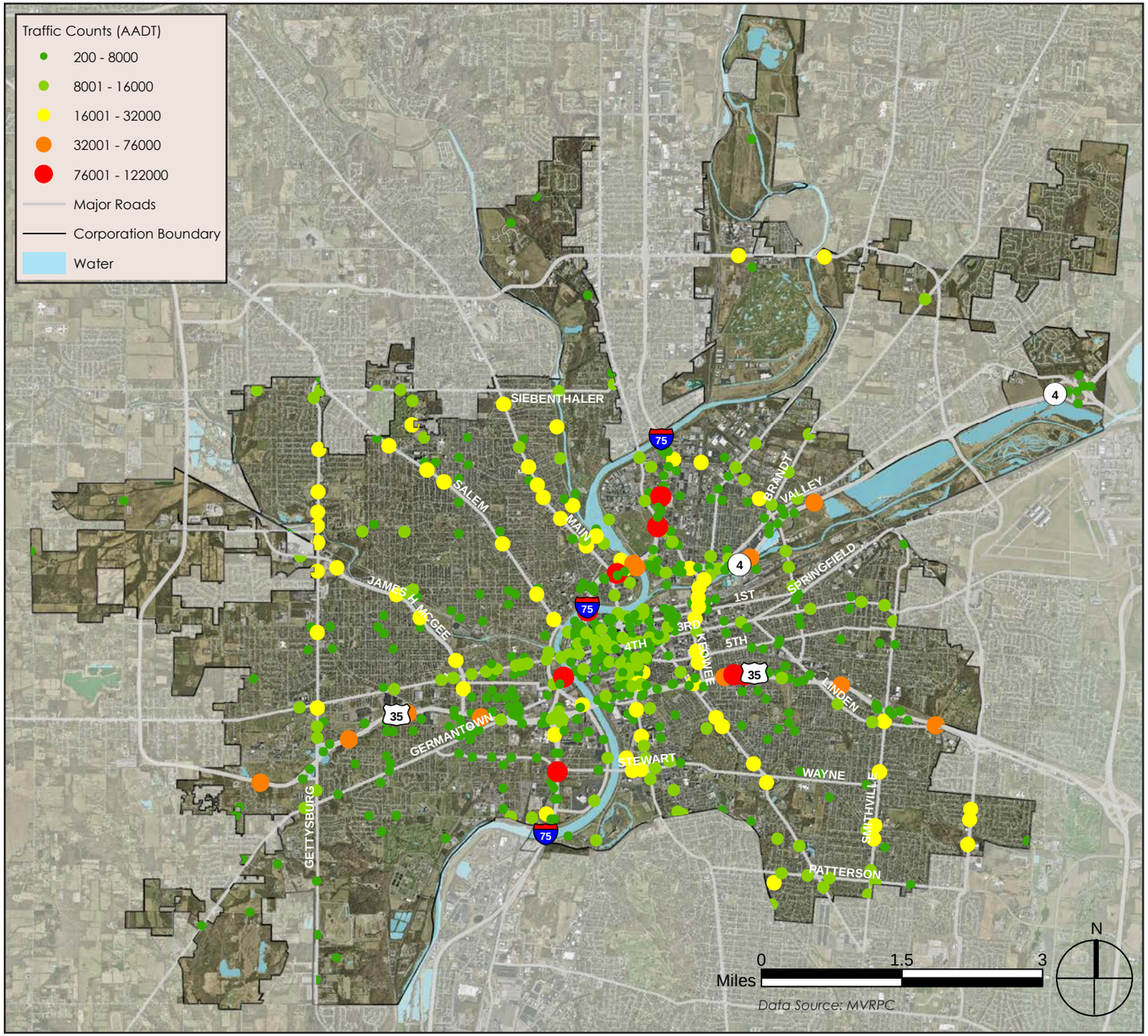
These districts occupy 11 percent, or about 6 square miles, of Dayton's land. Most of this area is in and around Downtown, although the VA Medical Center, the University of Dayton, and key corridors such as Third Street, Salem Ave, Main Street, and Wayne Ave, comprise a significant portion. The geographic diversity of Complete Streets-compatible zoning districts can be used to encourage roadway improvements throughout the City. A potential project's location in one of these districts is one criteria used to rate a project's feasibility, and is included in the methodology for project prioritization, discussed in Chapter Five.

3.2.2.2 Subdivision Regulations

Unlike zoning regulations, pertinent sections of Dayton's subdivision regulations have not been updated since 1973. Section 151.37, Official Thoroughfare Street Design Standards, includes standards for classifying and designing streets, many of which are outdated and contrary to Complete Street principles. For example, maximum block length is 1,500 feet, which encourages speeding and is reflective of suburban-style, auto-oriented development. Smart Growth America recommends a maximum block *perimeter* of 1,600 feet, and a maximum block length of 500 feet. These distances are more conducive to a pedestrian-friendly environment, because a dense street grid offers more convenient routes to pedestrians and slows traffic.

Traditional terms such as arterial and collector, used to define a street's functional classification, should be updated to reflect Dayton's new Complete Street typologies and design guidelines, presented in Chapter Four. These typologies are more context-sensitive, accounting for land use and multimodal activity, and emphasize connectivity rather than traffic volume.

Figure 3.14: Traffic Counts



3.2.3 Roadway Congestion

Figures 3.14-3.15 show Average Annual Daily Traffic (AADT) counts throughout the City. Dayton's historic population loss, discussed earlier, was accompanied by a decline in traffic volumes, which were historically much higher than they are today. The City's transportation network was built during a period of high population growth, when many more vehicles were on the roads. Now that the network serves a smaller population, the City has an opportunity to repurpose excess roadway capacity for multimodal users, such as pedestrians, bicyclists, and transit riders.

According to the Texas A&M Transportation Institute's 2015 Urban Mobility Scorecard (see Table 3.2 on the following page), the Dayton area experiences less congestion than peer urban areas across the country. In categories such as percent of congested lane miles, truck congestion cost, and excess fuel consumption per auto commuter, Dayton scores better than 33 urban areas with populations of 500,000 to one million people and better than the average of 500 urban areas included in the study.

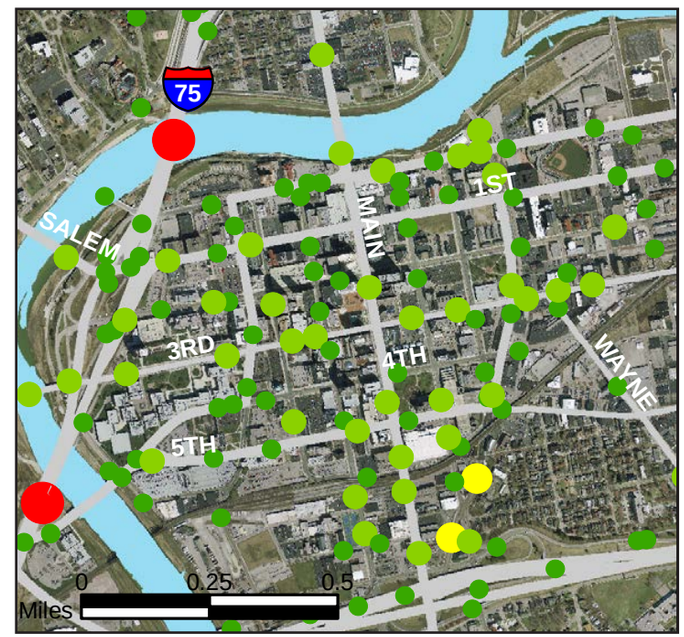


Figure 3.15: Downtown Traffic Counts

In 2015, Dayton ranked 91st out of 101 cities in yearly delay per auto commuter, a measure that divides extra travel time during the year by the number of people who commute in private vehicles in the urban area. A higher rank indicates a smaller delay (as a comparison, the Washington, D.C. metro area ranked first, with 82 hours of yearly delay). Dayton commuters were delayed an average of 25 hours in 2014, compared to an average of 52 hours for all cities in the study. Dayton also scored well on travel time index, excess fuel per auto commuter, and congestion cost per auto commuter.

Although Dayton performs above its peers, congestion has increased in certain areas, particularly on its highway system. In 2015, the MVRPC conducted a detailed freeway corridor analysis as part of its Congestion Management Process Technical Report. It found that the I-75 corridor (from US-35 to I-70) was one of the most congested in the region. I-75 carries the highest percentage of truck traffic in the Dayton area (14,000 daily at 2010 levels) and traffic counts show AADT of 60,000 to 122,000 along I-75 through Downtown Dayton. To alleviate congestion and high crash rates, the Ohio Department of Transportation (ODOT) rebuilt all five miles of I-75 through Dayton, a ten year, $311 million project, completed in 2016.

Dayton's surface streets experience less traffic than its freeway system. Most traffic counts in and around the Central Business District are between 5,000 and 20,000 AADT. Certain arterials such as N Gettysburg Ave, Salem Ave, N Main Street, Keowee Street, and Wayne Avenue carry up to 40,000 vehicles per day. With regards to Complete Streets, less congestion allows more space for multimodal facilities such as bike lanes and bus lanes. Providing safe and convenient accommodations for all roadway users reduces congestion even further by encouraging people to walk, bike, and take transit instead of driving.

Table 3.2: Congestion Ranking

	Yearly Delay per Auto Commuter		Travel Time Index		Excess Fuel per Auto Commuter	
	Hours	Rank	Value	Rank	Gallons	Rank
Dayton	25	91	1.12	91	13	86
101 City Average	52	N/A	1.26	N/A	23	N/A

Source: Texas A&M Transportation Institute's 2015 Urban Mobility Scorecard

Figures 3.16-19: Traffic flow in Dayton

Figure 3.16: Keowee Street Bridge

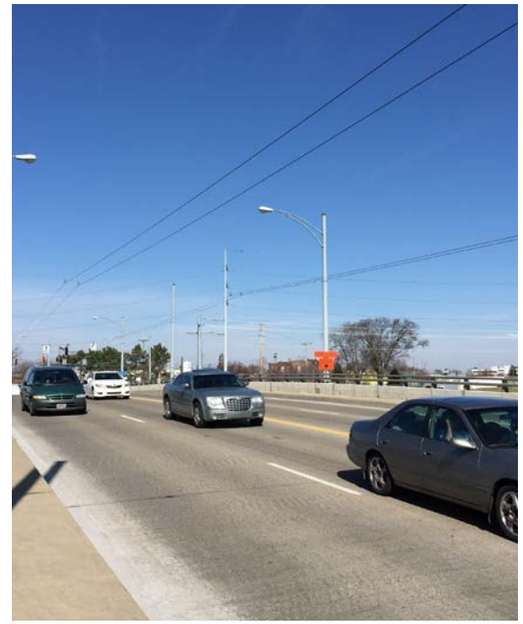


Figure 3.17: Brown Street

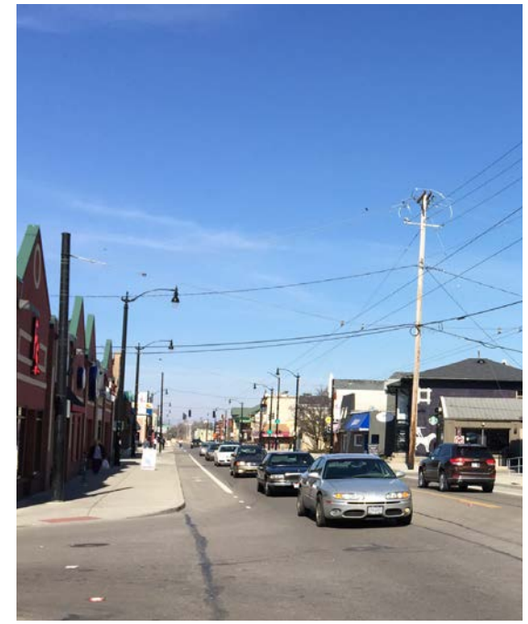


Figure 3.18: Wayne Avenue

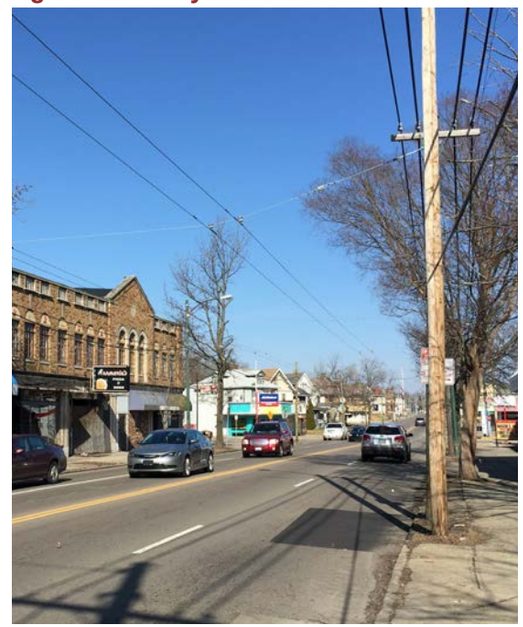
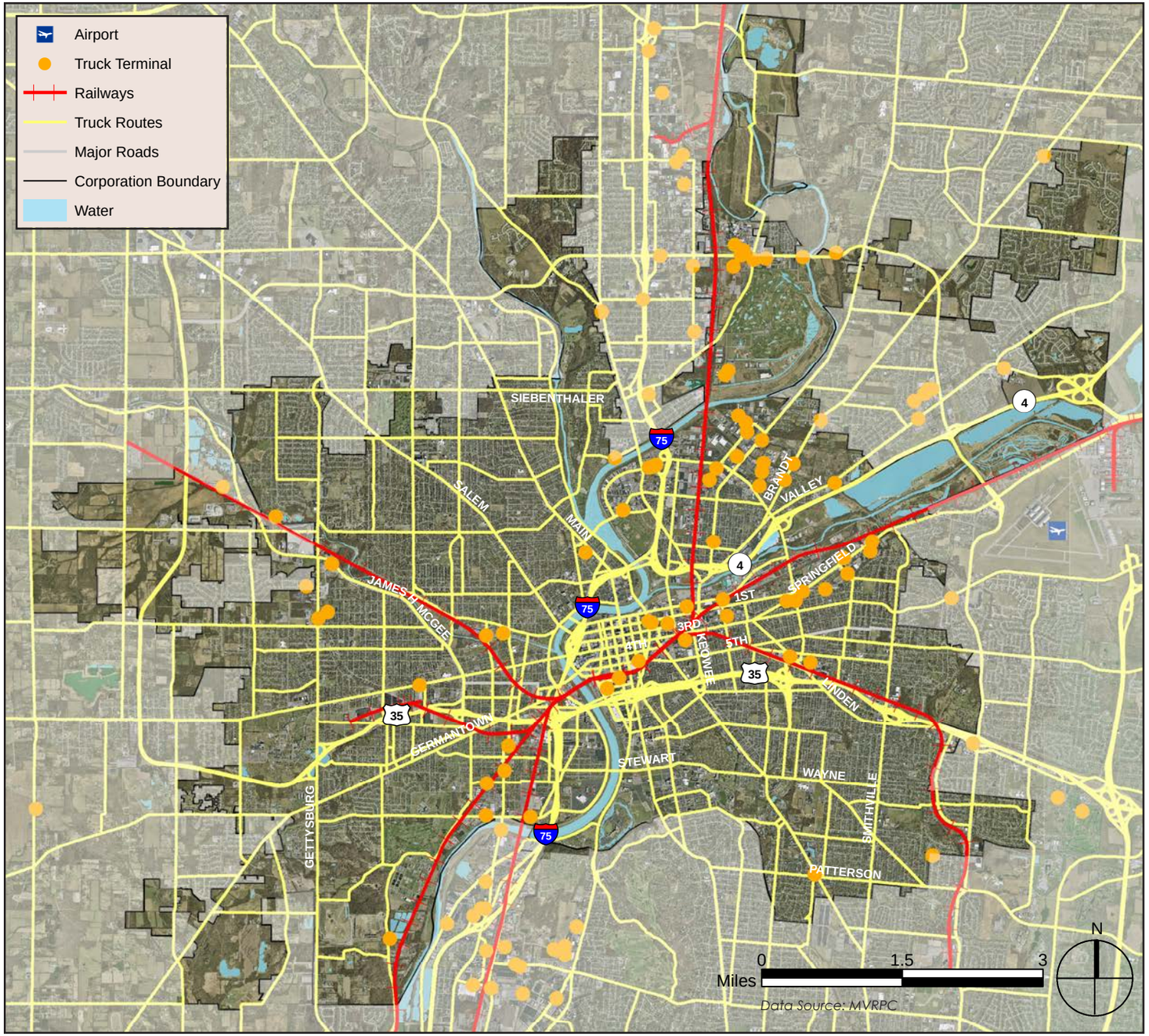


Figure 3.19: Third Street

Figure 3.20: Freight Facilities



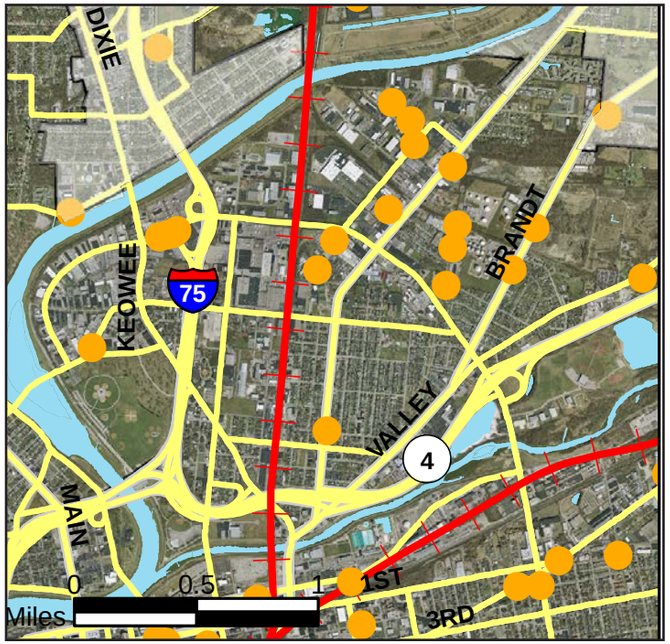
3.2.4 Freight Movement

Dayton is a continental leader in freight and logistics. It is the only urban area in the country located within 500 miles of 60 percent of the country's population and manufacturing, and 60 percent of Canada's population. It sits at the crossroads of two major interstates, I-75 and I-70. Over 154,000 motor vehicles pass through the interchange every day, and freight accounts for up to 35 percent of that traffic.

3.2.4.1 Trucking

As shown in Figures 3.20-3.21, Dayton's surface freight network is extensive. According to the MVRPC's Freight Movement Study, trucking accounts for 94 percent of freight movement in the region. The 2006 study counted over 300 trucking and logistics facilities in the Miami Valley region, primarily along the I-75 corridor in and around Dayton. The Miami Valley Region has approximately 5,260 miles of roadway, of which 2,200

Figure 3.21: Northeast Quadrant, Industrial District



account for regional network roadways. The City is well served by truck routes, as well as 28 truck terminals in and around Downtown. Excluding I-675, all of Dayton's interstate corridors are designated as part of the National Freight Network. The Texas A&M Transportation Institute's 2012 Urban mobility Report estimated the value of goods carried by the trucking industry in Dayton at $34 billion in 2011 and truck congestion costs at $52 million.

3.2.4.2 Air and Rail

Dayton's proud heritage as a leader in aviation began with the Wright Brothers over 100 years ago. Today, the Greater Dayton region is home to Wright-Patterson Air Force Base, a global research and development hub, and Dayton International Airport, within a 90 minute flight from more than half the country's population. Military and commercial air freight moves through Wright-Patterson Air Force Base and Dayton International Airport, respectively. In 2015, 807 tons of cargo passed through Dayton International Airport.

In addition to carrying truck freight, the I-75 corridor is home to the busiest north-south rail route east of the Mississippi. Two national rail companies, CSX and Norfolk Southern, and several rail yards operate in and around Dayton. Rail freight accounts for only five percent of tonnage in the region .

When it comes to Complete Streets, most people picture bike lanes and sidewalks rather than loading docks and rail yards. Freight is sometimes overlooked during policy and design development because the needs of freight operators are typically not an impetus for adopting a Complete Streets policy.

Different kinds of freight vehicles and facilities need specific accommodations. Tractor trailers, containerized freight, and local delivery trucks all require different curb radii and lane widths, amongst other design considerations. Appropriate buffers between freight and other road users depend on the kind of cargo being transported. Raw materials and industrial goods require more separation than retail cargo, for instance. In some cases, the presence of freight traffic could create dangerous conditions or become a nuisance to adjacent homes and businesses. Curb-side deliveries should be prohibited where bike lanes are present, or where front-door deliveries interfere with sidewalk traffic. Dayton already bans curbside deliveries throughout much of Downtown, although enforcement is still an issue.

Many of these concerns can be resolved by including freight operators in the planning process. Sometimes, the safest solution is to remove freight from the equation, routing trucks onto a more appropriate street and maintaining pedestrian, bicycle, transit, and private vehicle access on the street under consideration. In other cases, it is necessary to maintain freight access and incorporate improved facilities into Complete Street design. Regardless, the importance of freight and its positive economic impact on the community

Figures 3.22-25: Freight movement and facilities in Dayton

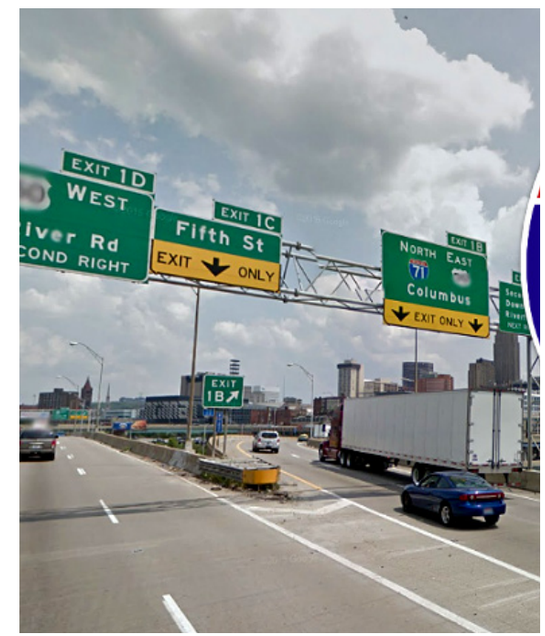
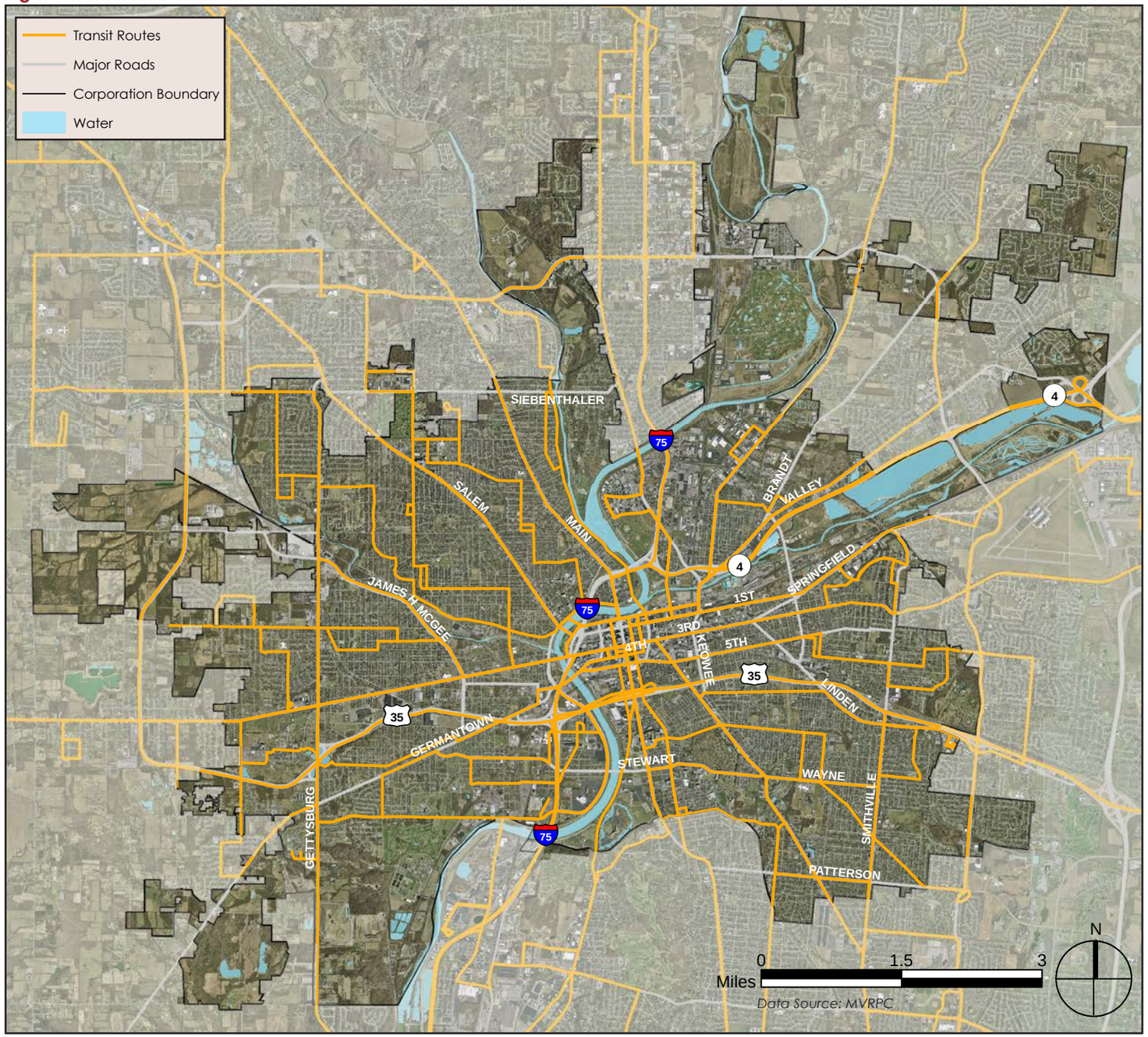


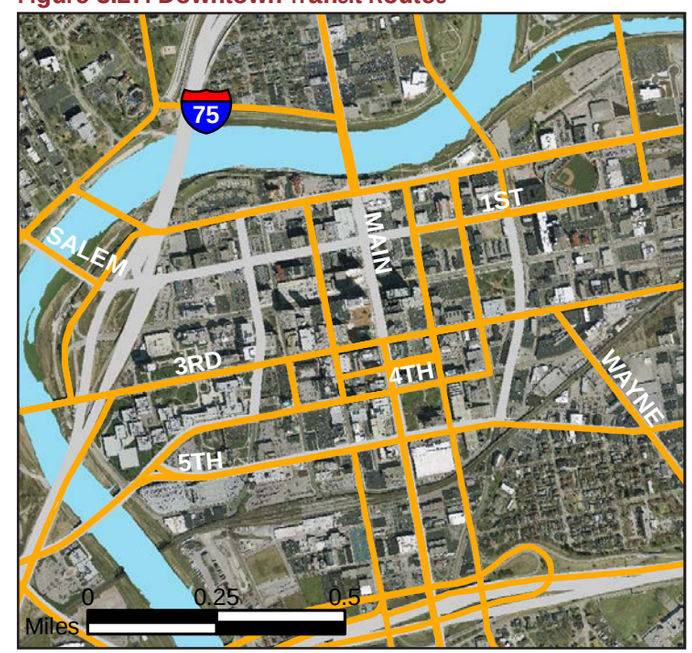
Figure 3.26: Transit Routes



3.2.5 Public Transportation

The Greater Dayton Regional Transit Authority (RTA) serves the City of Dayton, Montgomery County, and parts of Greene County. The system covers about 1,000 miles of directional roadways and is made up of six route classifications: local, suburban, crosstown, rural/express, feeder/Senior E-Z Ride, and high school. The RTA's fixed route system centers on Wright Stop Plaza in Downtown Dayton. Most routes primarily serve Dayton and its suburbs, while a handful of routes extend into low-density areas of Montgomery County. Total system ridership is approximately 10 million passengers per year, the majority of which is generated through local routes. The RTA's total operating expenses for 2015 through 2019 are $329 million, and capital projects will total $158.3 million. Fare box revenue for the same five year period is estimated at $48.6 million.

Figure 3.27: Downtown Transit Routes

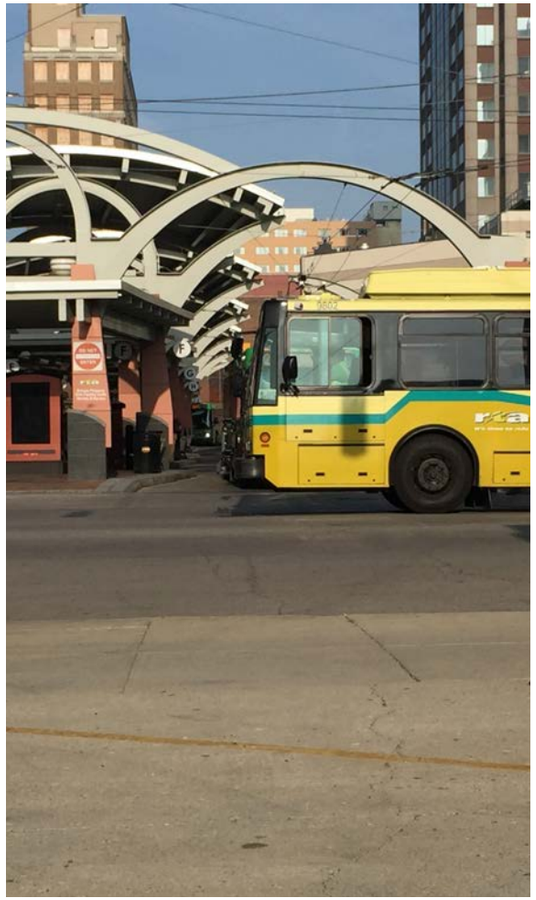


As of 2013, the RTA bus fleet consisted of 24 hybrid/diesel buses, 84 clean diesel buses, 95 paratransit vehicles, 24 contingency fleet buses, and 54 electric trolley buses, which are unique to Dayton.

The RTA serves all of Dayton's major roads (See Figures 3.26-3.27), from high-density corridors like Third Street and Main Street, to commuter-oriented thoroughfares like James H McGee Boulevard and Smithville Road. Connecting people to jobs is an important function of any transit system. The RTA serves major employment centers, including the Central Business District, Dayton International Airport, and suburban office parks.

Even in cities with good transit coverage, many would-be transit users avoid taking the bus. Almost every transit trip begins and ends as a walking trip. Faced with inaccessible stops that lack sidewalks, curb ramps, and convenient crosswalks, many people choose to drive instead. The transit-dependent are forced to navigate these inconvenient and often dangerous environments. Complete Streets prioritize access to transit. Improved stops and shelters with attractive branding, ample lighting and seating, ADA-compliant facilities, and bicycle racks are often a more economical investment than providing paratransit service for riders that cannot access poorly designed stops. Bus lanes and bus bulb outs increase the convenience and efficiency of transit operations, making it a viable alternative to driving. Given its rightful place on the road, transit alleviates congestion and improves the traveling experience for all road users.

Figures 3.28-31: Transit facilities in Dayton



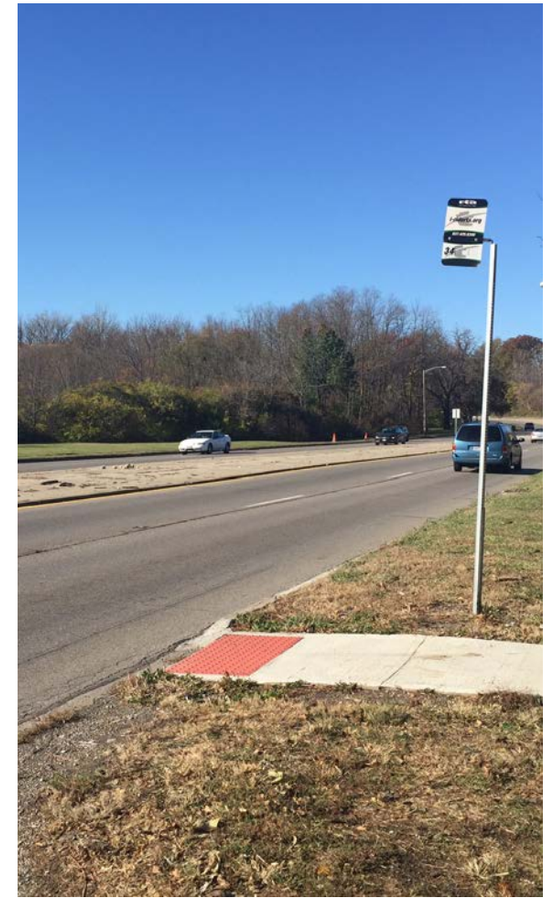
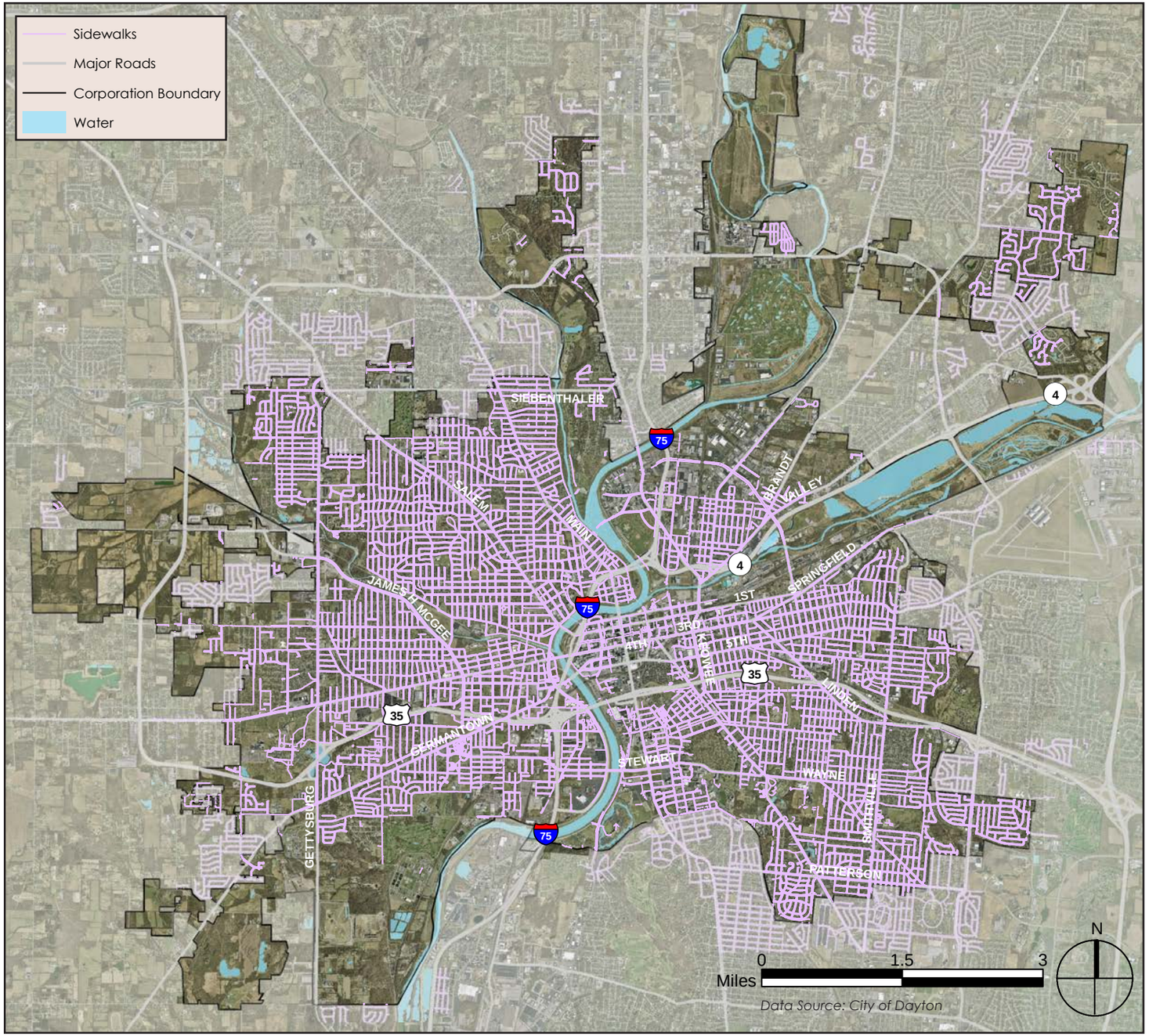


Figure 3.32: Pedestrian Facilities



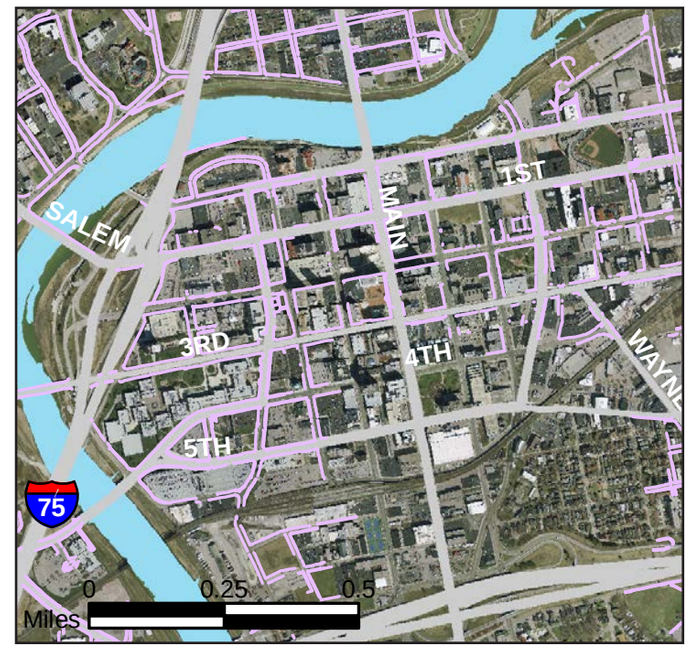
3.2.6 Pedestrian Facilities

3.2.6.1 Sidewalks

Dayton's sidewalk network closely follows its residential development patterns. The dense grid of neighborhood streets found primarily in the City's southeast and northwest quadrants (see Figures 3.32-3.33) is accompanied by an equally robust sidewalk network. In many areas, an ambitious pedestrian could walk from the corporation limit all the way to Downtown using Dayton's sidewalks.

While Dayton does well in terms of sidewalk connectivity, in some areas, sidewalk design and maintenance do not adequately serve the needs of pedestrians. Certain roadways have sidewalks next to multiple lanes of fast-moving traffic, forcing pedestrians to navigate auto-oriented environments. Some areas that do have robust sidewalk networks, such as Phesant Hill and Forest Ridge in north-east Dayton, do not connect to other

Figure 3.33: Downtown Pedestrian Facilities



parts of the city. Neighborhoods in and around Downtown feature highly connected sidewalks with generous widths, pedestrian-scaled lighting and streetscaping, and well-maintained crossings.

3.2.6.2 Signal Timing

Certain intersections equipped with walk signals, such as Keowee Street and E Third Street, do not give pedestrians enough time to safely clear the intersection, especially for the elderly and pedestrians with disabilities. At other intersections, such as N Broadway Street and Edison Street, pedestrians must wait an unreasonably long time for the light to change after activating the push-button signal. Studies show that risk tolerance increases with waiting time, meaning that people are more likely to jaywalk under dangerous conditions the longer they are delayed. This is particularly important at intersections that are adjacent to concentrations of vulnerable pedestrians, such as elementary schools and senior centers. Specific solutions are discussed in the following chapter.

Complete Streets design will build upon Dayton's already robust sidewalk network. Filling in gaps is an important consideration, but improvements to existing sidewalks should also be considered. Amenities that create a safer and more pleasant walking environment, such as landscaping, street trees, and decorative lighting, can be used to enhance many of Dayton's existing sidewalks.

Figures 3.34-37: Pedestrian facilities in Dayton

Figure 3.34: Brown Street

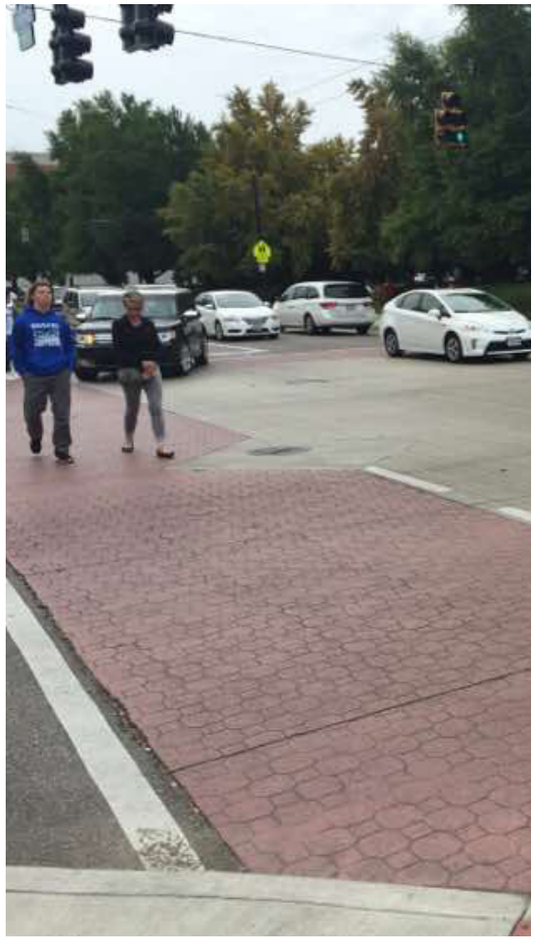


Figure 3.35: Patterson Boulevard

Figure 3.36: Second Street

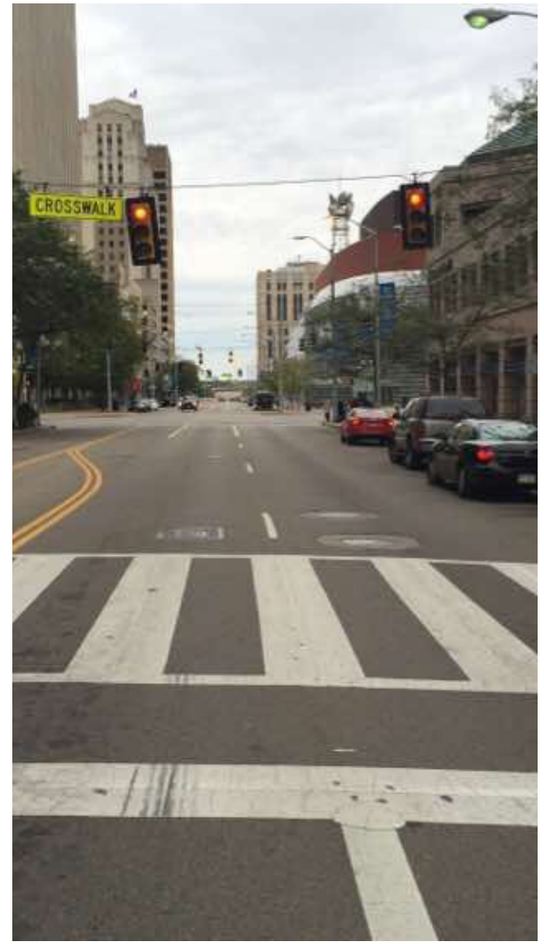
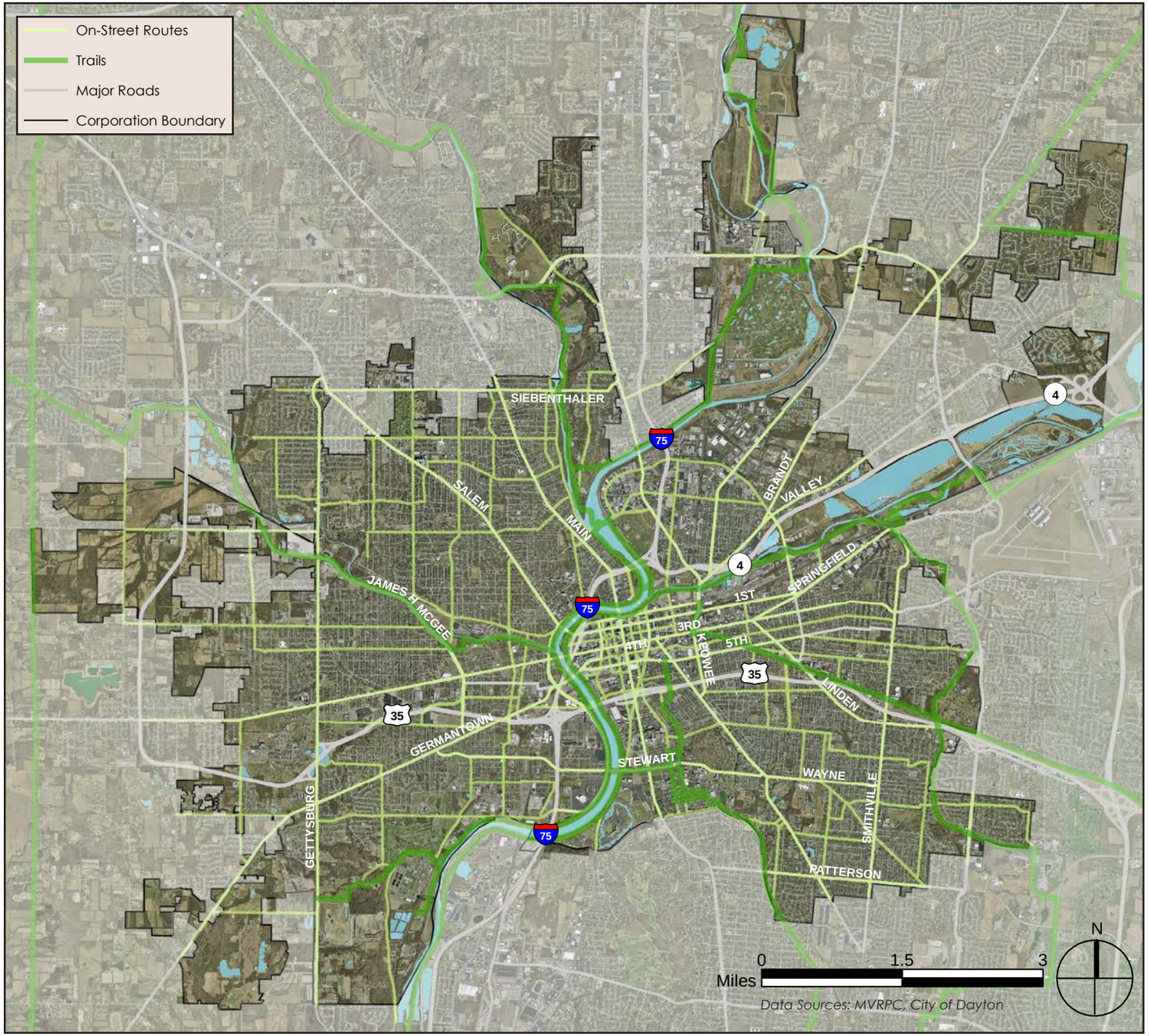


Figure 3.37: Fifth Street

Figure 3.38: Bicycle Facilities



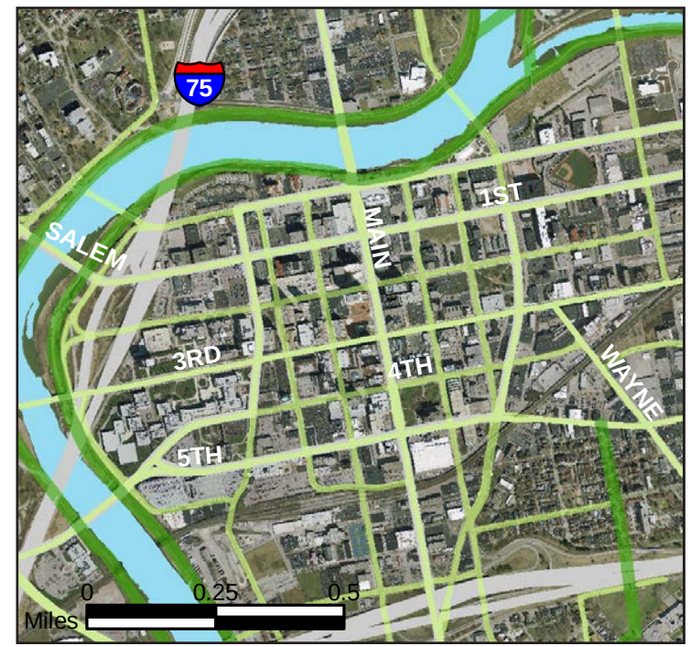
3.2.7 Bicycling

3.2.7.1 Infrastructure

Dayton's location at the confluence of three waterways has allowed the City to build an extensive trail system along its riparian corridors (see Figures 3.38-3.39). Since 1976, when the first section of paved trail opened along the Great Miami River in Downtown Dayton, the regional network has expanded continuously. It now has over 300 miles of trails, the largest regional paved trail system in the country. Proposed bikeways in the Miami Valley Comprehensive Local-Regional Bikeways Plan would double the network's size over the next 15 years.

The MVRPC and other agencies conduct trail counts at over 30 locations across the regional trail system (counts included all trail users: bicyclists, pedestrians, etc.). With an average daily count of 230 users, the Downtown riverfront served the highest volume of bicyclists and pedestrians (2014 data).

Figure 3.39: Downtown Bicycle Facilities



Dayton is rapidly expanding its on-street bikeway network as well. Shared lane markings, or sharrows, and bicycle lanes are being installed throughout the City, from Warren Street near the University of Dayton to Keowee Street in the McCook Field neighborhood, and many other locations. In 2011, Dayton completed resurfacing every street Downtown, adding bicycle improvements throughout, including bike lanes on Perry, Jefferson, and St Clair Streets.

The same waterways that support an extensive trail system also impede commuting cyclists trying to access Downtown. Bridges that cross over those rivers were designed for high volumes of motorized traffic with few bicycle amenities. These obstacles deter would-be cyclists from crossing into Downtown. In a survey conducted by Bike Miami Valley, many respondents indicated that improving connections across highways, bridges, and other barriers would make bicycling in Dayton feel more comfortable and safer.
Dayton, Montgomery County, and the Ohio Department of Transportation replaced seven bridges since 2003, with bicycle amenities included in some projects. Identifying problem areas that still exist and installing bikeways across key bridges into Downtown is one step in connecting the Central Business District to outlying neighborhoods. Case studies and engineering solutions that address this issue are presented in Chapter 3, Complete Street Elements.

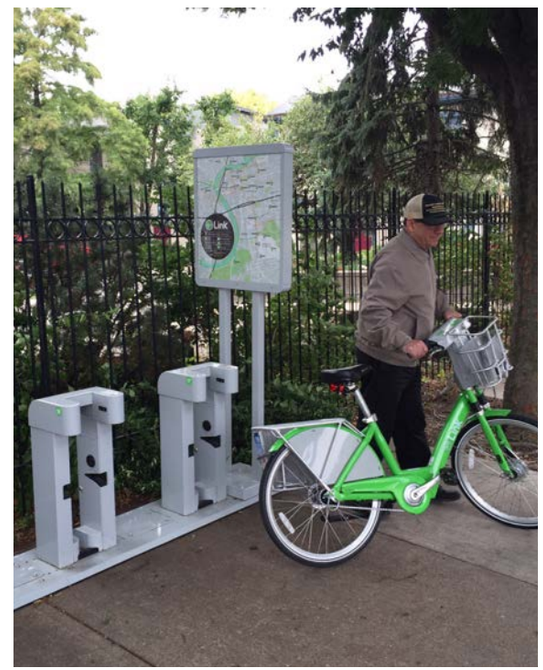
3.2.7.2 Bicycling Initiatives

Dayton's 2025 Bicycle Action Plan outlines an ambitious infrastructure improvement program over the next ten years, with the goal of providing safe, convenient, well-connected, and reliable on-road, separated, and end-of-trip facilities for bicyclists of all skill levels.

Along with the engineering projects discussed above, the plan lists objectives for the remaining four E's in bicycle planning, as well as an additional category, maintenance:

- Enforcement: Ensure all users of the transportation network, including bicyclists, both respect the rights of other network users and obey all traffic laws.
- Education: Create both a knowledge base where all users of the transportation network understand and obey the rules of the road; and a transportation culture where bicyclists are viewed as legitimate and respected users of the roadway network.
- Encouragement: Promote bicycling as an affordable, reliable, convenient, environmentally-friendly, and health-conscious alternative to motorized transportation.
- Evaluation/Planning: Accurately and regularly collect information on the five W's for bicycling in the City of Dayton by asking the who, what, where, when, and why of bicycling. Update and maintain the City of Dayton 2025 Bicycle Action Plan on a regular and on-going basis.
- Maintenance: Provide bicycle facilities with an appropriate level and quality of maintenance.

Figures 3.40-43: Bicycle facilities in Dayton



With clearly defined goals and objectives, Dayton already performs well in these areas and will continue to improve as it implements its bikeway plan. Other bicycle initiatives include the following programs.

Safe Routes to School: In 2009, the City of Dayton was awarded a $583,000 grant by the Ohio Department of Transportation to address transportation issues around five recently reconstructed Dayton Public Schools facilities. Dayton used $222,413 for infrastructure investments and safety improvements for pedestrians, bicyclists and motorists around the schools. The remaining funds supported non-infrastructure needs, such as safety education and funding of police overtime during back-to-school and other high traffic periods. The City is now developing a Safe Routes to School plan for all K-8 schools.

Bike/Walk Dayton Committee: The Bike/Walk Dayton Committee leads efforts to promote and encourage active transportation as a viable form of travel and a way to improve the quality of life for Dayton's residents. Led by the City Commission Office, it represents a broad coalition of community leaders and organizations, including City of Dayton, Dayton Police Department, Five Rivers Metroparks, Dayton Public Schools, Dayton-Montgomery County Public Health, Sinclair Community College, University of Dayton, Miami Conservancy District, and the Miami Valley Regional Planning Commission.

Courteous Mass Rides: Launched in 2009, Courteous Mass-Dayton invites bicyclists to take to the streets in a safe and responsible way. Unlike Critical Mass rides in other cities, Courteous Mass-Dayton does not disrupt traffic, but rather seeks to demonstrate that bicycles are a part of traffic and deserve respect while sharing the road and observing traffic laws.

Bicycle Friendly Community Status: In 2010, concerted efforts by the City of Dayton, the Bike/Walk Dayton Committee, and other partners, led the League of American Bicyclists to award Dayton Bronze level Bicycle Friendly Community status. Dayton was the second community in Ohio to receive this nationally recognized honor. A Bicycle Friendly Community welcomes bicyclists by providing safe accommodations for bicyclists and encouraging people to bike for transportation and recreation. The City is now striving towards the goal of achieving Gold level status by 2020 and Platinum status by 2025 (there are currently five Platinum communities nationwide).

In addition to these programs, the City is pursuing a number of other bicycling initiatives that distinguish Dayton as a regional leader in active transportation. The City is vigorously promoting bicycling as a legitimate form of transportation and a benefit to public health through partnerships with advocacy organizations like Bike Miami Valley, programs such as Bike to Work Month and Day, the Link Bike Share system, the City of Dayton's Bike Route Map, and infrastructure improvements including the Riverscape Bike Hub, traffic signal upgrades, and resurfacing and restriping projects.

The Complete Street Design Guidelines in Chapter 4 offer a more nuanced approach to expanding Dayton's bikeway network that complements and builds upon the 2025 Bicycle Action Plan. The following chapter describes innovative treatments such as bicycle boulevards, cycle tracks, and bike boxes that will add to the City's bicycle facility toolkit, and guidelines on the street types that can best accommodate and benefit from these treatments. Once Dayton completes implementation of the 2025 Bicycle Action Plan, its Complete Street Design Guidelines will ensure that appropriate bicycle facilities continue to be included in roadway improvements wherever possible. The plan also encourages Dayton to consider what impacts new technologies like driverless vehicles may have on the bikeway network as the year 2040 approaches.

3.2.8 Regional Transportation Investment

MVRPC distributes federal and state transportation dollars in the Dayton region. In 2015, the organization allocated $52.9 million for roadway improvements (including bicycle and pedestrian facilities), and over $36.9 million for transit projects. Over $4.5 million was obligated for roadway projects in Dayton.

3.2.9 Transportation Technology

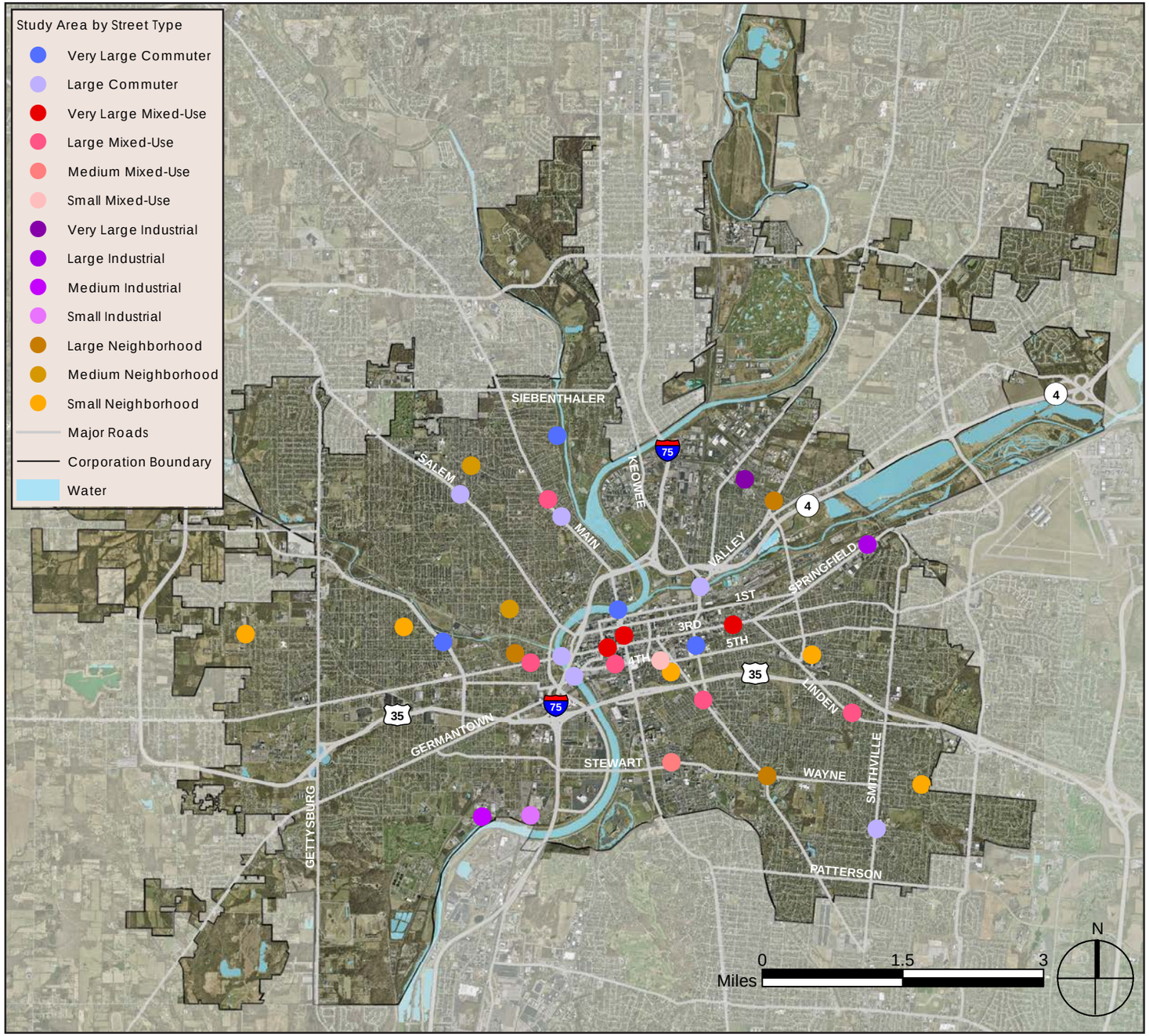
The City's bike share program, Link, launched in 2015 with 24 stations and 225 bicycles Downtown. Link uses IT-based systems, such as electronic and wireless communications, to interface with customers, track and maintain its fleet, and gather data. RTA and Bike Miami Valley operate the system in conjunction with B-cycle.

In 2014, the car sharing service Uber began operations in and around the Dayton area. Its service area extends from Five Points to Vandalia and from Miamisburg to Xenia. With regards to transit, RTA is in the process of developing a mobile application that would allow riders to access real-time information about bus service, receive alerts, and offer route selection assistance.

In addition to these services, the Dayton region also employs technology to manage congestion and improve transportation operations. Intelligent Transportation Systems (ITS) are deployed along Dayton's freeway corridors. Dynamic message signs alert motorists of upcoming accidents and provide estimated travel times to major interchanges. More comprehensive systems such as Integrated Corridor Management are also being considered for use in the Dayton region.

Before this plan expires in 2040, a major shift in transportation technology could occur in the form of driverless vehicles. Chapter 5 discusses driverless vehicles' implications on Complete Streets and provides policy recommendations to help Dayton prepare for the potential impacts of driverless vehicles, showing how this technology can coexist with, and even augment, certain components of Complete Streets.

Figure 3.44: Existing Conditions Study Area Locations



3.3 Existing Conditions Inventory

As a preliminary step in developing a set of Complete Street typologies for Dayton, the project team surveyed a selection of the City's existing street network. This exercise revealed what a Complete Street in Dayton currently looks like, relative to the rest of the network. It identified streets that support high-density, multimodal activity as well as streets that offer opportunities for improvement.

The Existing Conditions Inventory classifies streets according to Dayton's Complete Street Typologies, presented in Chapter 4. Typology assignment uses a two-tier system to classify streets. The first tier categorizes streets by curb to curb (or pavement) width, assigning a size to each street:

- Very Large: > 60'
- Large: 40'-59'
- Medium: 30'-39'
- Small: < 30'

The second tier identifies streets by primary function, traffic volume, and other contextual features. Second tier categories are:

- Mixed-Use Street
- Commuter Street
- Industrial Street
- Neighborhood Street

The inventory examines a wide cross section of study areas to ensure that all street typologies are included. Thirty-five study areas were selected based on geographic diversity. Street segments in all four quadrants of the City were examined (see Figure 3.44). Other factors include, but are not limited to, curb to curb width, speed limit, and traffic volume. The project team visited all study areas to document existing conditions. Measurements and photographs were taken, as well as qualitative data such as discussions with road users. Fourteen of the 35 study areas were selected for more thorough analysis. One example, a Very Large Mixed-Use Street, is presented

in this section; please refer to Appendix A (page 91) for an analysis of the remaining study areas, including mapping and an examination of public and private realm elements.

Public realm elements refer to features located within the right-of-way, such as sidewalks, lighting, street furniture, and number of lanes. Elements in the private realm are anything outside the right-of-way, including land use, setback, and building placement. Elements in both categories shape the street's character as well as its physical features.

Table 3.3 compares two Very Large Mixed-Use Street segments. Examples in the first column feature many elements of a Complete Street and may be used as benchmarks to measure Dayton's progress as it implements its Complete Street Design Guidelines. Examples in the second column exhibit some components of a Complete Street but are lacking in other areas. Each entry is further divided into three color coded categories:

- Green = complete/no changes needed
- Orange = partially complete/some changes needed/ neutral
- Red = incomplete/major changes needed

It should be noted that for certain public and private realm elements, color categories differ according to the street typology in question. For example, a Very Large Mixed-Use street such as downtown Third Street receives a green score for the presence of wide sidewalks due to the high volume of pedestrians, whereas a small neighborhood street may receive a green score for narrow sidewalks due to light pedestrian activity. Certain quantitative categories, including number of travel lanes, speed limit, and traffic volume (AADT), are not color coded.

The segments of Third Street displayed on the following page (3.45-3.48) share similar curb to curb widths, Rights-of-Way, speed limits, and number of travel lanes. The Downtown segment, between Ludlow Street and Main Street, features many more Complete Street elements than the segment of E Third Street, between Terry Street and Harshman Street. Downtown Third Street is equipped with wide, landscaped sidewalks, decorative lighting, high visibility crosswalks, and signalized intersections with pedestrian signals. These elements provide a safe and convenient walking environment, along with parallel parking, which buffers pedestrians from traffic. On the south side of the street, a continuous façade of mid- and high-rise buildings clearly defines the public realm. A mix of uses and street-level window displays engage and entertain pedestrians as they walk down the block. On the north side, a public plaza surrounded by historic buildings invites more pedestrian activity beyond the street. In the road itself, two travel lanes in either direction accommodate private vehicles, transit, trucks, and bicyclists. Although it lacks certain features, such as bicycle facilities, Downtown Third Street is an excellent example of a successful Complete Street in Dayton.

In contrast, E Third Street, between Terry Street and Harshman Street is lacking many important elements of a Complete Street. Sidewalks are mostly devoid of trees, street furniture, and landscaping that could buffer pedestrians from fast-moving traffic. Marked crosswalks are scarce, and elevated, auto-oriented lighting defines the road at night. In the private realm, surface parking lots and deep setbacks separate non-motorists from the businesses on the block. Together, these attributes create an environment that is dominated by automobiles and deters pedestrians, bicyclists, and transit users.

As discussed earlier with regards to land use, not all streets can or should feature the amenities of a block like Downtown Third Street. Pedestrian, bicycle, and transit improvements should focus on areas that already see some level of multimodal activity. In areas like E Third Street between Terry and Harshman where most trips are by automobile, investing in multimodal amenities may not be as fruitful. The methodology for project prioritization in Chapter 5 offers detailed guidance in determining the best candidate streets for Complete Street improvements.

3.4 Conclusion

A confluence of positive trends in Dayton is underway. Increased bicycle ridership and advocacy efforts, interest in urban living and a growing Downtown population, a robust transit system, and one of the busiest freight networks in the country mean that more and more users will be sharing space on the City's roads. Dayton is ready for a Complete Streets plan that balances the needs of all roadway users. The following chapter describes Complete Street design elements that accommodate pedestrians, bicyclists, transit, freight, and private vehicles. It highlights successful instances of these treatments in other cities, some of which could be applied in Dayton. And it sets the stage for a re-visioning of Dayton's transportation network that will carry it forward for the next 25 years.

	Third Street	
	Ludlow St to Main St	Terry St to Harshman St
Public Realm		
Curb to Curb Width (ft)	60	65
ROW (ft)	110	100
Speed Limit (MPH)	35	35
Number of Travel Lanes	4	5
Traffic Volume (AADT)	13,900	10,400
Surface Condition	Excellent	Fair
Directionality	Two Way	Two Way
Parking	Parallel	Parallel
Bicycle Facilities	None	None
Sidewalks	Wide	Medium
ADA Curb Ramps	Yes	Yes
Marked Crosswalks	Textured, Signalized, Midblock	Partial
Signalized Intersections	Yes	None
Transit	Yes	Yes
Trees	Mature	Partial, Mature
Tree Lawn	None	None
Traffic Calming	Yes	None
Curb Cuts	None	Frequent
Street Furniture	Yes	None
Lighting	Decorative, Pedestrian-Scaled	Auto-Scaled
Private Realm		
Land Use within 1/4 mile	Commercial, Institutional, Open Space, Residential	Commercial, Residential, Industrial
Zoning	Central Business District	Mature Residential
Development Pattern	Urban Core	General Urban
Height (Stories)	4-18	1-3
Building Entrance	Front	Front
Setback (ft)	0-30	0-68
Parking Placement	Parking deck 7-8 Stories	Front and Side 146 Marked Spaces
Realm Interactions	Private Defines Public	Public Defines Private

Table 3.3: Very Large Mixed-Use Street Existing Conditions Inventory

Figure 3.45: Downtown Third Street Aerial (Ludlow to Main)

Figure 3.46: Downtown Third Street, Street View

Figure 3.47: E Third Street Aerial (Terry to Harshman)

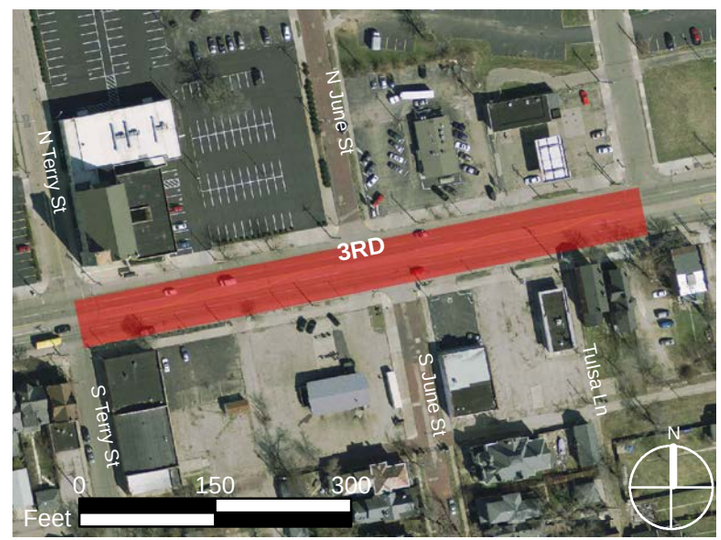


Figure 3.48: E Third Street, Street View

Figure 3.49: Historic E Third St

CHAPTER 4: COMPLETE STREET ELEMENTS

This chapter examines the Complete Street design elements that Dayton and other cities have used to create more multimodal and welcoming settings on their roadways. Complete Street design elements reshape auto-oriented environments. They transform streets from mere automotive conveyances into lively and dynamic spaces that welcome all users and support social, cultural, and economic activity. While these elements are also used on newly constructed roads, the vast majority of them can be found on streets that were designed around the automobile and have been retrofitted to accommodate pedestrians, bicyclists, and transit users. The items in this section represent a sampling of the many tools that are used to achieve Complete Streets, and should not be considered an exhaustive list. Rather, evidence-based research and state-of-the-practice recognizes these treatments as the most effective tools in their respective categories. Many of them already exist in Dayton, and specific examples are shown throughout the chapter. Other treatments would be new to Dayton. Examples from other cities illustrate how these design elements have been used successfully. Throughout the chapter, photos are marked with symbols that provide additional information:

CS City with a Complete Streets policy

D Located in Dayton

Some of the case study cities are similar in size and vision to Dayton. Others are included to show examples of cutting-edge technology and innovation in categories such as transit accessibility, green infrastructure, and pedestrian amenities. As the year 2040 approaches, infrastructure will increasingly rely on smart technology to boost efficiency in transportation systems. Using mobile platforms to accommodate roadway users with disabilities, crowd-sourcing sidewalk repairs and street maintenance, and providing real-time information to transit users will become the standard in transportation operations. In addition to these progressive, technology-based approaches, this chapter also presents design elements that use public art and placemaking to calm traffic and create more livable, sustainable environments. By using a combination of these strategies, Dayton can build its already robust roadway network into a world-class, multimodal transportation system.

4.1 Pedestrian Facilities

Vibrant, successful streets all have one thing in common: they welcome pedestrians. More than any other road user, pedestrians are the lynch pin to a Complete Street. Everyone is a pedestrian at some point during their trip, whether it is walking to a parked car or waiting at a bus stop. Simply put, pedestrians are people who happen to be in the public realm. People walking down the street have an inherent understanding of what elements make for a useful, safe, comfortable, and interesting walk. Streets that lack those attributes generally lack pedestrians as well. Given the right environment, pedestrians will thrive. But creating that environment is a complicated process with many moving parts.

Several factors determine whether a street is walkable. In the road itself, it is the presence of cars, bikes, and transit; in the right-of-way, it is streetscapes and pedestrian facilities such as sidewalks; and in the private realm, land use and building design and placement are decisive factors. The relationship between motorists and pedestrians is often an adversarial one. Complete Streets reduce the potential for conflict by clearly defining which road users belong where, and providing safe and convenient amenities for both cars and pedestrians. Walkable cities tend to be bikeable and transit-friendly as well, since all three modes thrive in the same high-density, mixed-use environment. Attractive streetscapes and sidewalks that clearly define the pedestrian zone with landscaping, lighting, and street furniture entice walkers to use them. Mixing land uses so that a typical urbanite's routine destinations are within walking distance of one another is essential. Walking is only useful if there are places to walk to. Creating a walkable street is a complex task. The pedestrian facilities described here are just one piece of the puzzle.

Fifth Street: A Great Place in America

Dayton already boasts a number of successful Complete Streets. Along with Brown Street and Third Street in Wright-Dun, the Oregon District's Fifth Street offers a different example. In 2015, it was designated a Great Place in America by the American Planning Association. The short quarter mile stretch of E Fifth Street in the Oregon District supports a flurry of activity. Bike share stations and transit stops line the street, but pedestrians are the real stars on this vibrant corridor. A diverse array of contemporary businesses woven into the neighborhood's historic fabric attracts a steady flow of pedestrians. Stamped concrete crosswalks and curb extensions, sidewalks with bricked and landscaped amenity zones, and ornamental lighting form a pleasant and convenient walking environment. Handsome commercial buildings from the 19th and early 20th Centuries flank the road and create a compact urban envelope that visually narrows the street for drivers. Street trees and a brick roadway surface also slow traffic. The Oregon District is Dayton's oldest neighborhood and the first to be listed on the National Register of Historic Places. Its main thoroughfare was a Complete Street before the term existed, and continues to shine as the City's nationally recognized Great Street.

Figure 4.1: Fifth Street in the Oregon District

Figure 4.2

Curb Ramp

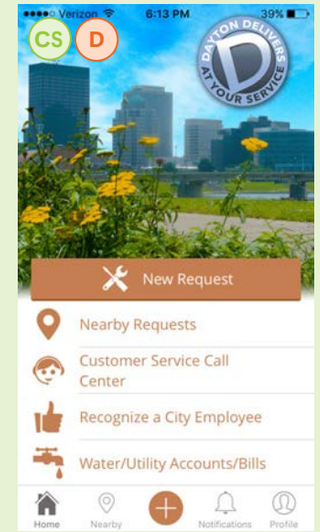
Curb ramps provide an accessible way for people with disabilities to safely navigate from a crosswalk or road to a sidewalk or vice versa. Title II of the Americans with Disabilities Act requires state and local governments to make pedestrian crossings accessible to people with disabilities by providing curb ramps. Curb ramps must have textured surfaces, called truncated dome mats, that alert people with disabilities of their proximity to the road. They are required where pedestrians must navigate from one curbed sidewalk to another and where people board and alight from public transportation.

Figure 4.3

Raised Crosswalk

Raised crosswalks bring the level of the roadway to that of the sidewalk, allowing easier navigation across roads for people with disabilities. They also act as speed humps, forcing traffic to slow down in areas of high pedestrian activity. Raised crosswalks located at intersections can be extended to fill the entire intersection, slowing traffic in all directions. In Dayton, raised crosswalks could be used on streets with low speed limits (25 mph) where speeding is a concern, and around pedestrian attractions like shopping malls, parks, and schools.

Figure 4.6



Case Study: Dayton, OH

The City of Dayton's Customer Service mobile app, called Dayton Delivers, allows residents to submit sidewalk and curb repair requests, along with many other roadway issues (parking meters, potholes, snow and ice removal, etc.).

Figure 4.4

High Visibility Crosswalk

Adding high-visibility elements to crosswalks alerts drivers to bicyclists and pedestrians, acting as a strong cue to control speeds. Elements can include flashing beacons, extra signage, textured and colored pavement, and in-pavement lighting. Dayton has several high visibility midblock crossings Downtown, replete with traffic lights, warning signage, and painted zebra stripes.

Figure 4.5

Pedestrian Refuge Island

Pedestrian refuge islands are sheltered spaces in the middle of a street—often connected to a median—that provide a protected place in the center of roadways for pedestrians and bicyclists to wait, allowing them to cross one direction of traffic at a time. They reduce vehicle speeds and can include landscaping that acts as a gateway to residential areas.

Figure 4.7

Pedestrian Hybrid Beacon

Pedestrian Hybrid Beacons (PHB), also known as HAWK (High-Intensity Activated crosswalK) signals, are often placed at midblock crossings on busy roads with high volumes of pedestrian traffic. They can also be used at minor, unsiganlized cross streets. PHBs remain dark until a pedestrian activates them, increasing motorists' awareness of pedestrians and reducing rear end collisions. Because they are only activated when needed, PHBs provide a safe alternative to full traffic signals while striking a balance between vehicle and pedestrian levels of service. Rectangular rapid flashing beacons, or active warning beacons, are an alternative to PHBs. Their irregular flash patterns are similar to emergency vehicle lights, and alert drivers to yield when pedestrians or bicyclists are crossing the road. Dayton could install PHBs or active warning beacons where the City's trail network crosses over major roads, and where pedestrian generators are separated by wide roads with busy traffic.

Figure 4.8

Case Studies: Singapore and Portland, OR

There are many other effective means of decreasing pedestrian wait time and allowing them enough time to safely clear the road. Singapore uses a program that distributes swipe cards to seniors and pedestrians with disabilities. Swiping the card at a walk signal adds up to 13 seconds for the pedestrian to clear the intersection. To decrease costs, this feature could be added to existing programs, such as the Greater Dayton Regional Transit Authority's Reduced Fare Identification Cards or school-issued student IDs.

Intelligent pedestrian signals achieve the same goal, automatically extending the walk light if a pedestrian is still in the crosswalk. In Portland, OR, intelligent pedestrian signals add a maximum of eight seconds to crossing time when needed. This occurred in 20 percent of crossings, reducing unnecessary traffic delays by 80 percent.

Figure 4.9

Case Study: Granville, OH

The Village of Granville installed a high visibility crosswalk at the intersection of the TJ Evans Trail and S Main Street. Textured pavement distinguishes the crossing from the roadway and provides an environmental cue for motorists to reduce speed. Speed limit and warning signage and push-button activated flashing lights further enhance the crossing's visibility and warn motorists of potential conflicts. In addition, stop signs and stop bars control traffic on the trail itself.

4.2 Bicycle Facilities

When considering the experience levels of people who use bicycle facilities, they can be divided into four categories: Strong and Fearless (1%), Enthused and Confident (5-10%), Interested but Concerned (~60%), and No Way, No How (~30%). As Dayton improves and expands its on-street bikeway network, it should consider what types of bicyclists would be likely to use these new facilities. While the first two categories are comfortable riding in most travel environments, even ones that are auto-oriented and provide few accommodations for bicyclists, the majority of the cycling population (as well as would-be cyclists) prefers low-speed, low-traffic streets or separated facilities. In a survey conducted by Bike Miami Valley, many respondents indicated that low-speed neighborhood routes would make them feel safer and more comfortable. The Miami Valley has over 300 miles of trails, but on-street facilities are needed to provide direct access to many destinations in the City, including centrally located shops, businesses, and neighborhoods.

Well-designed bicycle facilities follow the eight to eighty rule: they are designed so that people of all ages and abilities feel comfortable, from an eight year old who just removed the training wheels to a grandfather on his way to the store, and all riders in between. Using education, encouragement, and engineering solutions, many of these riders may graduate from Interested but Concerned to Enthused and Confident or even Strong and Fearless.

The treatments in this section offer varying degrees of separation and protection, from facilities shared with vehicles to buffered facilities for the exclusive use of bicyclists. The suitability of each treatment to a particular roadway depends on traffic volumes, speeds, and land use, and is discussed in Chapter 4.

Figure 4.10

Shared Lane Marking

Shared lane markings, or sharrows, are in-lane roadway markings indicating the proper positioning of bicyclists in the lane. The markings typically include a bike symbol topped with chevrons. While not a dedicated facility, these markings alert drivers to watch speeds as bicyclists share the road with vehicles. Sharrows are a cost-effective way for cities to improve their bikeway networks. They have also been shown to reduce the incidence of sidewalk riding and wrong-way bicycling and fill in gaps between dedicated facilities like bike lanes. Fourth, Fifth, and Wilkinson Streets in Downtown Dayton have sharrows.

Figure 4.12

Bicycle Boulevard Case Study: Columbus, OH

In the Westgate neighborhood, a cluster of bicycle boulevards uses residential streets to connect schools, a library, and a major park. The network also connects several neighborhoods to the Lower Scioto Greenway, part of the Ohio to Eerie Trail, which spans the entire state. Bicycle boulevards in Columbus consist primarily of low-cost pavement markings and signage, with the occasional intersection crossing treatment.

Figure 4.11

Standard Bicycle Lane

Bike lanes provide dedicated space within the roadway reserved exclusively for bicyclists. They can be added as part of a road diet where vehicle travel lanes are reduced and/or narrowed. Bike lanes form the backbone of most bikeway networks. Several north-south roads in Dayton are equipped with bikes lanes, including Perry, Jefferson, and St Clair Streets downtown, and Brown Street. Monument Street and Wyoming Streets offer bike lanes for east-west travel.

Figure 4.13

Bicycle Boulevard

Bicycle boulevards are residential streets with low speeds and traffic volumes, designed to give priority to bicyclists. They use quiet streets that parallel major roads and commercial corridors, providing safe and convenient facilities for less experienced bicyclists. Many traffic management elements can be used to create bicycle boulevards, including pavement markings, signage, and crossing treatments. Bicycle boulevards require coordinated signage and roadway markings to clearly define the route, and they must be actively branded and publicized to ensure adequate usage.

Figure 4.14

Protected Bike Lane Case Study: Pittsburgh, PA

In a survey conducted by Bike Miami Valley, many respondents indicated that improving connections across highways and other barriers would make bicycling in Dayton feel more comfortable and safer. Auto-oriented bridges into Downtown are a hindrance for bicyclists. These bridges were designed for high volumes of motorized traffic with few bicycle amenities and deter would-be cyclists from crossing into Downtown. Identifying these problem areas and installing protected bike lanes across key bridges is one step in connecting the Central Business District to outlying neighborhoods.

Like Dayton, Pittsburgh is a mid-size post-industrial city at the confluence of three rivers. Due to population loss, it also has excess capacity on its transportation network. The Birmingham Bridge, for example, was built for a highway that never materialized and connects south side neighborhoods to Downtown Pittsburgh over the Monongahela River. Motorists often exceeded the posted speed limit of 35 mph, taking the bridge's wide lanes as a cue to speed. In 2007, protected bike lanes were installed on the bridge, creating a travel path for bicycles as wide as the bridge's car lanes. Other bridges in Pittsburgh feature separated multiuse paths for exclusive bicyclist and pedestrian access.

Figure 4.15

Protected Bicycle Lane

Protected or buffered bike lanes use paint striping to offer greater separation between bicyclists and adjacent motorized traffic and/or parking lanes. They are typically applied to streets with high speeds and traffic volumes, and in areas where bicyclists are at risk of being "doored" by parked vehicles.

Figure 4.16

Cycle Track

Cycle tracks separate bicyclists from motor vehicles using barriers such as bollards, parked cars, landscaping, or grade-separation. They accommodate riders of various experience and comfort levels. One-way cycle tracks are typically used on streets with high bicycle volumes and high traffic volumes and speeds. A two-way cycle track allows travel in both directions on one side of the road and often requires less space than two separate bike lanes on either side of the road. Two-way cycle tracks are used on busy roads where most destinations are on one side, and where there is extra right-of-way on one side. Cycle tracks can be combined with traffic calming, road diets, and green infrastructure to create Complete Streets.

Figure 4.17

Cycle Track Case Study: Indianapolis, IN

The Indianapolis Cultural Trail is an eight mile cycle track/pedestrian path that loops around Downtown Indianapolis. The trail connects major destinations, including shopping centers, hotels, parks, and government buildings. It is landscaped with bioswales and stormwater planters, marking the first instance of green infrastructure in the City's right-of-way. The bioswales, which are filled with native plants, are below-grade and allow large volumes of stormwater runoff to percolate through the ground, diverting it from the city's combined sewer system. The trail added 500 trees to the downtown canopy and eight acres of greenspace. These natural barriers separate cycle track users from motorized traffic and provide a pleasant and convenient option for bicyclists Downtown.

During initial public involvement for Dayton Transportation Plan 2040, community members expressed interest in installing cycle tracks on major roads like Main Street and Wayne Avenue to create bikeway corridors into and through Downtown. These bikeways would act as direct, on-street alternatives to supplement the trail system. Currently, there are no cycle tracks in Dayton, although the bikeways on Stewart Street and Steve Whalen Boulevard fulfill the same purpose. The Stewart Street bikeway between Patterson Boulevard and Brown Street could be extended into Dayton's west side as a two-way cycle track. This treatment would increase connectivity between west side neighborhoods and south central locations like Miami Valley Hospital and the University of Dayton.

Figure 4.18

Bicycle Actuated Signal

A bicycle-actuated signal uses the same technology that detects waiting vehicles, re-calibrated to recognize bicyclists. Signage or pavement markings indicate where bicyclists should stop in order to be detected. These signals reduce waiting times for bicyclists and deter crossing during a red light. They can be used in combination with other bike facilities, such as bicycle boulevards and bike boxes, or on streets without facilities where there is a high volume of bicyclists. If vehicle loop detectors are already present, it costs very little to recalibrate them for bicycles.

Figure 4.19

Wayfinding Signage

Bicycle wayfinding signs guide bicyclists to their destinations along designated bikeways. They can indicate to bicyclists and other roadway users what type of bicycle facility is present, such as a bicycle boulevard. Some signs also include distance and travel time estimates to popular destinations like schools, parks, and commercial districts. Navigational signs placed at intersections indicate when a bikeway turns onto another street or intersects another bikeway. Legible and attractive signage encourages beginner bicyclists and unifies a city's bikeway network with consistent branding and imagery.

Figure 4.20

Wayfinding Signage Case Study: Asheville, NC

In 2012 the City of Asheville installed 21 wayfinding signs connecting downtown to the University of North Carolina-Asheville and several neighborhoods using bicycle-friendly streets. Design standards from the Manual on Uniform Traffic Control Devices (MUTCD) were used and the City collaborated with the North Carolina Department of Transportation to place the signage on state routes. Asheville consulted with local bicycle advocates to determine ideal sign locations and featured destinations. This cost-effective solution to wayfinding increased ridership in Asheville's core and supplemented its existing bikeway network.

Dayton's 2025 Bicycle Action Plan lists as one of its objectives implementation of a system of standardized way-finding signage along designated bike routes to direct bicyclists to points of interest. Outdated bikeway signage currently directs bicyclists towards dead ends and onto roadways that may be intimidating for some riders. Removing this signage and replacing it with well-marked signs that include mileage to popular destinations and incorporate future bikeway facilities, such as bicycle boulevards, would improve network connectivity. On-street signage that guides bicyclists towards the region's extensive trail system is also desirable.

Figure 4.21

Bike Box

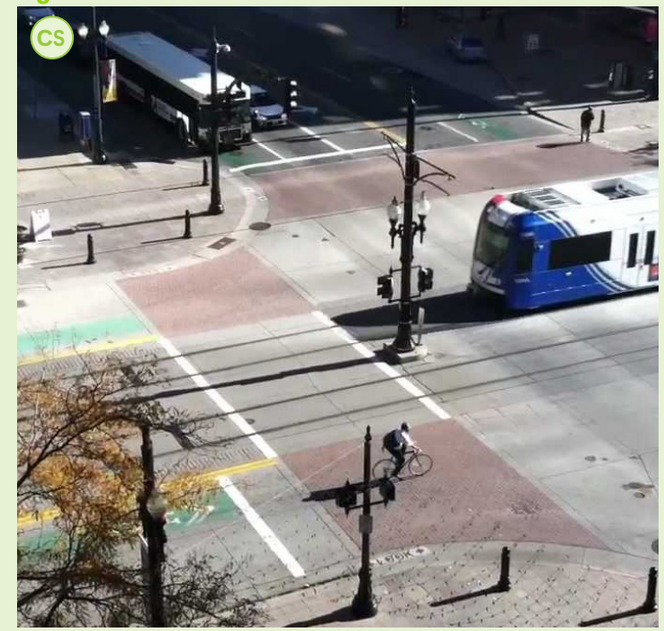
A bike box designates a space for bicyclists to stop in front of waiting traffic at a signalized intersection. The box is marked with paint and a bicycle symbol and is usually placed between the stop bar and the crosswalk, if there is one. They make bicyclists more visible and allow them to quickly clear the intersection ahead of vehicles. Bike boxes are often used on bicycle boulevard routes and at intersections where bicyclists frequently make left or right turns. However, without proper education, bicyclists and motorists may misuse or ignore this novel bike facility.

Figure 4.22

Two-Stage Turn Queue Box

A two-stage turn queue box, or bike turn box, provides a safe way for bicyclists to make left turns without merging across travel lanes. Queue boxes are located at the front of an intersection and allow left-turning bicyclists to pull over in front of stopped cross-street traffic and wait for the green signal to proceed through. This method increases bicyclists' visibility and makes their movements more predictable, reducing turning conflicts between bicyclists and vehicles. Turn boxes require more time than turning left with motorized traffic, and experienced bicyclists may opt to make a conventional left turn with traffic instead.

Figure 4.23



Two-Stage Turn Queue Box Case Study: Salt Lake City, UT

In 2011, Salt Lake City installed its first bike turn boxes that allow bicyclists to make left turns over median light rail tracks. It prioritized bicycle access and connectivity by providing a safe and legal method to cross the tracks where automobiles are prohibited from turning due to the light rail right-of-way.

Prior to installation, some bicyclists cut diagonally across the tracks through the intersection, creating a hazard for all road users, including the light rail. The turn boxes standardized bicycle movement through the intersection, making them more visible and encouraging predictable behavior.

4.3 Transit

Aside from obvious benefits like increased accessibility and mobility, transit can add much to the public realm, when done right. Many cities across the country are considering streetcars and other rail systems as a way to increase walkability and get people out of their cars. Experts caution that these motivations typically result in failed or underperforming service. Streetcars are pedestrian accelerators, not pedestrian creators. In fact, heavy pedestrian activity precedes most successful streetcar lines. Dense, mixed uses that generate high volumes of pedestrians are able to support streetcars because they offer yet another alternative to driving on multimodal corridors. Complete Streets generate the walking and biking activity needed to create such corridors, which could eventually lead to the right conditions for a successful rail network.

For cities that do not yet have the density needed to support rail, trolley buses or circulator routes are a good alternative. They are cheaper than rail and can be specially branded to promote the destinations they serve. In 2015, the City of Dayton, the Oregon District Business Association, and other partners began operating shuttle service between the Oregon District and the Transportation Center Garage to solve the neighborhood's parking problem. The Greater Dayton Regional Transit Authority plans to launch a free Downtown circulator service in 2017. If successful services in other cities, like Columbus and Cleveland, are an indication, these projects will increase walkability and street activity throughout Downtown, bolstering development and encouraging the steady influx of urban dwellers.

Urbanized areas successful integrate transit into local mobility needs. Transit works best in dense neighborhoods that can supply high ridership and many destinations within a few steps of the transit stop. These areas are ideal candidates for Complete Streets, so transit plays an essential role in creating an appealing atmosphere for all road users. High-frequency lines should be located in such environments. In addition, in order to effectively serve mobility-limited populations, such as those with low incomes or disabilities, transit lines must cover areas of a city to which these populations need access, regardless of density.

If taking the bus is not perceived as comfortable and convenient, people will opt for other means of travel, if they are able, so it is important to focus on improvements to the transit experience that improve the positive experience of riders. Transit is a ripe space for social interaction and allows riders to feel connected to their cities and neighborhoods on a level that is beyond reach for most drivers. Many cities use their transit systems as an opportunity for placemaking, empowering residents to take pride in their cities. Public art can spruce up transit stops and act as branding tools, reflecting neighborhood character and encouraging walkability.

This section explores how transit shapes the travelling environment and how it can be made more accommodating and attractive to riders and would-be riders alike.

Figure 4.24

Figure 4.25

Figure 4.26

Signage

Where low ridership does not justify a shelter, clear, visible, signage with attractive branding should mark stop locations. Even in areas with well-maintained pedestrian facilities, people with disabilities may still struggle to find bus stops. Inaccessible or poorly marked stops inhibit ease-of-access for potential riders, especially when travelling through unfamiliar areas. Mobile technology provides a hitherto untapped resource that can safely guide disabled people and new users alike through transit systems.

Shelter

Well-designed and eye-catching transit stops can add much to a street's character, increase ridership, and offer a superior experience to driving. Transit routes should have adequate shelters with seating, trash receptacles, lighting, and pertinent information posted. Shelters should be ADA-accessible. Crosswalks, walk signals, and yield signs should accompany transit stops near intersections. Bike racks at transit stops and on transit vehicles increase ease-of-access. These improvements should be placed in areas that are already at least somewhat walkable with medium- to high-density development.

Bulb Out

A bus bulb out or curb extension allows buses to stop in the travel lane, reducing delays and conflicts with other vehicles. Bus bulb outs have the same traffic calming effects that regular bulb outs do: they narrow the roadway and shorten the distance that pedestrians must cross at intersections, they can be designed with smaller curb radii to reduce vehicle speeds during right turns, and they make waiting transit riders more visible to oncoming traffic. Moreover, bus bulb outs offer the added benefit of providing extra space for transit shelters and transit users.

4.4 Traffic Calming

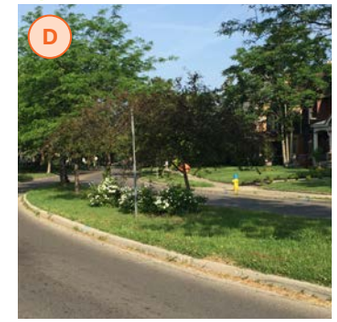
Traffic calming measures are used to manage vehicular speed, volume, and cut-through traffic. They can also enhance a streetscape both aesthetically and functionally, creating more pleasant and safer spaces for bicyclists, pedestrians, and transit users. When considering traffic calming measures on a particular street, planners and engineers look at the neighborhood as a whole, because changes on one street can impact surrounding streets. Treatments used in traffic calming are divided into two categories. Some treatments use vertical deflection to slow traffic. Speed humps, raised intersections and crosswalks, and textured pavement fall under this category. Most treatments fall under the second category, horizontal deflection, which alters the road's width, forcing vehicles to slow down as they navigate through the area. Chicanes, curb extensions, and medians are examples of horizontal deflection.

Dayton offers many examples of effective traffic calming measures throughout the City. In the Oregon District, brick road surfaces slow traffic, and landscaped curb extensions narrow the road on Fifth Street. Gateway treatments like the one at the intersection of Wayne Avenue and Van Buren Street distinguish quieter residential streets from main roads, cueing motorists to slow down. Throughout Downtown, decorative, pedestrian-scaled lighting encourages sidewalk activity. At Third Street and Wayne Ave, back-in angled parking narrows the roadway and buffers pedestrians from traffic. The Patterson Boulevard streetscape shows how a combination of decorative lighting, on-street parking, landscaping, and street furniture can transform an auto-oriented street into an environment that welcomes all users. Around the University of Dayton, brick crosswalks define intersections as multimodal spaces, alerting drivers to the high volume of pedestrians in the area. All of these examples are found in high-density, mixed-use neighborhoods where transit, bicyclists, and pedestrians share the road with other vehicles. On roads where such activity is lacking, traffic calming elements can beautify streets and attract people, whose presence slows traffic. As speeds decrease, eye contact and other communication between users become more natural. Traffic calming creates and maintains human connections on the road, making a safer environment for all.

In addition to physical changes to a road's hardscape such as the treatments discussed in this section, other alterations to the travel environment provide innovative and cost-effective ways to calm traffic. In the 1980's, Dutch engineers started to implement "psychological" traffic calming measures that are less costly than traditional traffic calming measures but still influence drivers to slow down. Rather than relying on costly engineering solutions such as speed humps that many drivers resent or ignore, Dutch engineers began using "mental speed bumps" that forced drivers to slow down without even realizing it. Social cues from the environment indicate that a slower speed is appropriate. Such cues could be anything from public art to roadside parklets. These tools can also be used to beautify streets, such as E Third Street below the railroad bridge, where a series of murals decorates the underpass.

Unexpected sights make drivers slow down and stay alert. Commercial streets with outdoor seating and lots of activity, neighborhood streets with children playing in front yards, or mixed-use streets with eye-catching sculptures and murals are all examples of psychological traffic calming. In some ways, psychological traffic calming represents a cultural shift as to how people use their streets. It is likely more effective on streets that already offer a modicum of support to pedestrians and bicyclists, and may be harder to achieve than infrastructure means of calming traffic, discussed on the following pages.

Figure 4.27



Median

Medians are any type of barrier that separates opposing traffic on a two-way street. Unless there is a break in the median at an intersection, medians block turning movements and through traffic on intersecting streets. They can be landscaped or made of concrete or other materials. Lighting and signage for pedestrian crossings can also be included.

Figure 4.28

Lane Narrowing

Narrowed lanes provide a more subtle calming effect than other physical calming methods. One cost-effective solution is to visually narrow lanes using paint, creating a wider shoulder, parking lane, or introducing a bike lane.

Figure 4.29

Textured Pavement

Textured pavement, such as brick, concrete pavers, and stamped asphalt, produces small, constant changes in vertical alignment. When used at crossing locations, textured pavement provides a visual and audible cue to drivers that identifies an intersection or crosswalk as a pedestrian area. Green infrastructure, like pervious concrete, is used in textured pavement to capture stormwater runoff. Certain textured materials require less maintenance than traditional asphalt surfaces and can be used to beautify the street.

Figure 4.30

Road Diet

A road diet reduces travel lane widths or removes them completely to make room for wider sidewalks, bicycle facilities, landscaping, on-street parking, and other traffic calming treatments. These elements help slow traffic on wide roads that encourage speeding. A road diet typically converts a four lane road into a three-lane road with a center turn lane, although it can also be used on wider roads with four to six lanes. Treatments range from a simple, relatively inexpensive restriping to moving the curb lines and physically narrowing the road.

Certain segments on Dayton's major roads—Very Large and Large Mixed Use and Commuter Streets—could be good candidates for road diets, especially where a pedestrian-scaled, walkable environment is desirable.

Figure 4.31

Chicane

Chicanes are a set of two or more bulb outs or curb extensions that narrow and realign the roadway for short segments making drivers slow down to negotiate the curves. They discourage cut-through traffic but still maintain two-way traffic and full access for larger vehicles. A chicane effect can be created using various methods, including concrete curbs, landscaped areas or alternating parallel parking from one side of the street to the other every few hundred feet. Landscaped chicanes provide a space to capture storm water runoff, simultaneously greening the roadway and calming traffic. The chicanes on Frank Street east of Main Street in Dayton are combined with a gateway treatment to mark an entrance into the University of Dayton area.

Figure 4.32

Curb Extension/Bulb Out

Curb extensions, also called bulb outs or neckdowns, narrow the roadway by extending the curb at key intersections and midblock crossing locations. They slow traffic and reduce turning speeds and crossing distance, making pedestrians more visible to oncoming traffic. Psychologically, they indicate that the walking environment is equally important as the road itself, reclaiming space to improve pedestrian comfort and safety. In Dayton, bulb outs in the Oregon District alternate with on-street parking to buffer pedestrians from traffic.

Figure 4.33

Road Diet Case Study: Charlotte, NC

Charlotte undertook a five year, multiphase project to convert a high-speed four lane roadway with frequent collisions into a multimodal, livable environment that connects neighborhoods instead of isolating them. The City installed 20 pedestrian refuge islands, bicycle lanes, decorative lighting, widened sidewalks, and gateways for a cost of $1.3 million. Four and five vehicle lane segments were reduced to three lanes, and all of these improvements were achieved with no significant impact on vehicle level of service. The project resulted in decreased speeds and crash rates, and positive feedback from the surrounding communities.

Figure 4.34

Raised Intersection

These intersections are entirely elevated to the sidewalk level. Raised intersections are designed with ramps for vehicles and often include decorative surface materials on the flat raised section. Although they reduce speeds at high conflict points between pedestrians and vehicles, they are also costlier to maintain than conventional intersections. In Dayton, strips of rough pavement known as "jiggle bumps" have been installed at certain intersections in residential neighborhoods to compel stop sign compliance. Raised intersections could be used for the same purpose, where speeding and cut-through traffic is a concern.

Figure 4.35

Reduced Corner Radii

Reduced corner radii are used at intersections to make vehicle turning movements slower, typically in conjunction with other calming techniques like bulb outs and raised crosswalks. Minimizing the size of a corner radius creates more compact intersections, improves motorist and pedestrian sight distance, and shortens crossing distances. A standard curb radius is 10 to 15 feet, but many cities reduce curb radii to as small as two feet . The presence of emergency vehicles, buses, and heavy trucks should be considered before reducing corner radii, and designs should accommodate large vehicles while still restricting the turning speed of smaller vehicles. Large vehicles should be able to use the full area of the intersection for turning movements. In some cases, concrete curbs reinforced with steel that can handle the weight of large vehicles, or truck aprons that extend into the street, should also be installed. In Dayton, reduced corner radii should be used in areas of high pedestrian activity, such as Downtown or around schools, parks, and other neighborhood sites, and wherever the speed of turning vehicles poses a danger to crossing pedestrians.

Figure 4.36

On-Street Parking

Parking is a significant consideration for many cities, especially in older urban neighborhoods like the Oregon District or Wright-Dunbar. Along with providing convenient access to homes and businesses, on-street parking serves an important secondary function, as it helps narrow roadways and calm traffic. On-street parking, both parallel and angled, creates a buffer between pedestrians and motorists, and can also shield certain bicycle facilities, like cycle tracks, from adjacent traffic. Angled parking should be back-in only so that drivers face the roadway when they exit the parking space. This allows for greater visibility and eye contact with other roadway users. Parking should be placed strategically, where it makes the most efficient use of space and is able to fulfill its dual purpose. If it is convenient and accessible to adjacent land uses while buffering sidewalk activity from the road, then it is likely a good fit.

Figure 4.37

Road Closure

Road closures are often reserved for locations where all other calming attempts have failed. They may be adjacent to intersections, creating cul-de-sacs and dead ends, or placed midblock, creating two stub streets. Gates, landscaping, bollards, and other barriers bar through-traffic, usually leaving pathways open for bicyclists and pedestrians. Street closures require strong community support since they restrict both cut-through traffic and access for neighborhood residents.

Figure 4.38

Road Closure Case Study: Dayton, OH

The Five Oaks neighborhood, between Salem Avenue and Main Street north of downtown, was plagued by crime in the early 1990's. Homeowners escaped to the suburbs, houses fell into disrepair, and property values plummeted. Confronted with this crisis, the City of Dayton and the Five Oaks Neighborhood Improvement Association adopted a radical solution: 35 iron gates and 26 alley barricades were installed throughout the neighborhood in 1992. The barriers, which cost about $11,000 each, did not affect pedestrian access, and gate keys allowed emergency and City vehicles to access the closed-off streets.

As a result of the road closures, traffic volume fell by 67 percent, and crashes dropped by 40 percent. Violent crime was cut in half and average home sale prices saw a 15 percent rise within one year. In Five Oaks, severe problems of crime and traffic called for extreme measures. But road closures can be used in less extensive ways as well. Access from E Fifth Street to Clay Street in the Oregon District is blocked by a small brick plaza and garden, sheltering half a dozen homes on the block from cut-through traffic.

4.5 Streetscape

Manicured landscapes, decorative lighting, public art, and textured sidewalks can be found in Dayton's central neighborhoods, particularly Downtown, Wright-Dunbar, and the Oregon District. These features create an inviting pedestrian atmosphere and remind motorists that they are sharing the street with more vulnerable users. As other neighborhoods and business districts revitalize, it will be important to replicate these successes throughout Dayton.

Figure 4.39

Gateway

Signage, public art, and landscaping are all used to alert motorists that they are entering a special area at entrances to neighborhoods, commercial areas, town centers, or busy places of activity. In addition to their traffic calming and streetscape functions, gateways showcase the history and unique qualities of neighborhoods. With strong community involvement, gateway projects become highly effective placemaking tools and are a key ingredient in revitalizing commercial districts. They are typically supplemented with other traffic calming and streetscape measures such as curb extensions, lighting, and landscaping.

Figure 4.40

Gateway Case Study: Columbus, OH

The newly rebuilt Long Street Bridge incorporates public art, landscaping, and bicycle facilities and reconnects the historic hub of black arts and culture to Downtown Columbus. The neighborhood was cut off from Downtown during the construction of I-71. Replacing a standard highway overpass that featured chain link fences and narrow sidewalks, the new bridge honors the neighborhood's history and marks the entry point for motorists and other travelers. A mural featuring famous black artists, political leaders, and other figures buffers pedestrians and bicyclists from highway noise, and a park provides recreational opportunities for passersby.

Figure 4.41

Decorative Lighting

Pedestrian-scaled, decorative lighting defines streetscape character and invites a wider range of users than standard, auto-oriented lighting. Decorative fixtures shine on the sidewalk as well as the road, making pedestrians more visible and building facades more welcoming. Decorative lighting is often used in historic districts and on roads of special civic or ceremonial significance. Dayton uses decorative lighting Downtown and in some residential neighborhoods.

Figure 4.42

Street Furniture

Poles, signposts, public art, benches, bicycle parking racks, and transit shelters are all types of street furniture. They occupy a space on the sidewalk called the amenity or furniture zone, between the curb and the walking zone, that provides a barrier between pedestrians and traffic. These items visually narrow the roadway for motorists, prompting them to slow down. Street furniture beautifies the public realm and can be tailored to reflect neighborhood character.

4.6 Green Infrastructure

In urban environments, installing green infrastructure in the right-of-way can address many common problems that the street grid causes. Impervious surfaces, such as buildings, roads, parking lots, and sidewalks made of conventional concrete or asphalt, interrupt the water cycle's natural flow, blocking rainwater from infiltrating the soil. Instead, large volumes of polluted stormwater empty into the sewer system and eventually into a city's lakes, rivers, and natural water features. This process can harm plant and wildlife and pollute drinking water. Stormwater runoff from roads and parking lots is particularly caustic, as it contains heavy metals and oil from vehicles.

Green infrastructure alleviates these environmental impacts by mimicking the natural collection, absorption, and diffusion of stormwater into the ground. It catches, treats, and infiltrates runoff into the soil before it reaches the sewer system. In addition to its significant functional purposes, described on the following pages, green infrastructure does much to beautify a street. It can turn an environment of asphalt and steel into a verdant ecosystem of flora and fauna. People are happier and more comfortable when their streets allow for natural features. The simple act of planting street trees has enticed businesses to locate on vacant properties, encouraged more physical activity, and slowed motorized traffic by visually narrowing the roadway. Installing green infrastructure gives cities a substantial return on their investment that benefits all roadway users.

Figure 4.43

Street Trees

A strong and mature tree canopy is one of the greatest assets to a streetscape. More than any other element, street trees can heavily influence the shape and feel of a roadway. Street trees calm traffic, shelter and protect pedestrians, provide habitats for native ecosystems, and reduce noise, air, and light pollution. In terms of stormwater management, trees have a marked impact. Communities that add 25 percent additional tree cover reduce stormwater runoff by ten percent. The proven economic, environmental, and social benefits of trees provide strong grounds to expand their presence on city streets. Attaining a full canopy can take decades, so protecting mature trees and the existing canopy is a cost-effective and proactive approach.

Figure 4.44

Street Tree Case Study: Baltimore, MD

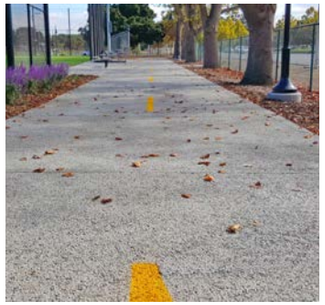
A tree canopy assessment takes stock of a city's arboreal resources and provides direction for improvements. At 27 percent tree cover, Baltimore's canopy is below the 40 percent recommended by American Forests, a conservation group, but the City has aggressively expanded its urban forests in recent years. According to a study in Landscape and Urban Planning, a 10 percent increase in the City's tree cover corresponded with an estimated 12 percent decrease in crime over four years. More foot traffic and eyes on the street fostered a sense of community. The tree canopy saves the city an estimated $20 million per year in reduced heating and cooling costs, pollution, and healthcare. The above map shows Baltimore's tree canopy.

Figures 4.45-46

Bioretention Case Study: Brooklyn Heights, OH

Brooklyn Heights, a suburb of Cleveland, converted a concrete median on a four-lane boulevard into a bioretention area. Stormwater runoff is captured from 7,400 square feet of roadway surface and deposited via curb cuts into the 200 square foot stretch of median, where it infiltrates the soil and is discharged to an underground drainage system. The project, which cost $16,200, reduces pollutants that drain into a nearby creek.

Figure 4.49



Pervious Concrete

Pervious concrete filters stormwater runoff through a network of porous material, typically four to eight inches in depth, before reaching a subgrade layer and soil. Compared to conventional impervious concrete, this material recharges groundwater supplies rather than depositing stormwater in overburdened sewer systems and waterways. Similar to permeable pavers, it is typically used on low-volume streets and on sidewalks.

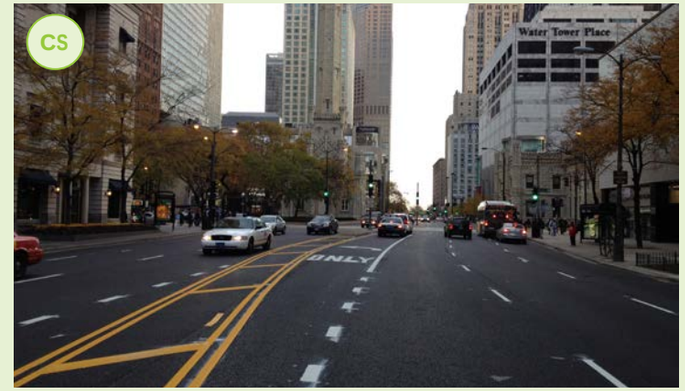
Figure 4.47

Bioretention/Landscaping

Plants and soils that are used to capture, clean, and dispose of polluted runoff are called bioretention. These countermeasures reduce the rate and volume of nonpoint pollutants that drain into sewer systems and watersheds. This process removes phosphorous, nitrogen, metals, oil, and grease from the stormwater before allowing it to reenter the groundwater system. In the public realm, bioretention treatments are incorporated into landscaped features, including curb extensions, planters, medians, and facilities with landscaped buffers such as cycle tracks. They beautify the roadway and can be used to calm traffic and improve the walking environment.

Bioretention landscaping is appropriate for all of Dayton's Complete Street Typologies, discussed in the following chapter. It should be considered for any Complete Street project that makes physical alterations in the right-of-way, such as widening sidewalks or installing medians. The City could work with local businesses to encourage bioretention and other green infrastructure improvements in privately maintained landscaping on sidewalks.

Figure 4.48



Recycled Roadway Surface Case Study: Chicago, IL

The newly resurfaced Michigan Avenue in Chicago is made of 45 percent recycled material. The project recycled asphalt shingles, 2,200 recycled car tires and 24 truckloads of reclaimed pavement. Total costs were estimated to be 40 percent lower than conventional resurfacing projects. The new surface is able to withstand Michigan Ave's heavy bus, freight, and foot traffic (it attracts 40 million tourists annually).

Figure 4.50

Recycled Roadway Surface

Using recycled materials in road resurfacing projects and new construction creates significant environmental and cost benefits. Reclaimed asphalt and pavement, recycled tires, and shingles can decrease project costs by as much as 40 percent, reducing the environmental impact of sourcing new materials. Recycled roads can support the same traffic volumes as conventional ones and have the added benefit of noise absorption due to recycled rubber in the roadway surface. Recycled roadway surface could be tested on smaller neighborhood streets throughout the City.

Figure 4.51

Permeable Pavers

Permeable or porous pavers are made of brick, concrete, stone, or other materials. Rather than directing runoff to a single collection point such as a bioretention cell, permeable pavers allow stormwater to infiltrate the ground as soon as it contacts the surface via cracks between the pavers. Stormwater then infiltrates the soil and percolates through it before reaching groundwater. In the public realm, permeable pavers can be used for sidewalks or roads, although in heavily trafficked areas that generate a high amount of polluted runoff, permeable pavers should be used with other treatments to manage stormwater.

4.7 Conclusion

In isolation, the design elements described in this chapter can only achieve so much. Simply planting street trees or installing bike lanes may not improve a street to the greatest degree possible. Complete Streets are formed when these elements are assembled as a whole, creating safe, sustainable, and enjoyable roadways that welcome all users. The next chapter defines Dayton's Complete Street Typologies and explains how these design elements could be used based on roadway size and land use.

Figure 4.52 Historic Main St in Dayton

CHAPTER 5: COMPLETE STREET DESIGN GUIDELINES

There are many roadway design elements that can be used to create a Complete Street. Traffic calming, green infrastructure, bicycle facilities, and other treatments are combined to create an endless number of roadway configurations. These arrangements must be context-sensitive, and a successful Complete Street takes land use, street width, traffic volume, and other roadway characteristics into account.

A city's roadway network is constantly changing to accommodate fluctuations in mode choice, traffic volumes, safety standards, and other factors. Dayton's streets have evolved over hundreds of years to their present configuration, and they will continue to change over the coming decades. This section provides guidance on how to enhance livability, sustainability, and accommodate all types of roadway users as future changes occur.

5.1 Functional Classifications and Complete Streets

Traditional functional classification systems are structured around the mobility and accessibility of the automobile and define streets primarily by carrying capacity, or the volume of vehicles that the road is designed to accommodate. Roadways are typically divided into a hierarchy of arterials, collectors, and local streets. These classifications are the basis for design elements such as speed limits and lane widths.

Complete Street functional classifications take a different approach. To design a street that is welcoming to all roadway users, a greater emphasis is placed on adjacent land use, which greatly influences how a street is used and what kind of traffic it carries. For example, a street that passes through a busy commercial shopping area near a university campus would likely support more alternative modes of travel than a road lined with warehouses and factories. Some streets pass through a variety of land uses and may fall under multiple classifications. A busy commercial street may transition into a quiet residential neighborhood within the span of just a few blocks. In these cases, a gateway treatment such as a planted median or public art that highlights this transition may be appropriate. For more information on the relationship between land use and roadway design, refer to the Needs Assessment in Chapter 2.

5.2 Complete Street Typologies

Dayton's Complete Street Typologies prioritize different roadway users based on adjacent land uses and road widths. Land use classifications are as follows:

5.2.1 Mixed-Use Street

These streets support high-density development patterns that combine residential, commercial, office, civic, and other uses. They often serve as hubs of activity for residents, workers, and visitors, which can cause changes in traffic volume throughout the day and week. They are located primarily downtown and in smaller business districts throughout the city. Mixed-use streets should have slower speed limits and be designed to welcome all roadway users. As Downtown Dayton and its inner-ring neighborhoods experience a surge in new residents, the demand for walkable streets and convenient access to shops, restaurants, and other destinations will likely rise, requiring a greater focus on high-density mixed-use streets.

5.2.2 Commuter Street

The primary function of these streets is to convey motor vehicles to and from Downtown Dayton and other employment hubs, such as Wright-Patterson Air Force Base and the University of Dayton. These auto-oriented streets have Average Annual Daily Traffic counts of 16,000 vehicles or more (refer to Figure 3.14 on Page 14) and traverse the entire City, passing through various land uses, from high-density commercial to agricultural. The swift and efficient movement of motorized traffic should be prioritized on commuter streets. Almost all of Dayton's major job centers are well-served by commuter streets.

5.2.3 Industrial Street

These roadways primarily serve industrial areas and are designed to accommodate freight traffic. They are located east of Downtown along the Mad River corridor, as well as in the southwest, west, and north central areas of the City. As some of Dayton's former manufacturing and warehousing districts are converted to mixed-use development, these streets may need to be retrofitted to balance freight movement with growing bicycle, pedestrian, and transit traffic.

5.2.4 Neighborhood Street

These streets provide access to Dayton's many residential neighborhoods and are found throughout the City. Most traffic is local, mixed with bicyclists, pedestrians, and motor vehicles, as well as occasional transit and truck traffic. Neighborhood street design should foster safe, livable spaces with slow traffic speeds. Pedestrian and bicycle access to local destinations such as schools and parks should be prioritized.

5.3 Right-of-Way and Pavement Width

Both right-of-way (ROW) width and the width of pavement within the right-of-way were considered in the identification of street typologies. The right-of-way defines the limits of the public realm and can include most if not all of the previously identified complete street treatments. The right-of-way is wider than the street pavement to allow space for utilities and to accommodate vehicular movement and storage and pedestrian access.

Pavement or roadway width is the distance from curb to curb on a given street, or edge of pavement where curbs are absent. Dayton's Complete Street roadway widths are as follows:

Very Large: > 60'	Medium: 30'-39'
Large: 40'-59'	Small: < 30'

Of the 38 Complete Streets treatments described in the previous chapter, 24 would be located within the pavement width. Most Complete Streets projects involve improvements between curblines on existing roadways. These retrofit projects, which often consist of restriping, adding bicycle and pedestrian facilities along or across the road, and installing green infrastructure, are less costly than expanding the pavement width to include new treatments.

Many of Dayton's major roads have excessive rights-of-way that do not reflect the size of the road itself; certain roads have ROWs that are two to three times the pavement width. In some cases this space is reserved for future roadway expansion. While these ROWs may seem excessive given Dayton's current traffic volumes, they were once considered necessary to accommodate expected increases in traffic.

Although pavement width offers a more accurate measure of a street's character and is used to define Dayton's Complete Street Typologies, average right-of-way for each typology is also listed in the following pages.

5.4 How to Use This Section

Information about each street typology is arrayed on a two-page spread. The first page gives an overview of existing conditions for a particular typology, such as the primary roadway users and land uses that it serves, and opportunities for improvement. A selection of proposed Complete Street treatments is described in the text and shown in a graphic rendering of the street typology. A schematic view of the street with dimensions is also featured.

The renderings depict one of many possible configurations for each typology, and should not be considered definitive layouts for all roadways in the typology. Each Complete Street project is unique and will require a design process. This guide is meant to be used as a starting point and checklist of various Complete Streets elements that could be incorporated.

The second page features a detailed description of existing conditions listing the number of travel lanes, zoning districts, pedestrian, bicycle, and transit facilities, and other factors. A key map indicates which streets in Dayton fall under this particular typology, and photographs show several examples. An abbreviated list of appropriate Complete Street elements is also included.

5.5 Complete Streets Design Guidelines

Table 5.1 lists Complete Street treatments in six categories: Pedestrian Facilities, Bicycle Facilities, Transit, Traffic Calming, Streetscape, and Green Infrastructure. Treatments are labeled appropriate (green), sometimes appropriate (yellow), or inappropriate (red) for each street typology. These designations are based on nationally recognized standards from organizations including the Federal Highway Administration, National Association of City Transportation Officials, American Association of State Highway and Transportation Officials, and on a survey of Complete Street plans from cities including Cleveland, Boston, and San Francisco.

	Mixed Use				Commuter		Industrial				Neighborhood		
	Very Large	Large	Medium	Small	Very Large	Large	Very Large	Large	Medium	Small	Large	Medium	Small
Pedestrian Facilities													
Curb Ramp	●	●	●	●	●	●	●	●	●	●	●	●	●
Raised Crosswalk	■	■	■	◆	■	■	■	■	■	■	●	●	●
High Visibility Crosswalk	●	●	●	●	●	●	●	●	●	●	●	●	●
Pedestrian Refuge Island	●	●	●	◆	●	●	●	●	◆	◆	●	◆	■
Pedestrian Hybrid Beacon	●	●	◆	◆	●	●	●	●	◆	◆	●	■	■
Bicycle Facilities													
Shared Lane Marking	◆	◆	●	●	■	■	■	■	■	◆	●	●	●
Standard Bicycle Lane	◆	◆	●	■	■	◆	■	■	◆	◆	◆	◆	■
Protected Bicycle Lane	●	●	◆	■	◆	●	●	●	◆	■	◆	■	■
Cycle Track	●	◆	◆	■	●	●	●	●	◆	■	■	■	■
Bicycle Boulevard	■	■	■	■	■	■	■	■	■	■	●	●	●
Bike Box	●	●	●	◆	●	●	●	●	●	◆	◆	◆	◆
Two-Stage Turn Queue Box	●	●	◆	◆	●	●	●	●	◆	◆	◆	■	■
Bicycle Actuated Signal	●	●	●	●	◆	◆	◆	◆	◆	◆	●	■	■
Wayfinding Signage	●	●	●	●	●	●	●	●	●	●	●	●	●
Transit													
Signage	●	●	●	●	●	●	●	●	●	●	●	●	●
Shelter	●	●	●	●	●	●	◆	◆	◆	◆	◆	◆	◆
Bus Bulb out	●	●	◆	■	■	■	■	■	■	■	●	■	■
Traffic Calming													
Lane Narrowing	◆	◆	■	■	◆	◆	◆	■	■	■	◆	■	■
Road Diet	◆	◆	■	■	◆	◆	◆	■	■	■	◆	■	■
Median	●	●	◆	◆	◆	◆	■	■	■	■	◆	◆	■
Chicane	■	■	◆	●	■	■	■	■	■	■	■	●	●
Curb Extension/Bulb Out	●	●	●	●	◆	■	■	■	■	■	●	■	■
Raised Intersection	■	■	■	◆	■	■	■	■	■	■	◆	●	●
Reduced Corner Radii	◆	◆	◆	◆	◆	◆	■	■	■	■	◆	◆	◆
Textured Pavement	◆	◆	◆	◆	■	■	■	■	■	■	◆	◆	◆
On-Street Parking	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	●	◆
Road Closure	■	■	◆	◆	■	■	■	■	■	■	●	●	●
Streetscape													
Decorative Lighting	●	●	●	●	●	●	◆	◆	◆	◆	●	●	●
Street Furniture	●	●	●	●	●	●	◆	◆	◆	◆	●	●	●
Gateway	●	●	●	●	●	●	◆	◆	◆	◆	●	●	●
Green Infrastructure													
Street Trees	●	●	●	●	●	●	●	●	●	●	●	●	●
Bioretention/Landscaping	●	●	●	●	●	●	●	●	●	●	●	●	●
Recycled Roadway Surface	●	●	●	●	●	●	◆	◆	◆	◆	◆	◆	◆
Permeable Pavers (Roadway)	■	■	◆	●	■	■	■	■	◆	◆	●	●	●
Permeable Pavers (Sidewalk)	●	●	●	●	●	●	●	●	●	●	●	●	●
Pervious Concrete (Roadway)	■	◆	◆	●	◆	◆	■	■	◆	◆	◆	◆	◆
Pervious Concrete (Sidewalk)	●	●	●	●	●	●	●	●	●	●	●	●	●

Table 5.1: Complete Streets Design Guidelines

5.6 Very Large Mixed-Use Typology

Most of Dayton's Very Large Mixed-Use Streets prioritize motorized traffic, in part because they often serve as major thoroughfares or transition into commuter streets that carry a large number of vehicles. Almost all mixed-use streets in this size category are Downtown, where streets such as Fifth, Third, and Main feature wide sidewalks, decorative lighting, and ample street furniture; in other parts of the city, these amenities are lacking. Transit is present on most very large mixed-use streets, while bicycle facilities are scarce. These streets are good candidates for active transportation improvements. Augmented bicycle, pedestrian, and transit facilities would attract a wider range of users and improve access to local businesses.

Because of the adequate pavement width and the proximity of the building frontage to the sidewalk and street, Very Large Mixed-Use Streets offer an excellent opportunity to accommodate a variety of travel modes (e.g. pedestrian, bicycle, and transit) and create a very active street environment. As shown in Figure 5.1, a two-way median cycle track gives cyclists a strong and visible presence on the street, with convenient access to destinations on both sides, via crosswalks. The long crossing distances on these roads may justify high-visibility crosswalks with textured pavement and pedestrian refuge islands that could connect destinations on opposing sides of the street, creating a more cohesive fabric of street-level activity. Green infrastructure, such as bioretention planters, should be installed in the excess right-of-way to mitigate stormwater runoff from the road. Permeable sidewalk pavers could serve the same purpose in the private realm, catching runoff pollutants from rooftops and other sources before they enter the sewer system.

Figure 5.1: Very Large Mixed-Use Typology, Sample Rendering & Cross Section

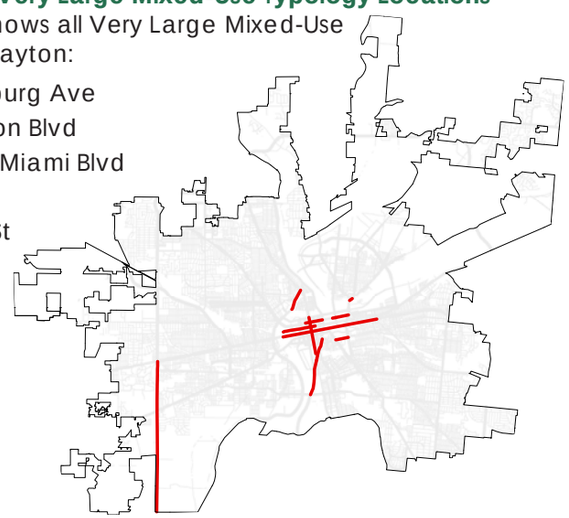
5.6.1 Typology Locations, Elements & Details

Figure 5.2 shows the locations of Dayton's Very Large Mixed Use Streets, located primarily Downtown (see Figures 4.3-4.4 for examples). The Recommended Elements in the next column show which Complete Street treatments would be appropriate for these streets. Incorporating these improvements within the pavement area and right-of-way of an existing street is not possible without understanding the unique characteristics of that street. Table 5.2 shows existing conditions for a typical Very Large Mixed-Use Street in Dayton. Curb to curb width is 60 feet or greater and right-of-way is 105-115 feet. Most Very Large Mixed-Use Streets have a speed limit of 35 mph with four to six lanes, on-street parallel parking, few bicycle facilities, wide sidewalks, transit service, and mature street trees. In the private realm, building entrances are oriented towards the street with shallow setbacks, variable parking placements, and heights ranging between two and 17 stories. These streets are compatible with a number of zoning districts, including Campus-Institutional, Urban Business District, Mature Neighborhood Commercial, Eclectic Neighborhood Commercial, Suburban Neighborhood Commercial, Mature General Commercial, Eclectic General Commercial, Suburban General Commercial, and Transitional and Mixed-Use Hub.

Figure 5.2: Very Large Mixed-Use Typology Locations

This map shows all Very Large Mixed-Use Streets in Dayton:

- S Gettysburg Ave
- S Patterson Blvd
- W Great Miami Blvd
- First St
- Second St
- Third St
- E Fifth St
- S Main St
- Valley St



Recommended Elements

Listed below is a consolidation of all of the recommended Complete Street elements for the Very Large Mixed-Use Street typology. To visualize these element locations, please see the sample rendering and cross section in Figure 5.1 (page 47); and for a complete list of possible elements, please refer to the Complete Street Design Guidelines in Table 5.1 (page 46).

1. **Pedestrian Facilities**
   - Curb Ramp
   - High Visibility Crosswalk
   - Pedestrian Refuge Island
   - Pedestrian Hybrid Beacon
2. **Bicycle Facilities**
   - Protected Bike Lane
   - Cycle Track
   - Bike Box
   - Two-Stage Turn Queue Box
   - Bicycle Actuated Signal
   - Wayfinding Signage
3. **Transit**
   - Signage
   - Shelter
   - Lane
   - Bus Bulbout
4. **Traffic Calming**
   - Median
   - Curb Extension/Bulbout
5. **Streetscape Features**
   - Decorative Lighting
   - Street Furniture
   - Gateway Treatment
6. **Green Infrastructure**
   - Biorentention
   - Recycled Roadway Surface
   - Permeable Pavers (Sidewalk)
   - Pervious Concrete (Sidewalk)
   - Street Trees

Table 5.2: Very Large Mixed-Use Street & Land Use Details

Public Realm	
Curb to Curb Width (ft)	> 60
right-of-way (ft)	100-115
Speed Limit (mph)	35
Number of Travel Lanes	4-6
Parking	Parallel
Bicycle Facilities	None
Sidewalks	Wide
Transit	Yes
Trees	Mature
Private Realm	
Building Entrance	Front
Setback (ft)	0-30
Parking Placement	Front, Rear, Side, and Parking Decks
Height (stories)	2-17
Zoning	CI, UBD, MNC, ENC, MX SNC, MGC, EGC, SGC, T

Figure 5.3: Third Street in Downtown Dayton

Figure 5.4: Main Street in Downtown Dayton

5.7 Large Mixed-Use Typology

Large Mixed-Use Streets serve as hubs of neighborhood activity throughout the City. Some of these streets, such as Third Street in Wright-Dunbar, have undergone improvements and are prompting a return of shops and businesses to the neighborhood. Others, like Main Street in the former Santa Clara Arts District, continue to suffer from vacancy and disrepair. A number of Large Mixed-Use Streets are just small segments of greater commuter corridors. Heavy traffic volumes and auto-oriented environments deter vibrant street life in these areas, lower property values, and encourage businesses to locate elsewhere.

One way to mitigate the negative effects of commuter traffic on this street type is by clearly marking the point where a commuter corridor transitions into a mixed-use street. There are many traffic calming elements that can create this distinction, including road diets, narrowed lanes, on-street parking, pedestrian-scaled lighting, wider sidewalks and more street furniture. A gateway treatment is the most effective way to mark the entry point into a slower speed, more multimodal and mixed-use environment. Landscaped medians and public art are commonly used as neighborhood gateways.

Figure 5.5 shows high visibility crosswalks and dedicated bus and bike lanes that level the playing field for active transportation users. Outdoor café seating, shade trees, awnings, and engaging building facades encourage street-level activity and indicate that motorists should proceed with caution. A gateway treatment calms traffic and a recycled roadway surface dampens noise pollution from vehicles, while pervious concrete on the sidewalk catches storm water runoff. These improvements create a more welcoming atmosphere for all users, reinvigorating nodes of mixed-use activity throughout the city.

Figure 5.5: Large Mixed-Use Typology, Sample Rendering & Cross Section

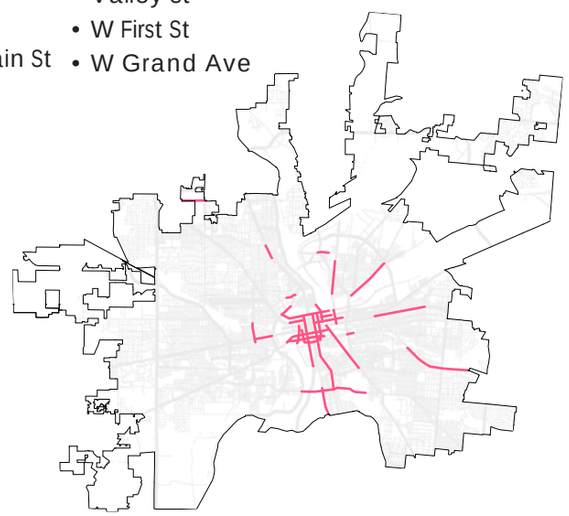
5.7.1 Typology Locations, Elements & Details

Figure 5.6 shows the locations of Dayton's Large Mixed-Use Streets, located primarily Downtown and in surrounding neighborhoods (see Figures 4.7-4.8 for examples). The Recommended Elements in the next column show which Complete Street treatments would be appropriate for these streets. Table 5.3 shows existing conditions for a typical Large Mixed-Use Street in Dayton. Curb to curb width is 40-59 feet and right-of-way is 70-89 feet. Most Large Mixed-Use Streets have a speed limit of 35 mph with three to four lanes, on-street parallel parking, few bicycle facilities, wide sidewalks, and transit service.

Figure 5.6: Large Mixed-Use Typology Locations

This map shows all Large Mixed-Use Streets in Dayton:

- Brown St
- E and W Fifth St
- E and W Fourth St
- E and W Stewart St
- E and W Third St
- E Second St
- Leo St
- Liden Ave
- N and S Main St
- N and S Patterson Blvd
- N Broadway St
- N Jefferson St
- N Saint Clair St
- S Ludlow St
- S Perry St
- S Saint Clair St
- Valley St
- W First St
- W Grand Ave
- W Monument Ave
- W Riverview Ave
- W Siebenthaler Ave
- W Sixth St
- Wayne Ave
- Webster St



Recommended Elements

Listed below is a consolidation of all of the recommended Complete Street elements for the Large Mixed-Use Street typology. To visualize these element locations, please see the sample rendering and cross section in Figure 5.5; and for a complete list of possible elements, please refer to the Typology Design Matrix in Table 5.1 (page 46).

1. **Pedestrian Facilities**
   - Curb Ramp
   - High Visibility Crosswalk
   - Pedestrian Refuge Island
   - Pedestrian Hybrid Beacon

2. **Bicycle Facilities**
   - Protected Bike Lane
   - Bike Box
   - Two-Stage Turn Queue Box
   - Bicycle Actuated Signal
   - Wayfinding Signage

3. **Transit**
   - Signage
   - Shelter
   - Lane
   - Bus Bulbout

4. **Traffic Calming**
   - Median
   - Curb Extension/Bulbout

5. **Streetscape Features**
   - Decorative Lighting
   - Street Furniture
   - Gateway Treatment

6. **Green Infrastructure**
   - Street Trees
   - Biorentention/Landscaping
   - Recycled Roadway Surface
   - Permeable Pavers (Sidewalk)
   - Pervious Concrete (Sidewalk)

Table 5.3: Large Mixed-Use Street & Land Use Details

Public Realm	
Curb to Curb Width (ft)	40-59
right-of-way (ft)	70-99
Speed Limit (mph)	35
Number of Travel Lanes	3-4
Parking	Parallel
Bicycle Facilities	None
Sidewalks	Wide to Medium
Transit	Yes
Trees	Mature
Private Realm	
Building Entrance	Front
Setback (ft)	0
Parking Placement	Rear and Side
Height (Stories)	1-5
Zoning	CI, UBD, MNC, ENC, SNC, MGC, EGC, SGC, T, MX

Figure 5.7: Third Street in Wright-Dunbar

Figure 5.8: Wayne Avenue in the Oregon District

5.8 Medium Mixed-Use Typology

Most of Dayton's Medium Mixed-Use streets are in and around the Central Business District, although certain neighborhoods feature medium mixed-use corridors as well.

In Figure 5.9, on-street parking, street furniture, crosswalks, bike racks, and bike lanes with actuated signals make for a safe and welcoming environment for pedestrians and bicyclists. Dynamic street-level activity supports a variety of land uses and slows vehicular traffic. Curb extensions filled with bioretention planters serve the dual purpose of catching roadway pollutants and shortening the crossing distance for pedestrians.

Medium mixed-use streets often blend with residential areas, attracting a variety of users. Depending on the time of day, school children, college students, shoppers, and exercisers share the street with commuters, transit, and freight, creating a lively roadway environment. Brown Street near the University of Dayton is a good example of this street type. Other medium mixed-use streets, similar to their large counterparts, continue to experience high vacancy rates and are flanked by auto-oriented environments. These areas offer opportunities for improvement as Dayton continues to revitalize its neighborhood business districts.

Figure 5.9: Medium Mixed-Use Typology, Sample Rendering & Cross Section

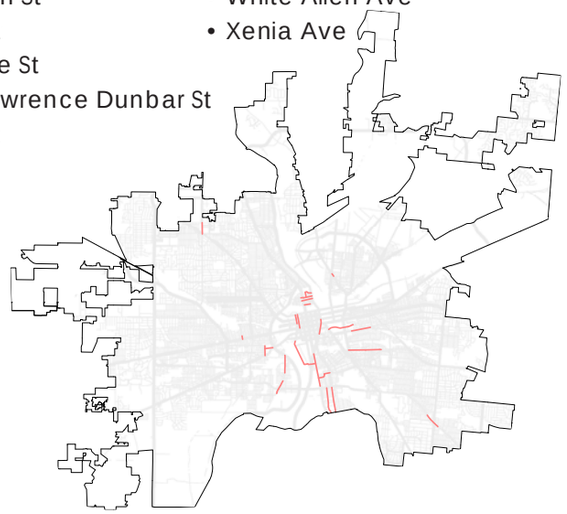
5.8.1 Typology Locations, Elements & Details

Figure 5.10 shows the locations of Dayton's Medium Mixed-Use Streets, located primarily Downtown and around the University of Dayton (see Figures 4.11-4.12 for examples). The Recommended Elements in the next column show which Complete Street treatments would be appropriate for these streets. Table 5.4 shows existing conditions for a typical Medium Mixed-Use Street in Dayton. Curb to curb width is 30-39 feet and right-of-way is 60-69 feet. Most Medium Mixed-Use Streets have a speed limit of 35 mph with two to three lanes, various parking configurations, some bicycle facilities, sidewalks, and transit service.

Figure 5.10: Medium Mixed-Use Typology Locations

This map shows all Medium Mixed-Use Streets in Dayton:

- Ashley St
- Brown St
- Cincinnati St
- E and W Babbitt St
- E Fifth St
- E Fourth St
- E Grand Ave
- Emmet St
- Longworth St
- Mound St
- N Keowee St
- N Paul Lawrence Dunbar St
- N Perry St
- N Wilkinson St
- Norwood Ave
- Philadelphia Dr
- Rubicon St
- S Main St
- S Patterson Blvd
- Stout St
- Watervliet Ave
- White Allen Ave
- Xenia Ave



Recommended Elements

Listed below is a consolidation of all of the recommended Complete Street elements for the Medium Mixed-Use Street typology. To visualize these element locations, please see the sample rendering and cross section in Figure 5.9 (page 51); and for a complete list of possible elements, please refer to the Typology Design Matrix in Table 5.1 (page 46).

1. **Pedestrian Facilities**
   - Curb Ramp
   - High Visibility Crosswalk
   - Pedestrian Refuge Island
2. **Bicycle Facilities**
   - Shared Lane Marking
   - Standard Bike Lane
   - Bike Box
   - Two-Stage Turn Queue Box
   - Bicycle Actuated Signal
   - Wayfinding Signage
3. **Transit**
   - Signage
   - Shelter
4. **Traffic Calming**
   - Curb Extension/Bulb Out
5. **Streetscape Features**
   - Decorative Lighting
   - Street Furniture
   - Gateway Treatment
6. **Green Infrastructure**
   - Street Trees
   - Biorentention/Landscaping
   - Recycled Roadway Surface
   - Permeable Pavers (Sidewalk)
   - Pervious Concrete (Sidewalk)

Table 5.4: Medium Mixed-Use Street & Land Use Details

Public Realm	
Curb to Curb Width (ft)	30-39
right-of-way (ft)	60-69
Speed Limit (mph)	35
Number of Travel Lanes	2-3
Parking	None/Parallel
Bicycle Facilities	None/Bicycle Lanes
Sidewalks	Medium
Transit	Yes
Trees	Partial
Private Realm	
Building Entrance	Front
Setback (ft)	0
Parking Placement	Rear and side
Height (Stories)	1-2
Zoning	CI, UBD, MNC, ENC, SNC, MGC, EGC, SGC, T, MX

Figure 5.11: Brown Street near University of Dayton

Figure 5.12: Watervliet Street

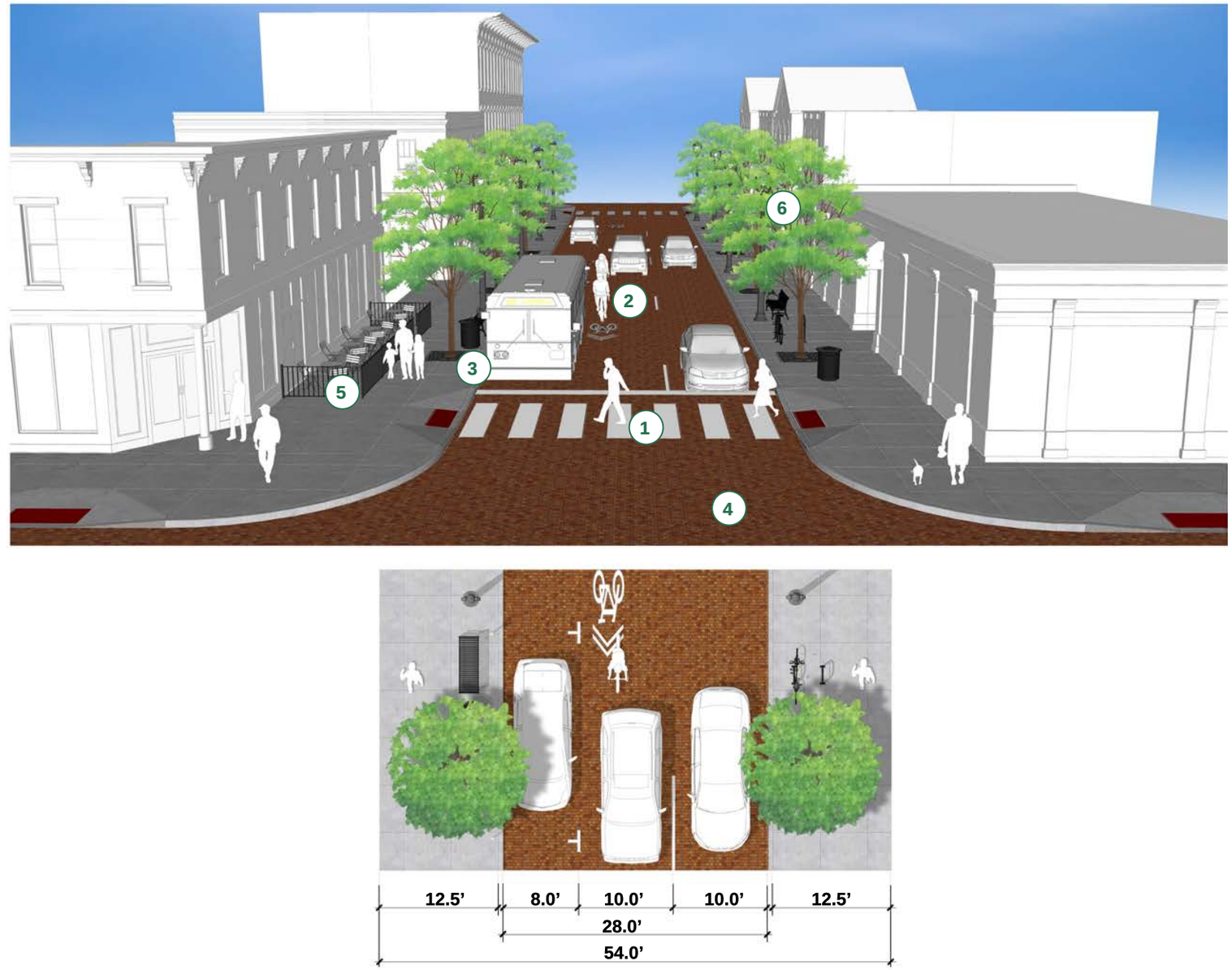
5.9 Small Mixed-Use Typology

Most of Dayton's mixed-use streets have pavement widths wider than 30 feet, but there are exceptions. These smaller streets already provide a balanced environment that prioritizes different users' needs. Despite their diminutive size, Small Mixed-Use Streets support a surprising level of activity, from shoppers and restaurant-goers to neighborhood residents out for a stroll, all while moving traffic slowly along the road.

In Figure 5.13, street trees and outdoor seating create a comfortable atmosphere for walkers. Shared-lane markings for bicyclists and transit vehicles slow traffic, as does a textured roadway surface. Narrower roads discourage cut-through traffic, so drivers tend to proceed slowly.

Small mixed-use streets often blend with residential areas, attracting a variety of users. Depending on the time of day, school children, college students, shoppers, and exercisers share the street with commuters, transit, and freight, creating a lively roadway environment. Fifth Street in the Oregon District is a good example of this street type. Other Small Mixed-Use Streets, similar to their large and medium counterparts, continue to experience high vacancy rates and are flanked by auto-oriented environments. These areas offer opportunities for improvement as Dayton continues to revitalize its neighborhood business districts.

Figure 5.13: Small Mixed-Use Typology, Sample Rendering & Cross Section



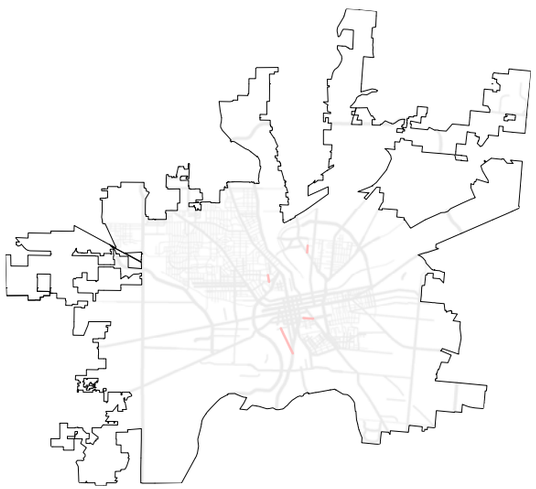
5.9.1 Typology Locations, Elements & Details

Figure 5.14 shows the locations of Dayton's Small Mixed-Use Streets (see Figures 4.15-4.16 for examples). The Recommended Elements in the next column show which Complete Street treatments would be appropriate for these streets. Table 5.5 shows existing conditions for a typical Small Mixed-Use Street in Dayton. Curb to curb width is less than 30 feet and right-of-way is 40-59 feet. Most Small Mixed-Use Streets have a speed limit of 25 mph with two lanes, parallel parking, no bicycle facilities, sidewalks, and transit service. Tree canopies are mature and building entrances face the street, with zero setbacks and off-street parking in the rear. Building heights are one to three stories. These streets are compatible with a number of zoning districts, including Campus-Institutional, Urban Business District, Mature Neighborhood Commercial, Eclectic Neighborhood Commercial, Suburban Neighborhood Commercial, Mature General Commercial, Eclectic General Commercial, Suburban General Commercial, Transitional, and Mixed-Use Hub.

Figure 5.14: Small Mixed-Use Typology Locations

This map shows all Small Mixed-Use Streets in Dayton:

- E Fifth St
- Forest Ave
- Hillrose Ave
- S Perry St



Recommended Elements

Listed below is a consolidation of all of the recommended Complete Street elements for the Small Mixed-Use Street typology. To visualize these element locations, please see the sample rendering and cross section in Figure 5.13 (page 53); and for a complete list of possible elements, please refer to the Typology Design Matrix in Table 5.1 (page 46).

1. **Pedestrian Facilities**
   - Curb Ramp
   - High Visibility Crosswalk
   - Pedestrian Refuge Island

2. **Bicycle Facilities**
   - Shared Lane Marking
   - Standard Bike Lane
   - Bike Box
   - Two-Stage Turn Queue Box
   - Bicycle Actuated Signal
   - Wayfinding Signage

3. **Transit**
   - Signage
   - Shelter

4. **Traffic Calming**
   - Chicane
   - Curb Extension/Bulb Out

5. **Streetscape Features**
   - Decorative Lighting
   - Street Furniture
   - Gateway Treatment

6. **Green Infrastructure**
   - Street Trees
   - Bioretention/Landscaping
   - Recycled Roadway Surface
   - Permeable Pavers (Roadway)
   - Permeable Pavers (Sidewalk)
   - Pervious Concrete (Roadway)
   - Pervious Concrete (Sidewalk)

Table 5.5: Small Mixed-Use Street & Land Use Details

Public Realm	
Curb to Curb Width (ft)	< 30
right-of-way (ft)	40-59
Speed Limit (mph)	25
Number of Travel Lanes	2
Parking	Parallel
Bicycle Facilities	None
Sidewalks	Medium to Narrow
Transit	Yes
Trees	Yes
Private Realm	
Building Entrance	Front
Setback (ft)	0
Parking Placement	Rear and Side
Height (Stories)	1-3
Zoning	CI, UBD, MNC, ENC, SNC, MGC, EGC, SGC, T, MX

Figure 5.15: Fifth Street in the Oregon District

Figure 5.16: Fifth Street in St Anne's Hill

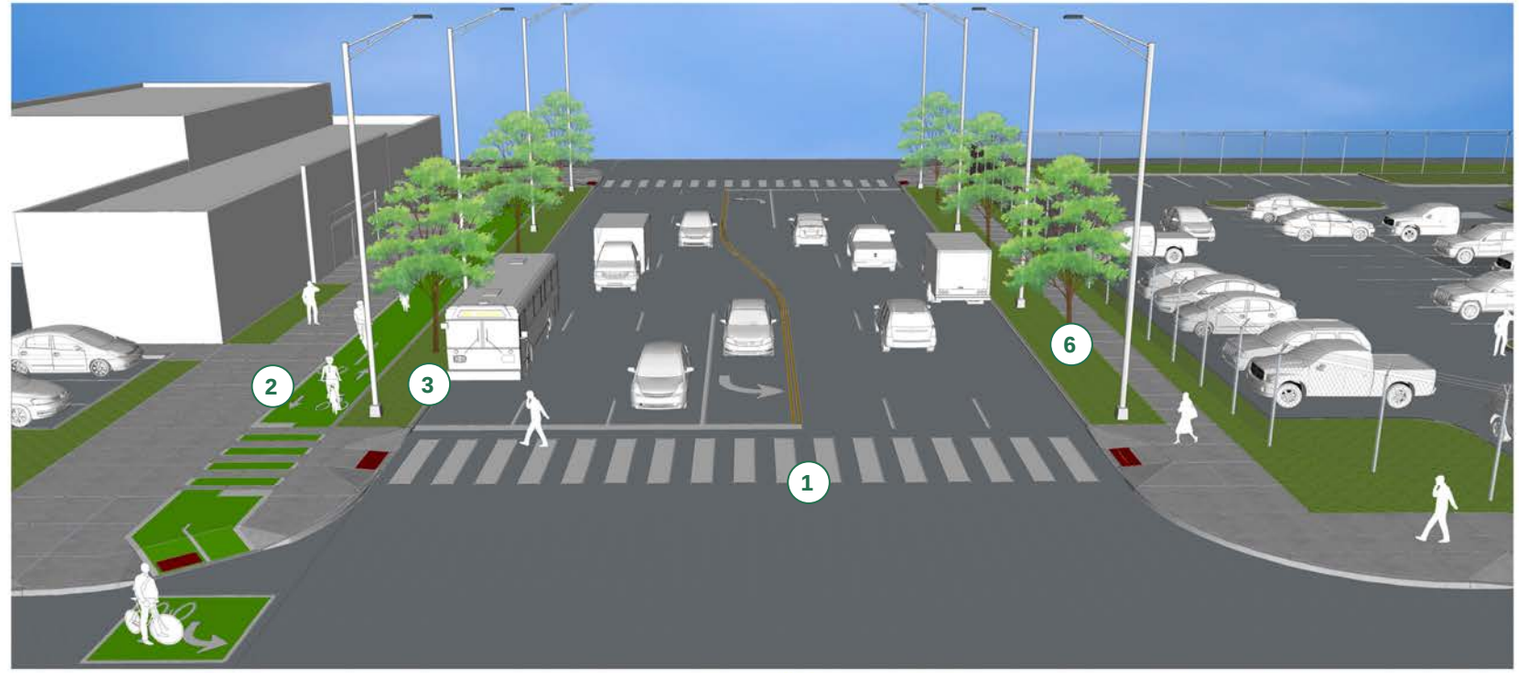
5.10 Very Large Commuter Typology

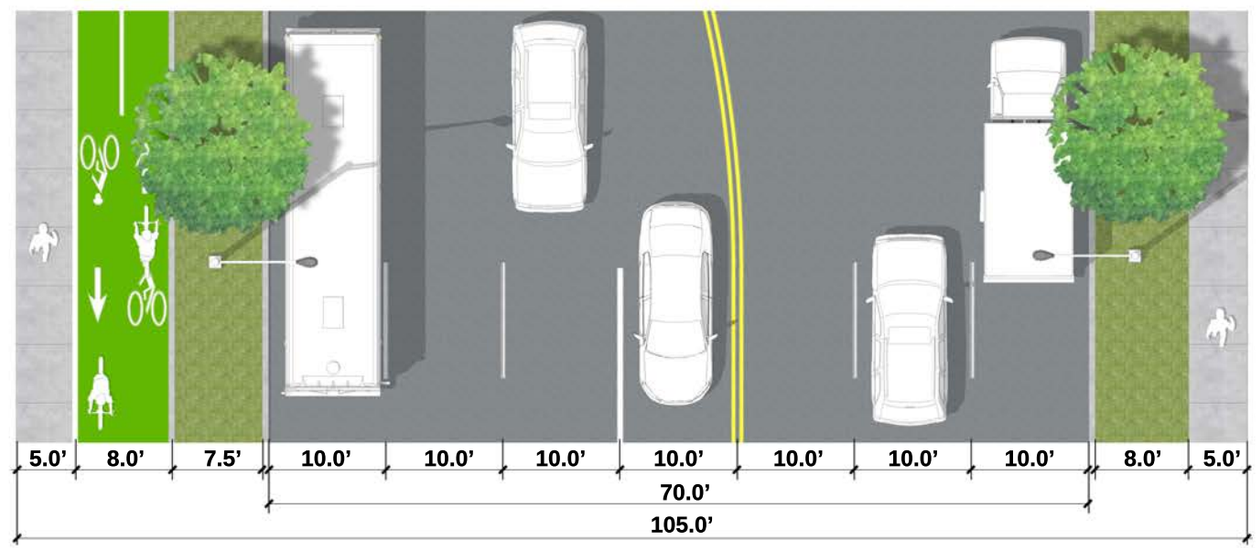
Dayton has a robust network of Very Large Commuter Streets, most of which feed into Downtown. As the arteries of the transportation network, these roads have a strong influence on the rest of the system, shaping travel patterns throughout the City. Because they are defined primarily by traffic volume and not by adjacent land use, as the other typologies are, Very Large Commuter Streets range from tree-lined boulevards to strip development, resulting in a variety of built and travel environments.

As expected, commuter streets prioritize automotive traffic and are not conducive to other modes. Most people would consider it extremely risky to bike on these roads, and pedestrians and transit users face a hostile environment with little buffer from large volumes of fast-moving traffic. Many of these streets do not have the potential to attract and support a vibrant street life. If there are no walk- or bike-friendly destinations in the area, there is little reason to entice active transportation users with expensive new infrastructure. Public funds are better spent on streets whose private realms attract, or have the potential to attract, a wider range of people beyond motorists. However, if the private realm adjacent to a commuter street was redeveloped with land uses that better defined the public realm and within an environment that was more walkable, compact, and mixed-use, then the investment would be worthwhile.

Where commuter streets do have potential to attract non-motorists, improvements can be made to accommodate occasional foot traffic and bicyclists. High visibility crosswalks, longer walk signal timing and shorter wait times for pedestrians would create a safer and more convenient walking environment. Bicyclists who choose to travel these roads should be provided with protected cycle tracks. Some commuter streets are wider than necessary for the amount of traffic they support. Road diets and lane narrowing would free up space for bike and transit facilities in the roadway.

Figure 5.17: Very Large Commuter Typology, Sample Rendering & Cross Section





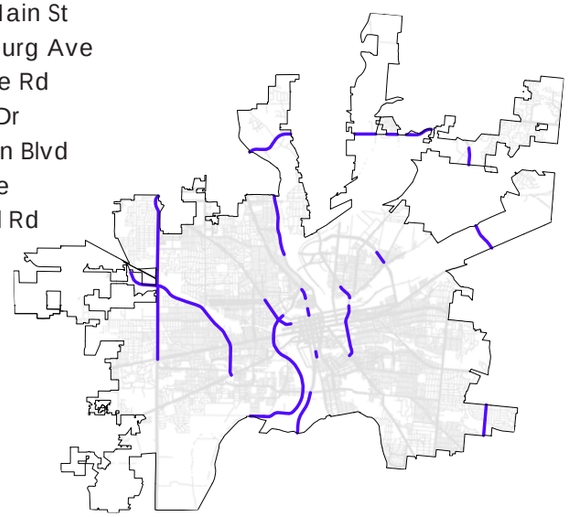
5.10.1 Typology Locations, Elements & Details

Figure 5.18 shows the locations of Dayton's Very Large Commuter Streets, located throughout the City (see Figures 4.19-4.20 for examples). The Recommended Elements in the next column show which Complete Street treatments would be appropriate for these streets. Table 5.6 shows existing conditions for a typical Very Large Commuter Street in Dayton. Curb to curb width is greater than 60 feet and right-of-way is 80-150 feet. Most Very Large Commuter Streets have a speed limit of 35 mph with four to seven lanes, no on-street parking, no bicycle facilities, narrow sidewalks, and transit service. Tree canopies vary and building entrances are on the front or side, with deep setbacks and off-street parking in the front, side, or rear. Building heights are one to two stories.

Figure 5.18: Very Large Commuter Typology Locations

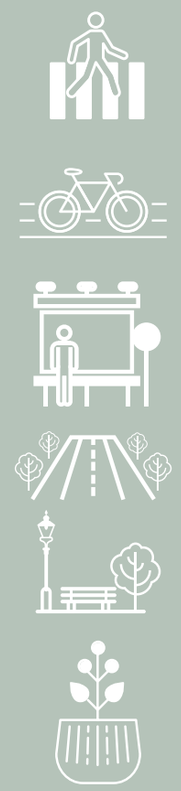
This map shows all Very Large Commuter Streets in Dayton:

- Harshman Rd
- N and S Edwin C Moses Blvd
- N and S James H McGee Blvd
- N and S Keowee St
- N and S Main St
- N Gettysburg Ave
- Needmore Rd
- Riverside Dr
- S Patterson Blvd
- Salem Ave
- Shoup Mill Rd
- Stanley Ave
- Woodman Dr



Recommended Elements

Listed below is a consolidation of all of the recommended Complete Street elements for the Very Large Commuter Street typology. To visualize these element locations, please see the sample rendering and cross section in Figure 5.17 (page 55); and for a complete list of possible elements, please refer to the Typology Design Matrix in Table 5.1 (page 46).



1. **Pedestrian Facilities**
   - Curb Ramp
   - High Visibility Crosswalk
   - Pedestrian Refuge Island
   - Pedestrian Hybrid Beacon
2. **Bicycle Facilities**
   - Cycle Track
   - Bike Box
   - Two-Stage Turn Queue Box
   - Wayfinding Signage
3. **Transit**
   - Signage
   - Shelter
4. **Traffic Calming**
   - See Table 5.1
5. **Streetscape Features**
   - Decorative Lighting
   - Street Furniture
   - Gateway Treatment
6. **Green Infrastructure**
   - Street Trees
   - Bioretention/Landscaping
   - Recycled Roadway Surface
   - Permeable Pavers (Sidewalk)
   - Pervious Concrete (Sidewalk)

Table 5.6: Very Large Commuter Street & Land Use Details

Public Realm	
Curb to Curb Width (ft)	> 60
right-of-way (ft)	80-150
Speed Limit (mph)	35
Number of Travel Lanes	4-7
Parking	None
Bicycle Facilities	None
Sidewalks	Narrow
Transit	Yes
Trees	Varies
Private Realm	
Building Entrance	Front and Side
Setback (ft)	60-140
Parking Placement	Front, Rear, and Side
Height (Stories)	1-2
Zoning	Varies

Figure 5.19: James H McGee Boulevard

Figure 5.20: Edwin C Moses Boulevard

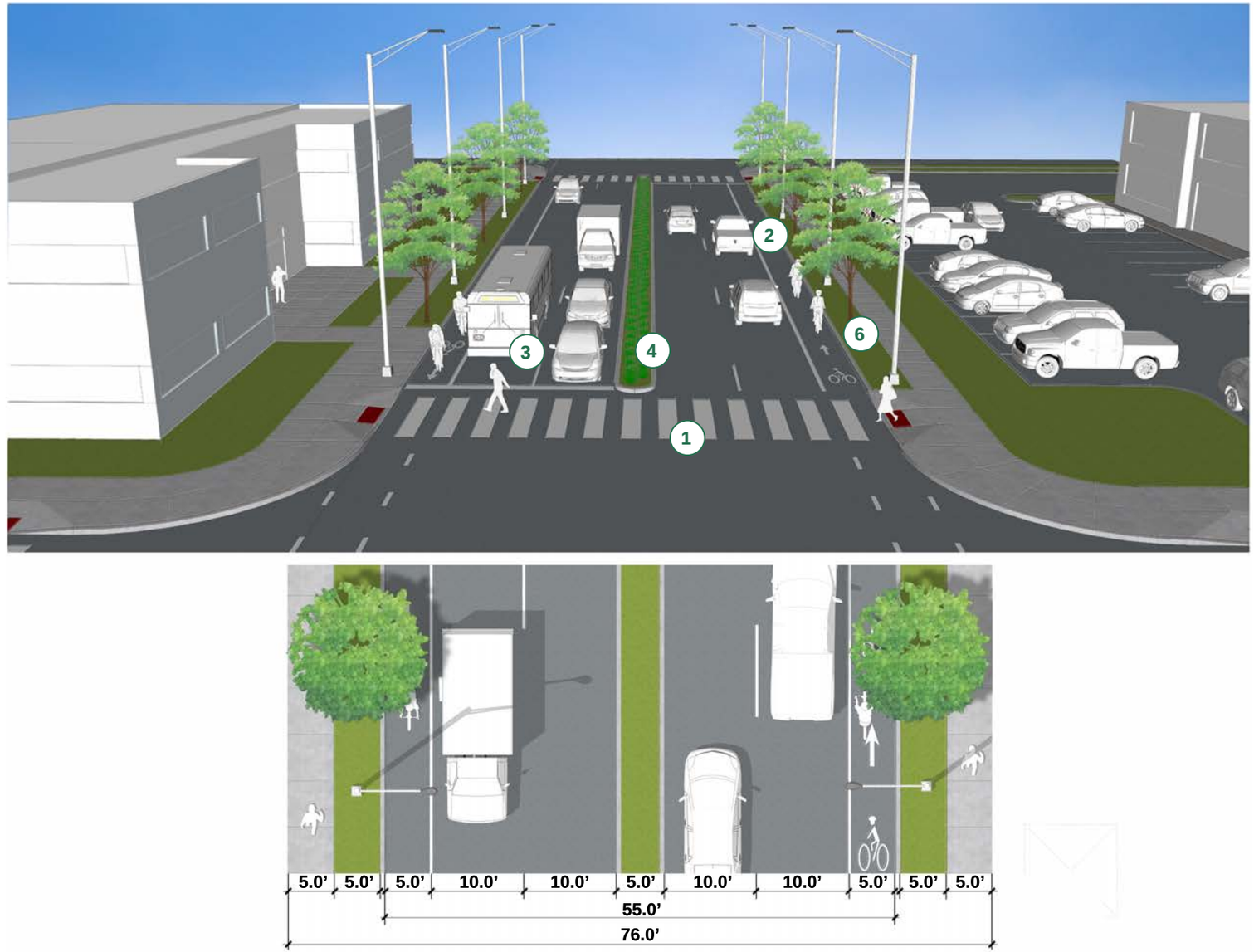
5.11 Large Commuter Typology

Large Commuter Streets could benefit from the same improvements as their very large counterparts. While most of these streets will remain heavily auto-oriented with little chance of attracting multimodal users, key segments should be made more accommodating to bicyclists, pedestrians, and transit users.

Where these streets pass through walkable land uses such as medium to high-density residential, schools, parks, and smaller shops and business, they are likely classified as Large Mixed-Use Streets, whose proposed enhancements have already been discussed. But the commuter roadway segments that flank these corridors also offer opportunities for change. Transitions zones can alert commuters that they are passing through a denser space shared with other users. Narrowed lanes could free up space for medians, providing refuge for crossing pedestrians. High-visibility crosswalks and protected bike facilities would invite active transportation users. Green infrastructure could capture the large volume of pollutants that commuter traffic emits, using street trees to mitigate exhaust pipe emissions and bioretention to catch runoff.

Where commuter streets do have potential to attract non-motorists, improvements can be made to accommodate occasional foot traffic and bicyclists. High visibility crosswalks would alert motorists to proceed with caution. Longer walk signal timing and shorter wait times for pedestrians would create a safer and more convenient walking environment, while balancing the need to maintain vehicle levels of service. Some commuter streets are wider than necessary for the amount of traffic they support. Road diets and lane narrowing would free up space for bike and transit facilities in the roadway.

Figure 5.21: Large Commuter Typology, Sample Rendering & Cross Section

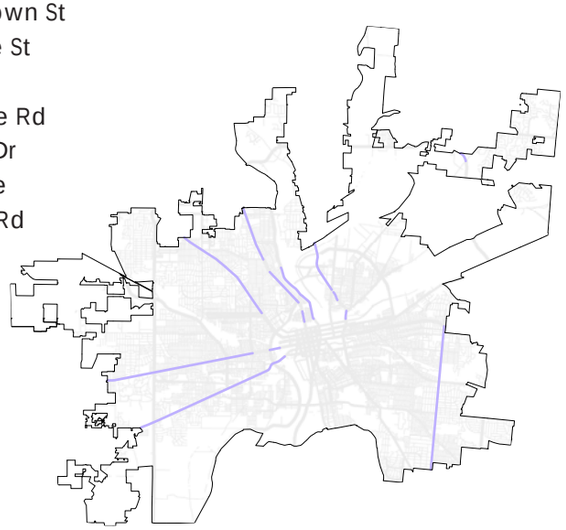


5.11.1 Typology Locations, Elements & Details

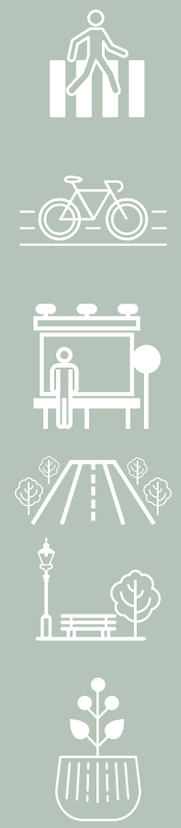
Figure 5.18 shows the locations of Dayton's Large Commuter Streets, located throughout the City (see Figures 4.23-4.24 for examples). The Recommended Elements in the next column show which Complete Street treatments would be appropriate for these streets. Table 5.7 shows existing conditions for a typical Large Commuter Street in Dayton. Curb to curb width is 40-59 feet and right-of-way is 60-79 feet. Most Large Commuter Streets have a speed limit of 35 mph with four lanes, no on-street parking, no bicycle facilities, medium width sidewalks, and transit service. Tree canopies are rare and building entrances are on the front or side, with medium setbacks and off-street parking in the front, side, or rear. Building heights are one to two stories and zoning varies.

Figure 5.22: Large Commuter Typology Locations
This map shows all Large Commuter Streets in Dayton:

- E Third St
- Germantown St
- N Keowee St
- N Main St
- Needmore Rd
- Riverside Dr
- Salem Ave
- Smithville Rd



Recommended Elements
Listed below is a consolidation of all of the recommended Complete Street elements for the Large Commuter Street typology. To visualize these element locations, please see the sample rendering and cross section in Figure 5.21 (page 57); and for a complete list of possible elements, please refer to the Typology Design Matrix in Table 5.1 (page 46).



1. **Pedestrian Facilities**
   - Curb Ramp
   - High Visibility Crosswalk
   - Pedestrian Refuge Island
   - Pedestrian Hybrid Beacon
2. **Bicycle Facilities**
   - Protected Bike Lane
   - Cycle Track
   - Bike Box
   - Two-Stage Turn Queue Box
   - Wayfinding Signage
3. **Transit**
   - Signage
   - Shelter
4. **Traffic Calming**
   - See Table 5.1
5. **Streetscape Features**
   - Decorative Lighting
   - Street Furniture
   - Gateway Treatment
6. **Green Infrastructure**
   - Street Trees
   - Bioretention/Landscaping
   - Recycled Roadway Surface
   - Permeable Pavers (Sidewalk)
   - Pervious Concrete (Sidewalk)

Table 5.7: Large Commuter Street & Land Use Details

Public Realm	
Curb to Curb Width (ft)	40-59
right-of-way (ft)	60-79
Speed Limit (mph)	35
Number of Travel Lanes	4
Parking	None
Bicycle Facilities	None
Sidewalks	Medium
Transit	Yes
Trees	None
Private Realm	
Building Entrance	Front and Side
Setback (ft)	10-88
Parking Placement	Front, Rear, and Side
Height (Stories)	1-2
Zoning	Varies

Figure 5.23: Main Street north of Downtown

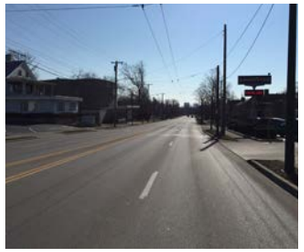
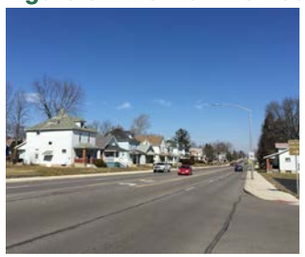


Figure 5.24: Smithville Road



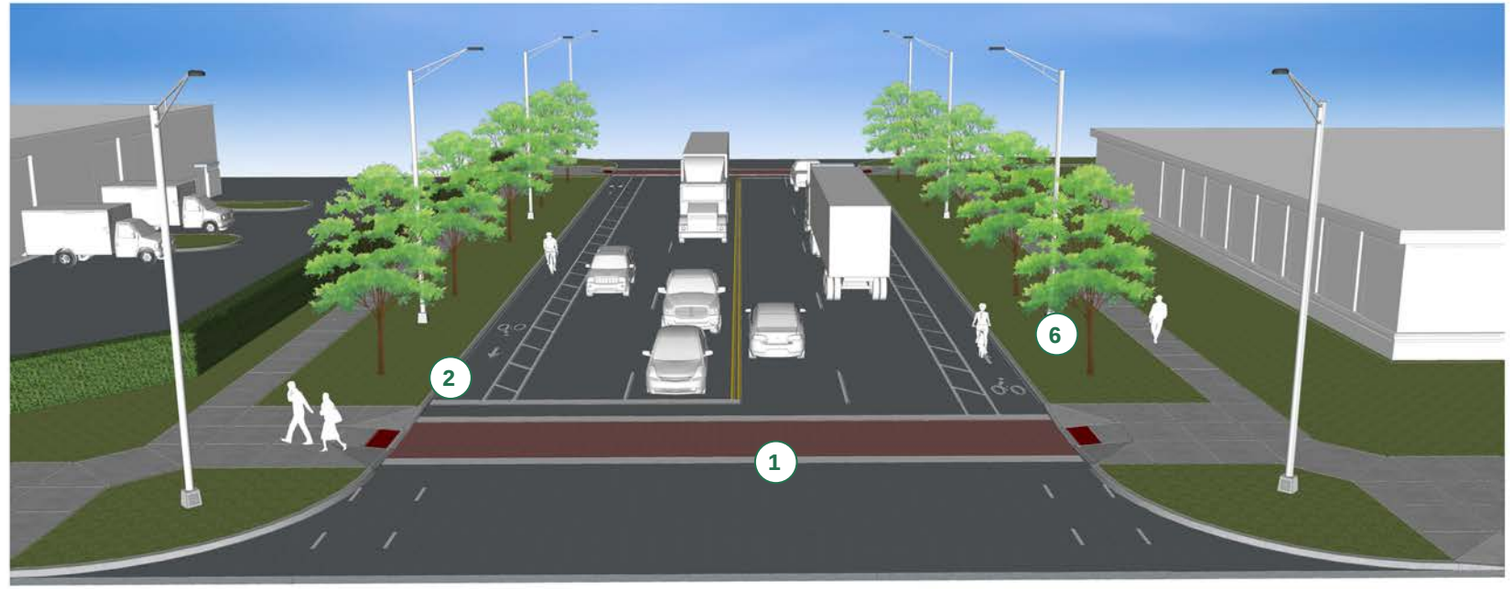
5.12 Large Industrial Typology

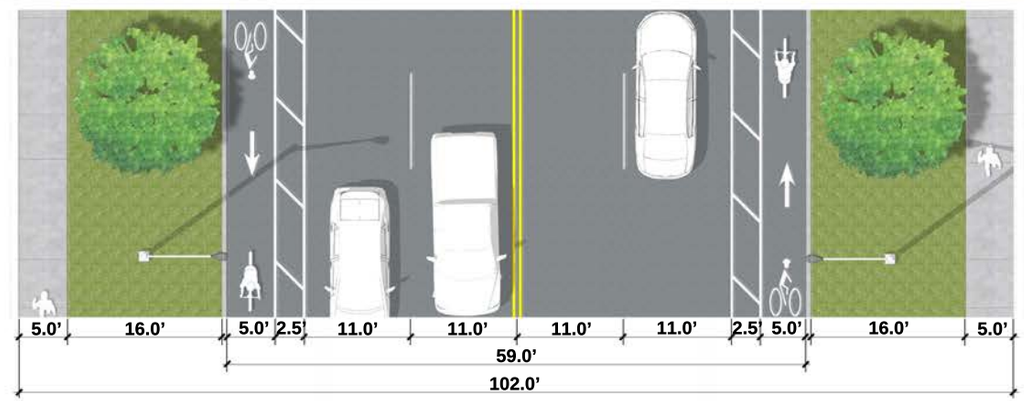
The four industrial street sizes share similar characteristics. There is little variation in recommended improvements for the different street sizes, so only one typology is shown here.

The efficient movement of goods is a crucial component to economic success. Although Complete Streets are often associated with bike lanes and landscaped sidewalks, accommodations for freight are an important component of a multimodal road. Especially in Dayton, which has a strong industrial heritage, freight routes should be considered when designing new streets or retrofitting existing ones. For example, a road diet would be inappropriate on a busy truck route, because wide lanes facilitate ease of travel for large vehicles. The presence of freight should also be considered when designing facilities for other users. Sidewalks with an extra wide tree lawn, or bike lanes that are buffered from traffic, may be needed to ensure the comfort and safety of pedestrians and bicyclists.

Freight movement will remain the primary function of these streets, as the land use cannot—and should not—attract pedestrians or bicyclists. But, as Figure 5.25 shows, some accommodations can be made to pedestrians and bicyclists that must frequent industrial areas, who are mostly employees walking from their parked vehicles or bus stops or bicycling to work. Because there may be few cross streets in industrial areas, signalized midblock crossings would provide safer and more convenient options to pedestrians than jaywalking. For bicyclists whose commutes take them on industrial streets, protected bike lanes or cycle tracks offer a degree of separation from adjacent freight traffic, and bike boxes at intersections increase cyclists' visibility among truck drivers.

Figure 5.25: Large Industrial Typology, Sample Rendering & Cross Section



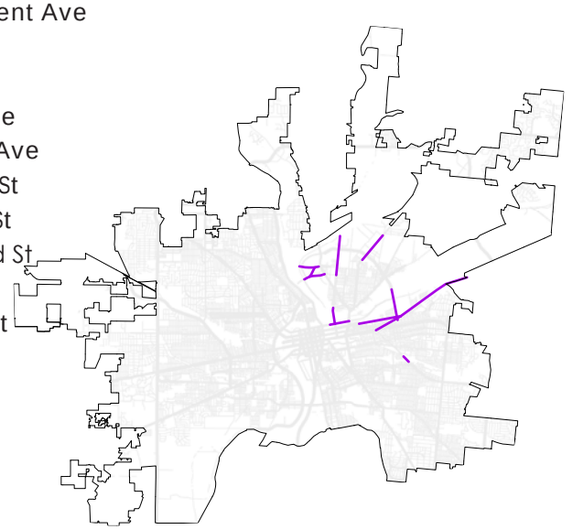


5.12.1 Typology Locations, Elements & Details

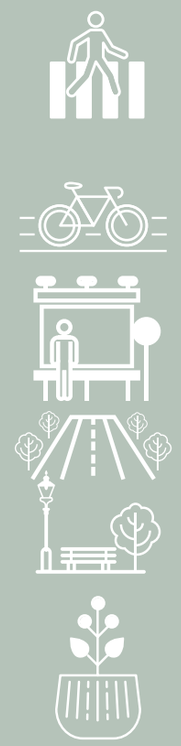
Figure 5.26 shows the locations of Dayton's Large Industrial Streets, located in the Northeast quadrant of the City (see Figures 4.27-4.28 for examples). The Recommended Elements in the next column show which Complete Street treatments would be appropriate for these streets. Table 5.8 shows existing conditions for a typical Large Industrial Street in Dayton. Curb to curb width is 40-59 feet and right-of-way is 60-105 feet. Most Large Industrial Streets have a speed limit of 40 mph with four lanes, no on-street parking, no bicycle facilities, narrow sidewalks, and transit service. Tree canopies vary and building entrances are on the front or side, with medium setbacks and off-street parking in the front, side, or rear. Building heights are one story. These streets are compatible with Industrial, Light Industrial, Business Park, and the Airport zoning districts.

Figure 5.26: Large Industrial Typology Locations
This map shows all Large Industrial Streets in Dayton:

- E First St
- E Monument Ave
- Helena St
- Leo St
- Linden Ave
- McCook Ave
- N Findlay St
- Nicholas St
- Springfield St
- Troy St
- Webster St



Recommended Elements
Listed below is a consolidation of all of the recommended Complete Street elements for the Large Industrial Street typology. To visualize these element locations, please see the sample rendering and cross section in Figure 5.25 (page 59); and for a complete list of possible elements, please refer to the Typology Design Matrix in Table 5.1 (page 46).



1. **Pedestrian Facilities**
   - Curb Ramp
   - High Visibility Crosswalk
   - Pedestrian Refuge Island
   - Pedestrian Hybrid Beacon
2. **Bicycle Facilities**
   - Protected Bike Lane
   - Cycle Track
   - Bike Box
   - Two-Stage Turn Queue Box
   - Wayfinding Signage
3. **Transit**
   - Signage
4. **Traffic Calming**
   - See Table 5.1
5. **Streetscape Features**
   - See Table 5.1
6. **Green Infrastructure**
   - Street Trees
   - Bioretention/Landscaping
   - Permeable Pavers (Sidewalk)
   - Pervious Concrete (Sidewalk)

Table 5.8: Large Industrial Street & Land Use Details

Public Realm	
Curb to Curb Width (ft)	40-59
right-of-way (ft)	60-105
Speed Limit (mph)	40
Number of Travel Lanes	4
Parking	None
Bicycle Facilities	None
Sidewalks	Narrow
Transit	Yes
Trees	Partial, Mature
Private Realm	
Building Entrance	Front and Side
Setback (ft)	8-80
Parking Placement	Front, Rear, and Side
Height (Stories)	1
Zoning	I-1, I-2, BP, AP

Figure 5.27: Nicholas Street

Figure 5.28: Springfield Street

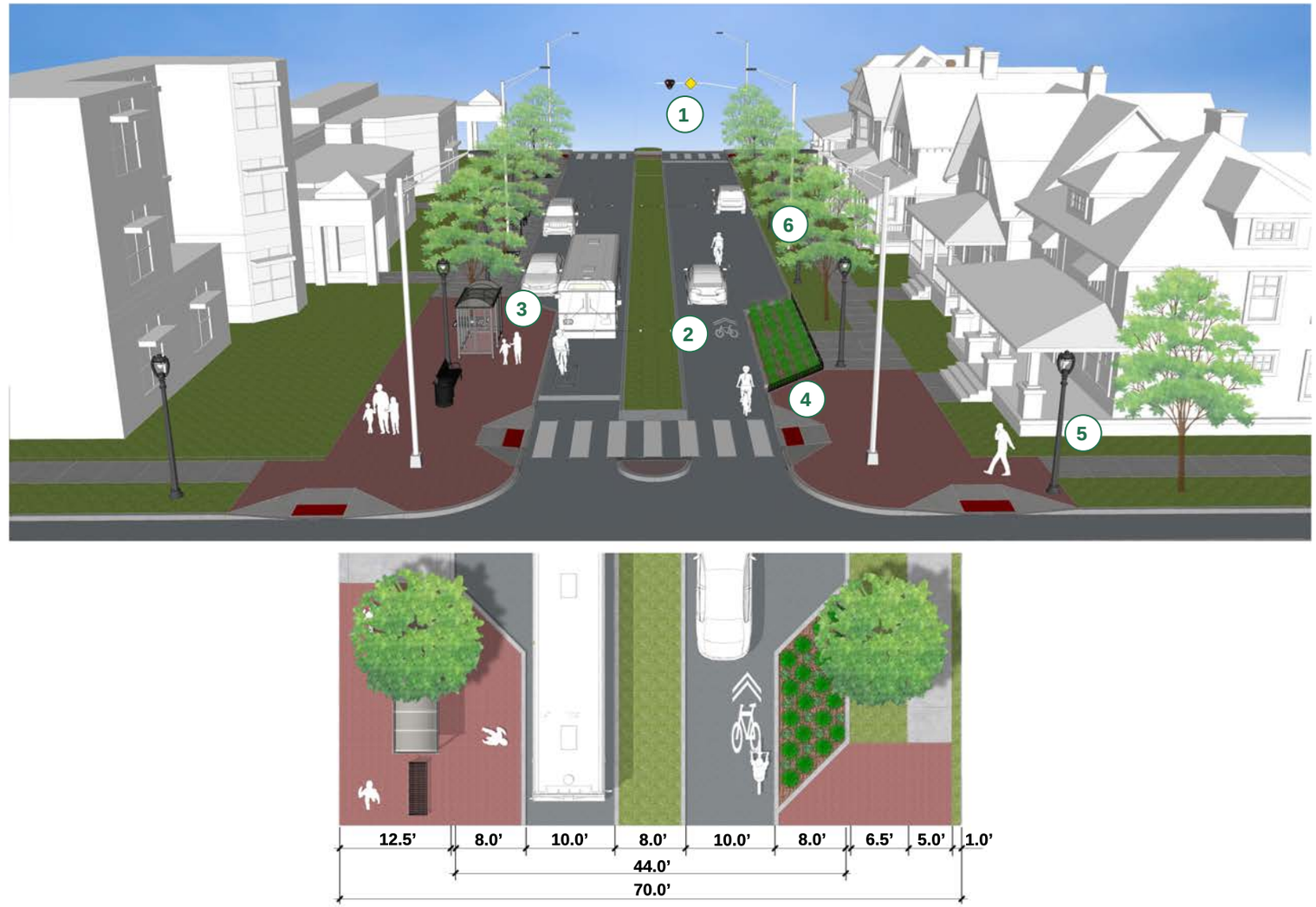
5.13 Large Neighborhood Typology

Certain large neighborhood streets are critical links between busier roads, creating auto-oriented environments. Others primarily serve residents and local businesses and see more foot and bike traffic. Transit operates on some large neighborhood streets. Certain residential boulevards, such as Arcadia, fall under this typology due to their wide medians.

In Figure 5.29, shared lane markings and bicycle actuated signals welcome bicyclists. A bus bulbout and curb extension shorten the crossing distance between the school on the left side of the street and houses on the right side. Bioretention planters and a median capture stormwater runoff. In the background, a midblock crosswalk is outfitted with a Pedestrian Hybrid Beacon and refuge island. On-street parking buffers pedestrians from the roadway. Decorative lighting and street trees provide a safe and comfortable place to walk.

Together, these improvements would transform an auto-oriented road into a multimodal environment. Not only would they make for a safer street, Complete Street elements can also contribute to neighborhood character using gateways and public art and enhance livablity for residents. Demand for such accommodations already exists on these streets, due to the schools, churches, and other busy centers of activity that are found here.

Figure 5.29: Large Neighborhood Typology, Sample Rendering & Cross Section



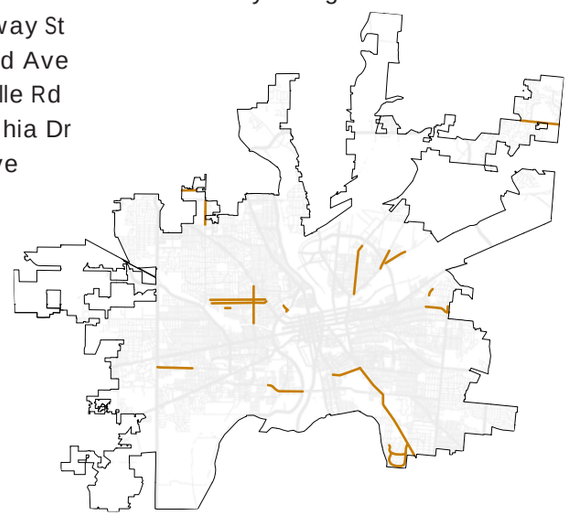
5.13.1 Typology Locations, Elements & Details

Figure 5.30 shows the locations of Dayton's Large Neighborhood Streets, located throughout the City (see Figures 4.31-4.32 for examples). The Recommended Elements in the next column show which Complete Street treatments would be appropriate for these streets. Table 5.9 shows existing conditions for a typical Large Neighborhood Street in Dayton. Curb to curb width is 40-59 feet and right-of-way is 60-70 feet. Most Large Neighborhood Streets have a speed limit of 35 mph with two lanes, parallel parking, no bicycle facilities, narrow sidewalks, and transit service. Tree canopies vary and building entrances are on the front, with medium setbacks.

Figure 5.30: Large Neighborhood Typology Locations

This map shows all Large Neighborhood Streets in Dayton:

- Arcadia Blvd
- Belmonte Park N
- Brandt St
- Broadview Blvd
- E Third St
- Kitridge Rd
- Lexington Ave
- McCall St
- N Broadway St
- N Garland Ave
- N Smithville Rd
- Philadelphia Dr
- Russet Ave
- Superior Ave
- Troy St
- Valerie Arms Dr
- Valley St
- W Grand Ave
- W Stewart St
- Wilmington Ave
- Wyoming St



Recommended Elements

Listed below is a consolidation of all of the recommended Complete Street elements for the Large Neighborhood Street typology. To visualize these element locations, please see the sample rendering and cross section in Figure 5.29 (page 61); and for a complete list of possible elements, please refer to the Typology Design Matrix in Table 5.1 (page 46).

1. **Pedestrian Facilities**
   - Curb Ramp
   - Raised Crosswalk
   - High Visibility Crosswalk
   - Pedestrian Refuge Island
   - Pedestrian Hybrid Beacon
2. **Bicycle Facilities**
   - Shared Lane Marking
   - Bicycle Boulevard
   - Bicycle Actuated Signal
   - Wayfinding Signage
3. **Transit**
   - Signage
   - Bus Bulb out
4. **Traffic Calming**
   - Curb Extension/Bulb Out
   - On-Street Parking
   - Road Closure
5. **Streetscape Features**
   - Decorative Lighting
   - Street Furniture
   - Gateway
6. **Green Infrastructure**
   - Street Trees
   - Bioretention/Landscaping
   - Permeable Pavers (Roadway)
   - Permeable Pavers (Sidewalk)
   - Pervious Concrete (Sidewalk)

Table 5.9: Large Neighborhood Street & Land Use Details

Public Realm	
Curb to Curb Width (ft)	40-59
right-of-way (ft)	60-70
Speed Limit (mph)	35
Number of Travel Lanes	2
Parking	Parallel
Bicycle Facilities	None
Sidewalks	Narrow
Transit	Yes
Trees	Mature and Young
Private Realm	
Building Entrance	Front
Setback (ft)	30
Parking Placement	Rear, Private Garages
Height (stories)	2-17
Zoning	CI, UBD, MNC, ENC, SNC, MGC, EGC, SGC, T

Figure 5.31: Arcadia Boulevard

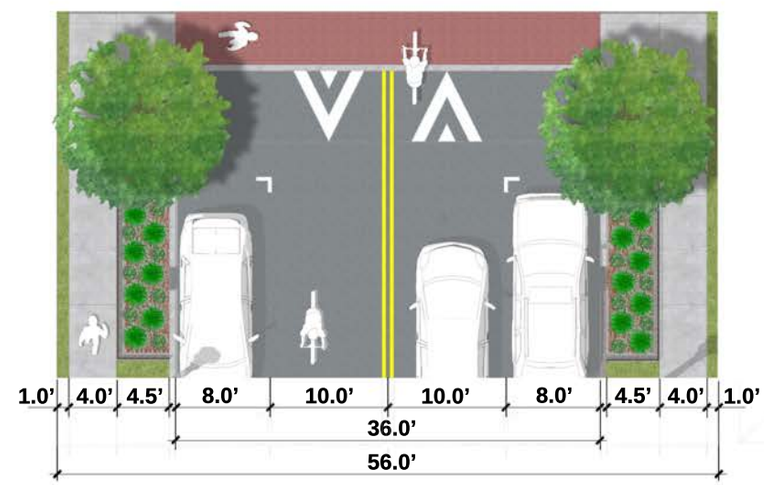
Figure 5.32: Russet Avenue

5.14 Medium Neighborhood Typology

Medium neighborhood streets are predominately residential, with fewer civic and commercial uses. These roads are the veins of Dayton's transportation network, providing access to much of the City's neighborhoods. Moving vehicular traffic efficiently on these streets is not always a top priority. Rather, bicyclists and pedestrians should be granted equal access to use of the roadway, creating a safe and welcoming atmosphere in Dayton's many neighborhoods.

Figure 5.33 shows bioretention planters, street trees, and decorative lighting that beautify the sidewalk and connect private homes to the public realm. In the road, permeable pavers, high-visibility and raised crosswalks, on-street parking, and a bicycle boulevard slow traffic. All of these features, in conjunction with a gateway treatment, serve to slow traffic and create a safer street for residents and passersby.

Figure 5.33: Medium Neighborhood Typology, Sample Rendering & Cross Section

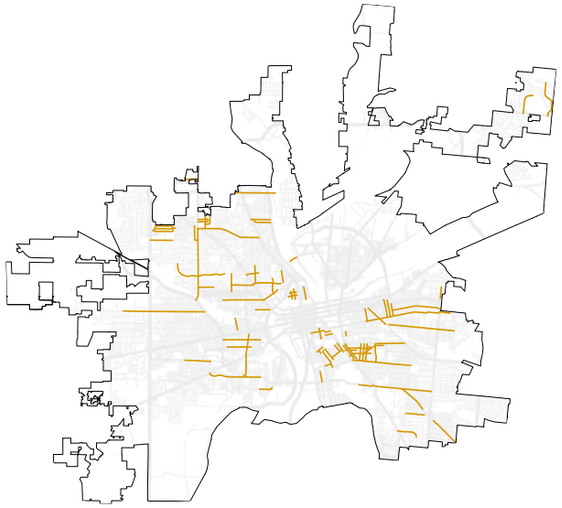


5.14.1 Typology Locations, Elements & Details

Figure 5.34 shows the locations of Dayton's Medium Neighborhood Streets, located throughout the City (see Figures 4.35-4.36 for examples). The Recommended Elements in the next column show which Complete Street treatments would be appropriate for these streets. Table 5.10 shows existing conditions for a typical Medium Neighborhood Street in Dayton. Curb to curb width is 30-39 feet and right-of-way is 40-59 feet. Most Medium Neighborhood Streets have a speed limit of 25 mph with two lanes, parallel parking, no bicycle facilities, narrow sidewalks, and transit service. Tree canopies are mature and building entrances are on the front, with medium setbacks. Garages accommodate off-street parking needs. Building height is two stories. These streets are compatible with Suburban Single-Family Residential 1, 2, Eclectic Single-Family Residential 3, 4, Mature Single-Family Residential 5, Suburban Multi-Family Residential, Eclectic Multi-Family Residential, Mature Multi-Family Residential, and Manufactured Home zoning districts.

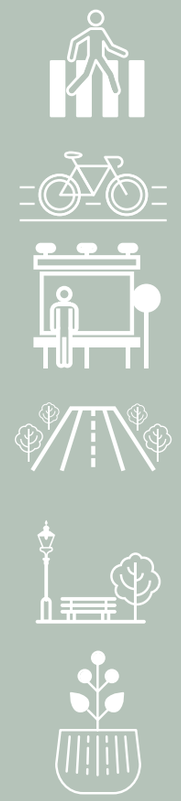
Figure 5.34: Medium Neighborhood Typology Locations

Medium Neighborhood Streets in Dayton are too numerous to list here. Please refer to the Typology Assignment Maps (Figures 4.41-5) to identify these streets. This map shows all Medium Neighborhood Streets in Dayton.



Recommended Elements

Listed below is a consolidation of all of the recommended Complete Street elements for the Medium Neighborhood Street typology. To visualize these element locations, please see the sample rendering and cross section in Figure 5.33 (page 63); and for a complete list of possible elements, please refer to the Typology Design Matrix in Table 5.1 (page 46).



1. **Pedestrian Facilities**
   - Curb Ramp
   - Raised Crosswalk
   - High Visibility Crosswalk
2. **Bicycle Facilities**
   - Shared Lane Marking
   - Bicycle Boulevard
   - Wayfinding Signage
3. **Transit**
   - Signage
4. **Traffic Calming**
   - Chicane
   - Raised Intersection
   - On-Street Parking
   - Road Closure
5. **Streetscape Features**
   - Decorative Lighting
   - Street Furniture
   - Gateway
6. **Green Infrastructure**
   - Street Trees
   - Bioretention/Landscaping
   - Permeable Pavers (Roadway)
   - Permeable Pavers (Sidewalk)
   - Pervious Concrete (Sidewalk)

Table 5.10: Medium Neighborhood Street & Land Use Details

Public Realm	
Curb to Curb Width (ft)	30-39
right-of-way (ft)	40-59
Speed Limit (mph)	25
Number of Travel Lanes	2
Parking	Parallel
Bicycle Facilities	None
Sidewalks	Narrow
Transit	Yes
Trees	Mature
Private Realm	
Building Entrance	Front
Setback (ft)	20
Parking Placement	Rear, Private Garages
Height (Stories)	2
Zoning	SR-1, SR-2, ER-3, ER-4, MR-5, SMF, EMF, MMF, MH

Figure 5.35: Highridge Ave

Figure 5.36: Fairview Ave

5.15 Small Neighborhood Typology

Small neighborhood streets are predominately residential, with fewer civic and commercial uses. These roads are the veins of Dayton's transportation network, providing access to much of the City's neighborhoods. Moving vehicular traffic efficiently on these streets is not always a top priority. Rather, bicyclists and pedestrians should be granted equal access to use of the roadway, creating a safe and welcoming atmosphere in Dayton's many neighborhoods.

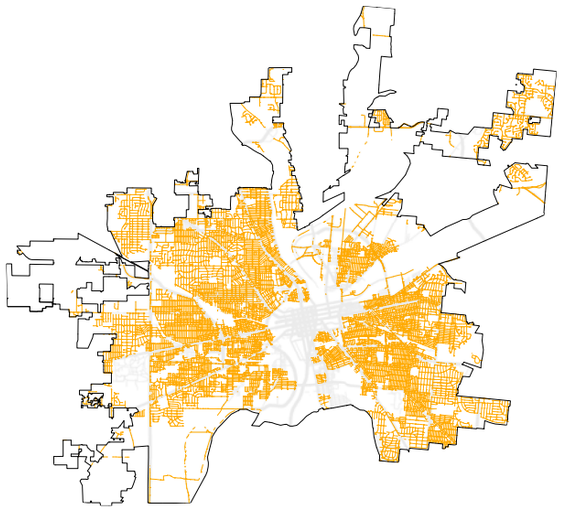
In Figure 5.37, street trees, provide a buffer between the road and sidewalk users. In the road, chicanes, textured pavement, and on-street parking slow traffic. Because neighborhood streets support a more diverse mix of users than other roads, it is especially important to include traffic calming elements. While separated mulitmodal facilities, such as bike lanes, are less important due to slow speeds and low traffic volumes, the presence of children, the elderly, and other vulnerable road users sharing space with vehicles justifies the Complete Street treatments shown here and listed on the following page.

Figure 5.37: Small Neighborhood Typology, Sample Rendering & Cross Section

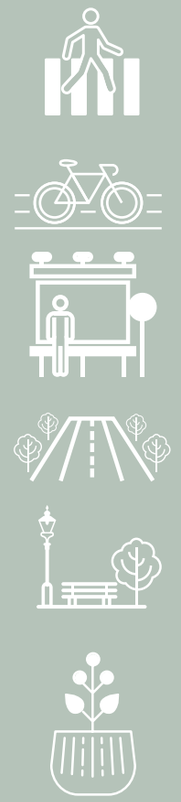
5.15.1 Typology Locations, Elements & Details

Figure 5.38 shows the locations of Dayton's Small Neighborhood Streets, located throughout the City (see Figures 4.39-4.40 for examples). The Recommended Elements in the next column show which Complete Street treatments would be appropriate for these streets. Table 5.11 shows existing conditions for a typical Small Neighborhood Street in Dayton. Curb to curb width is less than 30 feet and right-of-way is 30-55 feet. Most Small Neighborhood Streets have a speed limit of 25 mph with two lanes, parallel parking, no bicycle facilities, narrow sidewalks, and transit service. Tree canopies are mature and building entrances are on the front, with shallow setbacks. Garages accommodate off-street parking needs. Building height is two to three stories. These streets are compatible with Suburban Single-Family Residential 1, 2, Eclectic Single-Family Residential 3, 4, Mature Single-Family Residential 5, Suburban Multi-Family Residential, Eclectic Multi-Family Residential, Mature Multi-Family Residential, and Manufactured Home zoning districts.

Figure 5.38: Small Neighborhood Typology Locations
Small Neighborhood Streets in Dayton are too numerous to list here. Please refer to the Typology Assignment Maps (Figures 4.41-5) to identify these streets. This map shows all Small Neighborhood Streets in Dayton.



Recommended Elements
Listed below is a consolidation of all of the recommended Complete Street elements for the Small Neighborhood Street typology. To visualize these element locations, please see the sample rendering and cross section in Figure 5.33 (page 65); and for a complete list of possible elements, please refer to the Typology Design Matrix in Table 5.1 (page 46).



1. **Pedestrian Facilities**
   - Curb Ramp
   - Raised Crosswalk
   - High Visibility Crosswalk
2. **Bicycle Facilities**
   - Shared Lane Marking
   - Bicycle Boulevard
   - Wayfinding Signage
3. **Transit**
   - Signage
4. **Traffic Calming**
   - Chicane
   - Raised Intersection
   - Road Closure
5. **Streetscape Features**
   - Decorative Lighting
   - Street Furniture
   - Gateway
6. **Green Infrastructure**
   - Street Trees
   - Bioretention/Landscaping
   - Permeable Pavers (Roadway)
   - Permeable Pavers (Sidewalk)
   - Pervious Concrete (Sidewalk)

Table 5.11: Small Neighborhood Street & Land Use Details

Public Realm	
Curb to Curb Width (ft)	< 30
right-of-way (ft)	30-55
Speed Limit (mph)	25
Number of Travel Lanes	2
Parking	Parallel
Bicycle Facilities	None
Sidewalks	Narrow
Transit	None
Trees	Mature
Private Realm	
Building Entrance	Front
Setback (ft)	0-10
Parking Placement	Rear, Private Garages
Height (Stories)	2-3
Zoning	SR-1, SR-2, ER-3, ER-4, MR-5, SMF, EMF, MMF, MH

Figure 5.39: Clay Street

Figure 5.40: Lilac Avenue

5.16 Complete Streets Typologies and Zoning

Dayton's Complete Street land use classifications are broad and encompass a number of different zoning districts. For example, a Medium Neighborhood Street could be found in SR-1, SR-2, ER-3, ER-4, MR-5, SMF, EMF, MMF, or MH zoning districts. Creating a street typology for each district in Dayton's zoning code is not necessary for this plan since the plan is adaptive and flexible toward implementation in design phases of projects on a case by case basis. Many Complete Street treatments are appropriate across a wide array of street types, and broader land use classifications simplify treatment selection, providing a wider variety of Complete Street elements that will complement surrounding land use. Table 5.12 shows how Dayton's Complete Street typologies correspond to its zoning districts. Commuter streets are associated with the function of the road itself and are not bound by specific land uses, and are not listed here.

The Complete Street typologies show how these treatments can be applied in certain situations. The methodology for project prioritization, in the following chapter, considers zoning as an integral component of specific roadway projects.

Table 5.12: Complete Streets Typologies and Dayton Zoning Districts*

Complete Street Typologies	Dayton Zoning Districts	
Mixed-Use	Central Business District	CI
	Urban Business District	UBD
	Mature Neighborhood Commercial	MNC
	Eclectic Neighborhood Commercial	ENC
	Suburban Neighborhood Commercial	SNC
	Mature General Commercial	MGC
	Eclectic General Commercial	EGC
	Suburban General Commercial	SGC
	Transitional	T
	Mixed-Use Hub	MX
	Campus-Institutional	CI
Industrial	Light Industrial	I-1
	General Industrial	I-2
	Business Park	BP
	Airport	AP
Neighborhood	Suburban Single-Family 1	SR-1
	Suburban Single-Family 2	SR-2
	Eclectic Single-Family 1	ER-3
	Eclectic Single-Family 2	ER-4
	Mature Single-Family	MR-5
	Suburban Multi-Family	SMF
	Eclectic Multi-Family	EMF
	Mature Multi-Family	MMF
	Manufactured Home	MH

**Commuter Street Typologies are ommited, refer to text.*

5.17 Dayton's Typology Assignments

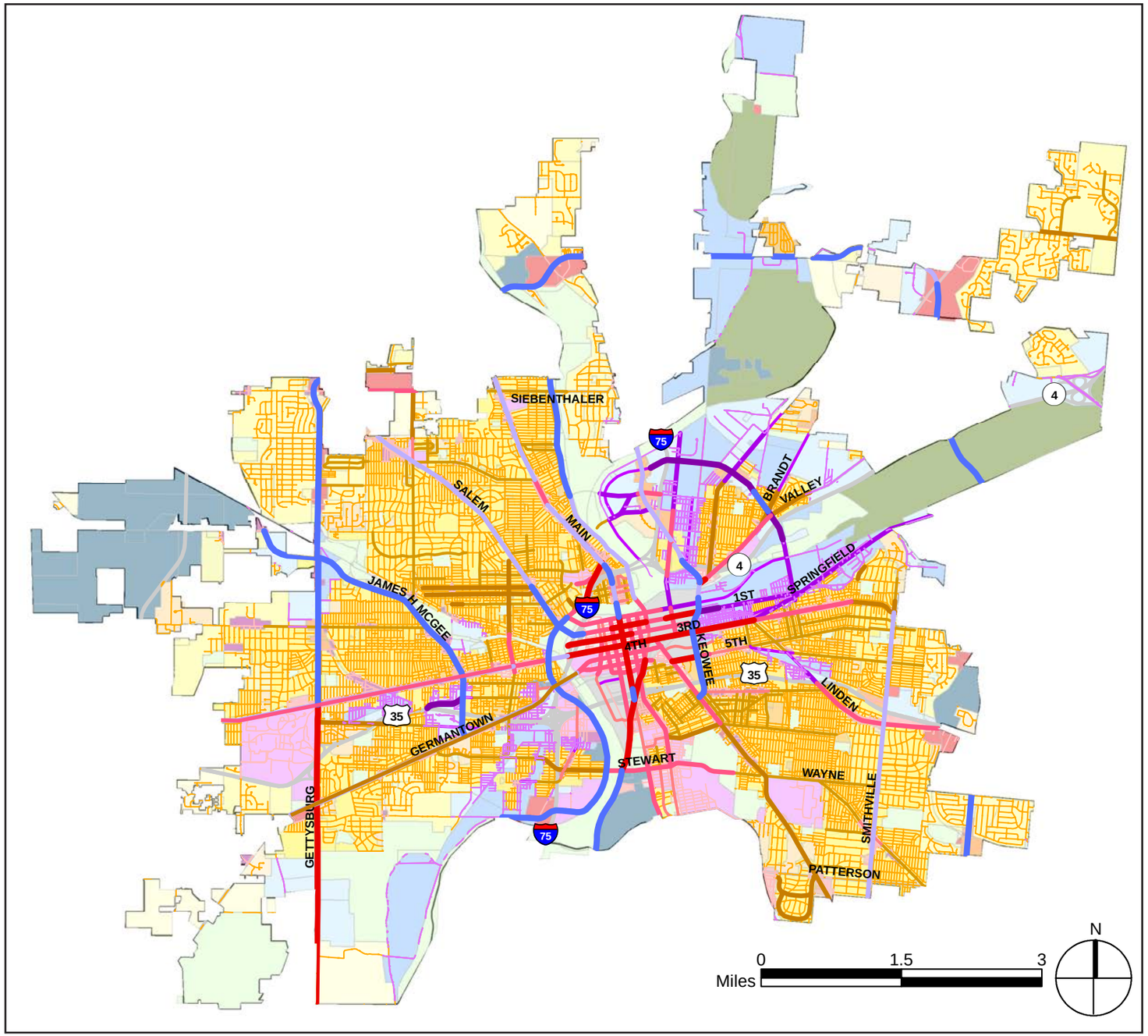
To provide more detailed guidance as to how the above typologies may be applied to Dayton's streets, the following maps (Figures 4.41-4.45) assign Complete Street typologies to all roads in the City.

Maps show the assigned Complete Street typologies based on right-of-way, pavement width and land use for all of Dayton's streets. Satellite imagery and zoning districts were examined with Geographic Information Systems (GIS) mapping, and used to measure and classify all major roads. A sample of smaller roads throughout the city was also measured. GIS identified over 80,000 street segments in the City.

Commuter Streets are defined by traffic volume and corridor length rather than land use, because their primary function is moving traffic. These streets traverse the entire City or major parts of it and carry over 16,000 vehicles daily (refer to Figure 3.14-15 on page 14). Certain corridors are divided between two typologies. N Gettysburg Ave, for example, qualifies as a commuter street due to traffic volume, but S Gettysburg Avenue does not, and instead is defined as mixed-use, due to adjacent institutional, industrial, and residential land uses.

Where pavement width and land use are consistent along a major road with the exception of one or two blocks, those blocks are classified as the predominant width and land use. Minor deviations in size and land use are not reflected on the maps.

Figure 5.41: City-Wide Typology Assignments



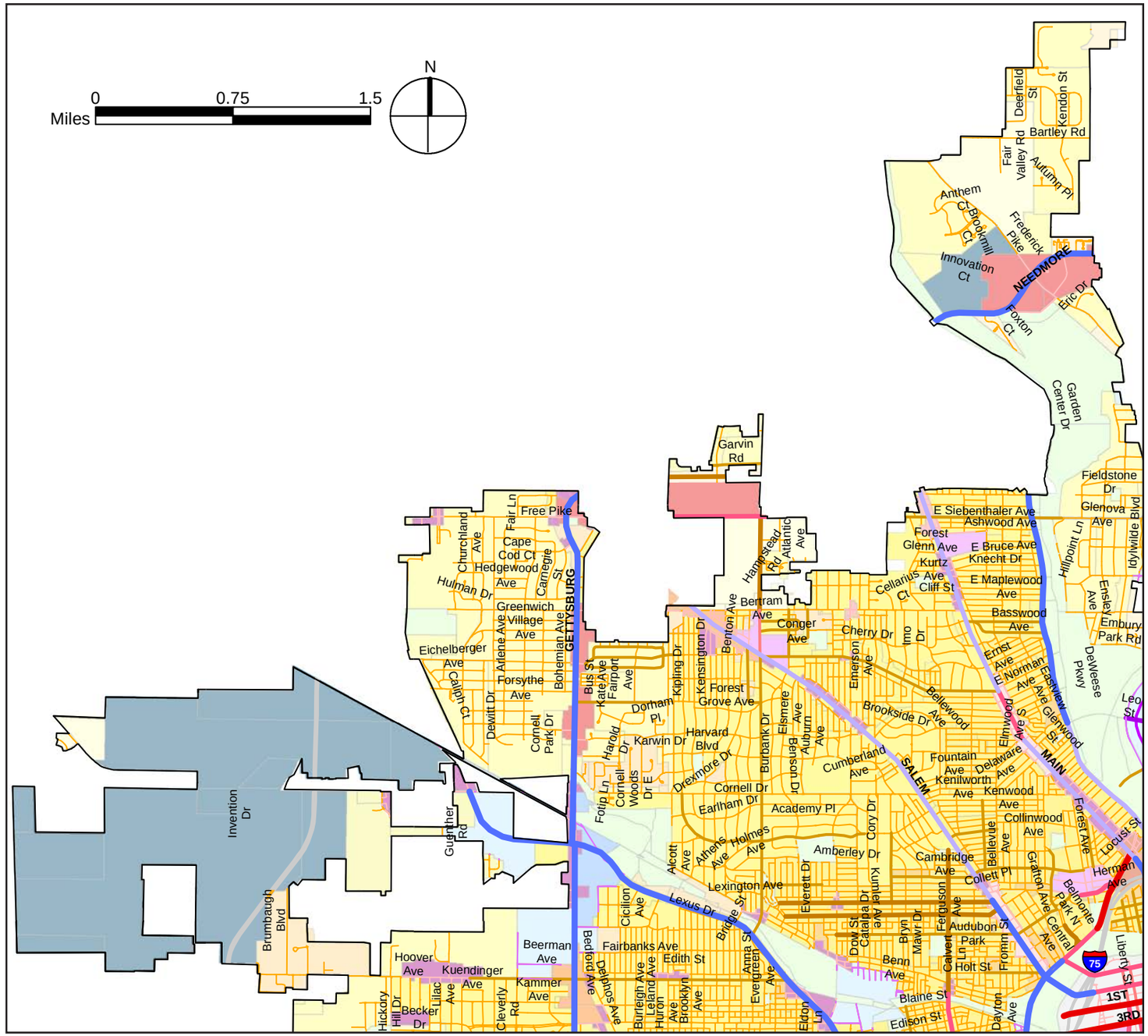
- Suburban Residential (SR-1)
- Suburban Residential (SR-2
- Eclectic Residential (ER-3)
- Eclectic Residential (ER-4)
- Mature Residential (MR-5)
- Suburban Multi-Family (SMF)
- Eclectic Multi-Family (EMF)
- Mature Multi-Family (MMF)
- Manufactured Home (MH)
- Central Business District (CBD)
- Urban Business District (UBD)
- Mature Neighborhood Commercial (MNC)
- Eclectic Neighborhood Commercial (ENC)
- Suburban Neighborhood Commercial (SNC)
- Mature General Commercial (MGC)
- Eclectic General Commercial (EGC)
- Suburban General Commercial (SGC)
- Transitional (T)
- Light Industrial (I-1)
- General Industrial (I-2)
- Business Park (BP)
- Campus-Institutional (CI)
- Well Head Operation (WO)
- Open Space (OS)

- Very Large Mixed Use
- Large Mixed Use
- Medium Mixed Use
- Small Mixed Use
- Very Large Commuter
- Large Commuter
- Very Large Industrial
- Large Industrial
- Medium Industrial
- Small Industrial
- Large Neighborhood
- Medium Neighbhorhood
- Small Neighborhood
- Corporation Boundary

Smaller streets may appear to be mislabeled due to the scale of the maps.

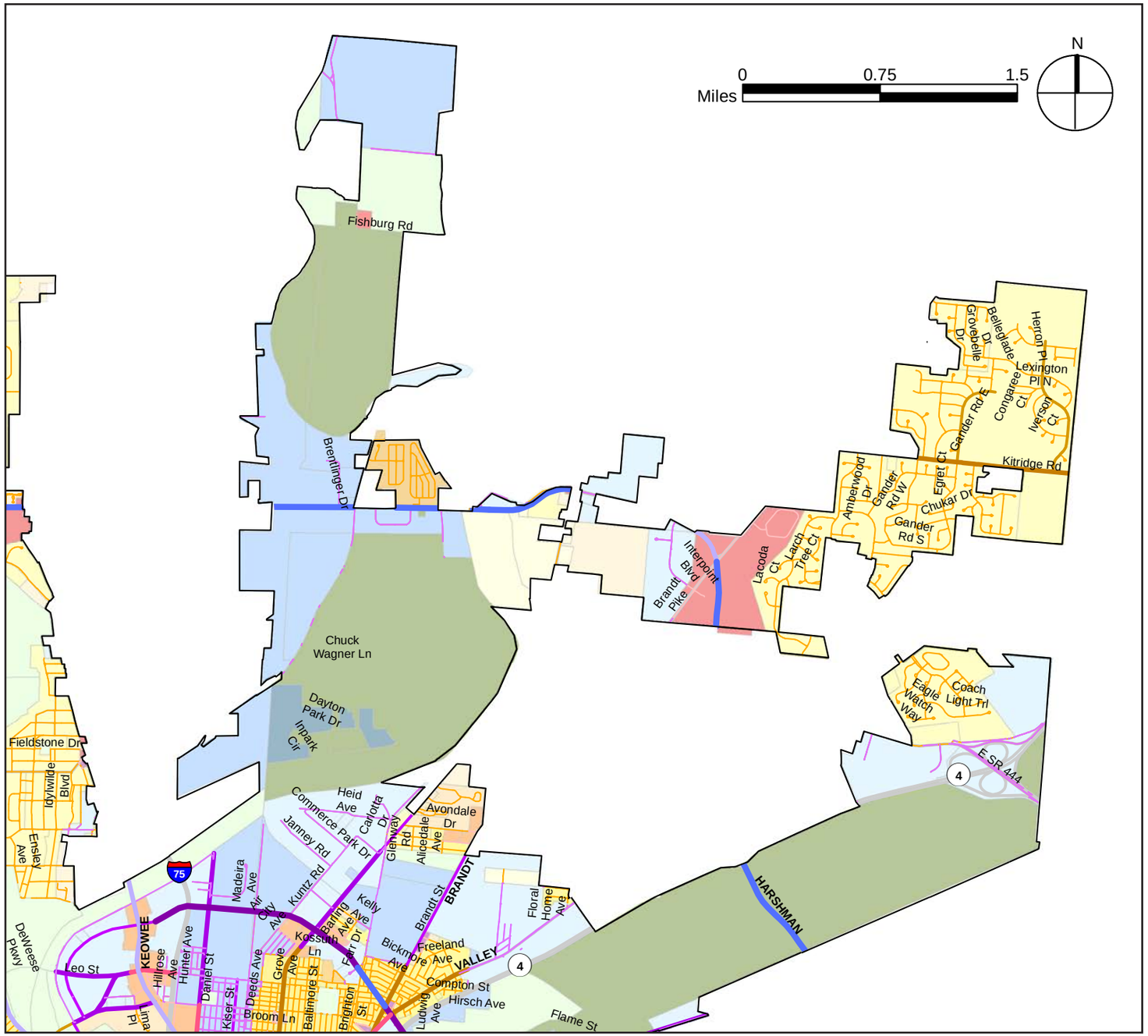
Figure 5.42: Northwest Quadrant Typology Assignments

- Suburban Residential, SR-1
- Suburban Residential, SR-2
- Eclectic Residential, ER-3
- Eclectic Residential, ER-4
- Mature Residential, MR-5
- Suburban Multi-Family, SMF
- Eclectic Multi-Family, EMF
- Mature Multi-Family, MMF
- Manufactured Home, MH
- Central Business District, CBD
- Urban Business District, UBD
- Mature Neighborhood Commercial, MNC
- Eclectic Neighborhood Commercial, ENC
- Suburban Neighborhood Commercial, SNC
- Mature General Commercial, MGC
- Eclectic General Commercial, EGC
- Suburban General Commercial, SGC
- Transitional, T
- Light Industrial, I-1
- General Industrial, I-2
- Business Park, BP
- Campus-Institutional, CI
- Well Head Operation, WO
- Open Space, OS
- Very Large Mixed Use
- Large Mixed Use
- Medium Mixed Use
- Small Mixed Use
- Very Large Commuter
- Large Commuter
- Very Large Industrial
- Large Industrial
- Medium Industrial
- Small Industrial
- Large Neighborhood
- Medium Neighbhorhood
- Small Neighborhood
- Corporation Boundary



Smaller streets may appear to be mislabeled due to the scale of the maps.

Figure 5.43: Northeast Quadrant Typology Assignments



- Suburban Residential, SR-1
- Suburban Residential, SR-2
- Eclectic Residential, ER-3
- Eclectic Residential, ER-4
- Mature Residential, MR-5
- Suburban Multi-Family, SMF
- Eclectic Multi-Family, EMF
- Mature Multi-Family, MMF
- Manufactured Home, MH
- Central Business District, CBD
- Urban Business District, UBD
- Mature Neighborhood Commercial, MNC
- Eclectic Neighborhood Commercial, ENC
- Suburban Neighborhood Commercial, SNC
- Mature General Commercial, MGC
- Eclectic General Commercial, EGC
- Suburban General Commercial, SGC
- Transitional, T
- Light Industrial, I-1
- General Industrial, I-2
- Business Park, BP
- Campus-Institutional, CI
- Well Head Operation, WO
- Open Space, OS

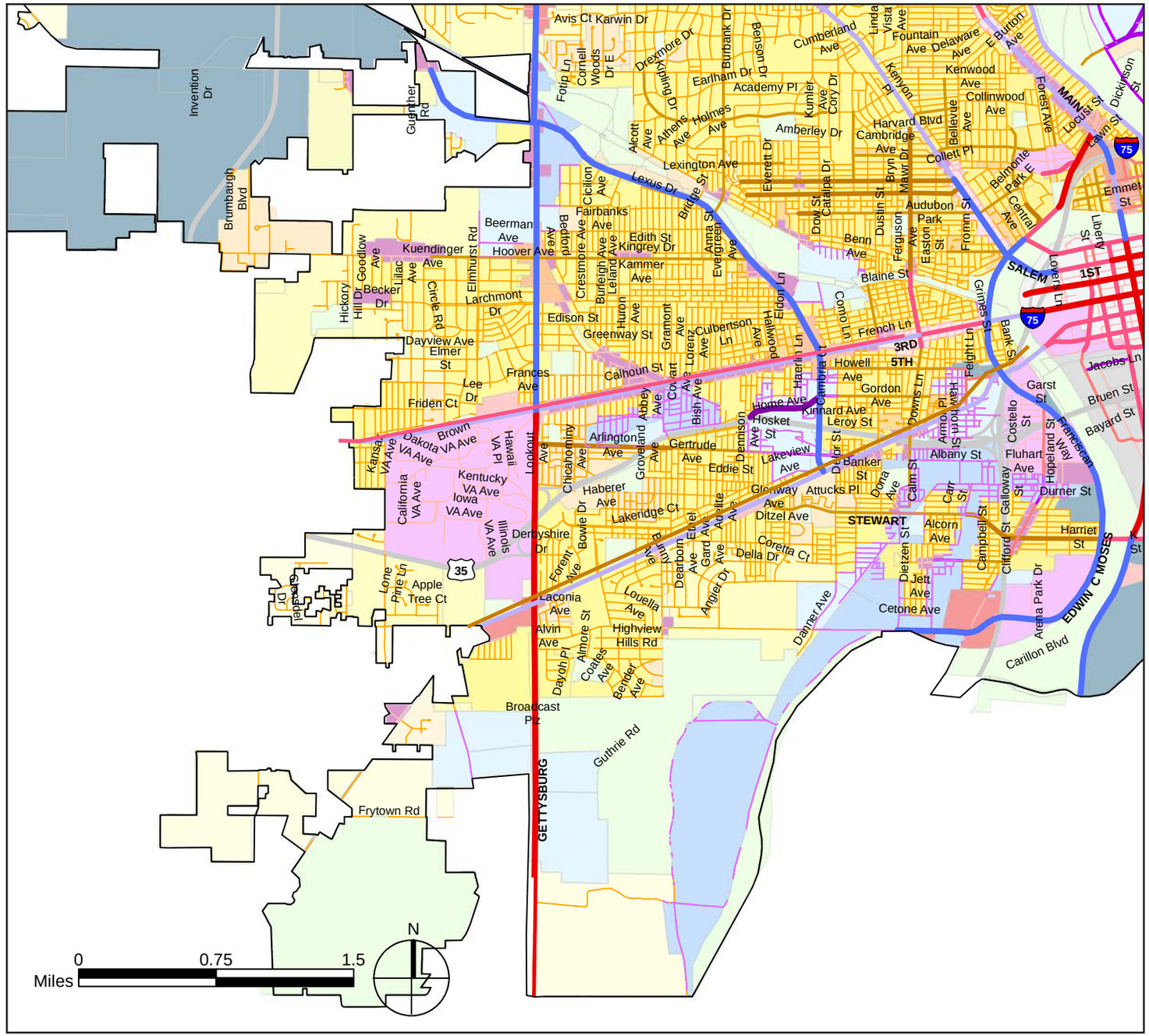
- Very Large Mixed Use
- Large Mixed Use
- Medium Mixed Use
- Small Mixed Use
- Very Large Commuter
- Large Commuter
- Very Large Industrial
- Large Industrial
- Medium Industrial
- Small Industrial
- Large Neighborhood
- Medium Neighbhorhood
- Small Neighborhood
- Corporation Boundary

Smaller streets may appear to be mislabeled due to the scale of the maps.

Suburban Residential, SR-1
Suburban Residential, SR-2
Eclectic Residential, ER-3
Eclectic Residential, ER-4
Mature Residential, MR-5
Suburban Multi-Family, SMF
Eclectic Multi-Family, EMF
Mature Multi-Family, MMF
Manufactured Home, MH
Central Business District, CBD
Urban Business District, UBD
Mature Neighborhood Commercial, MNC
Eclectic Neighborhood Commercial, ENC
Suburban Neighborhood Commercial, SNC
Mature General Commercial, MGC
Eclectic General Commercial, EGC
Suburban General Commercial, SGC
Transitional, T
Light Industrial, I-1
General Industrial, I-2
Business Park, BP
Campus-Institutional, CI
Well Head Operation, WO
Open Space, OS

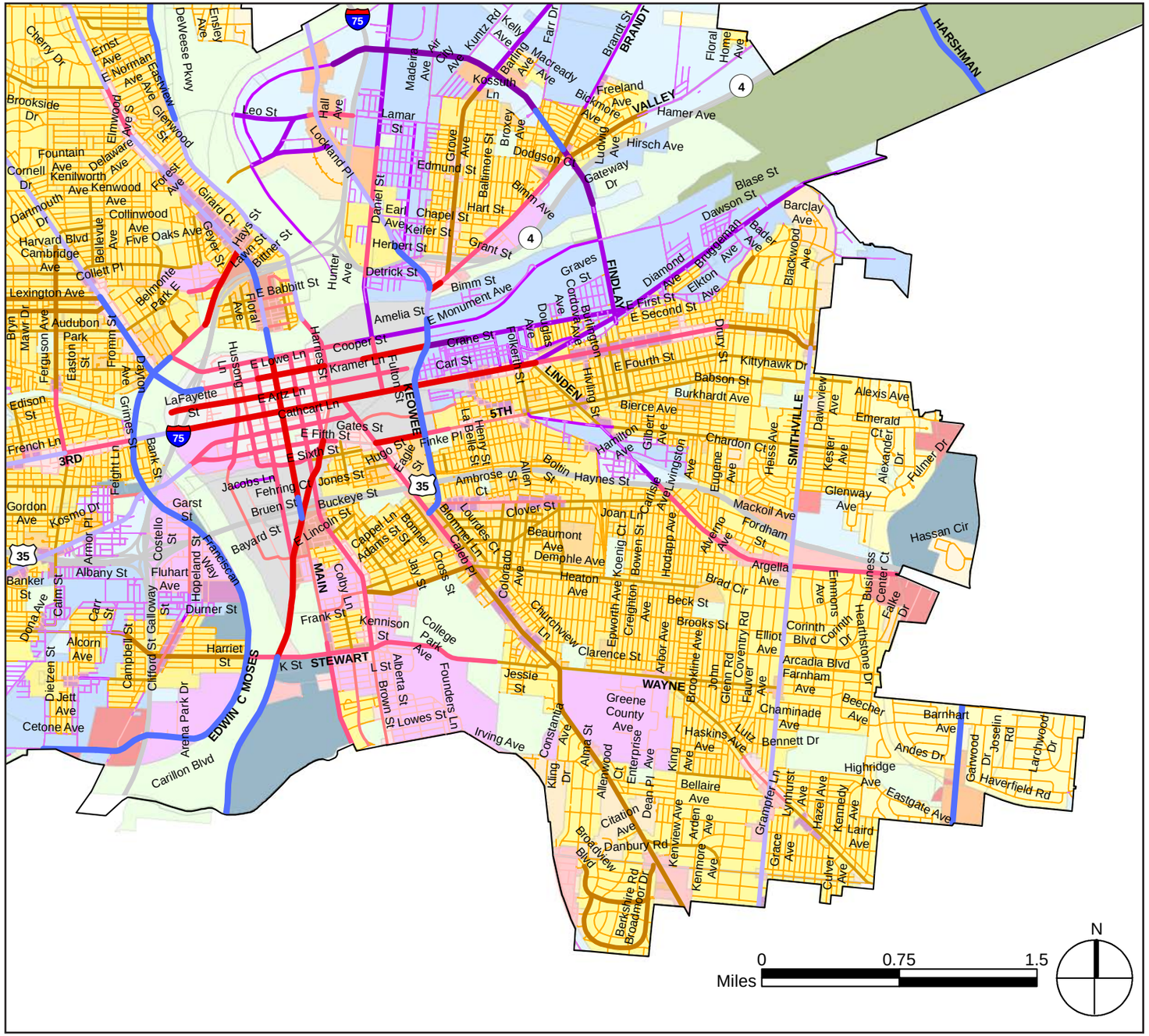
Very Large Mixed Use
Large Mixed Use
Medium Mixed Use
Small Mixed Use
Very Large Commuter
Large Commuter
Very Large Industrial
Large Industrial
Medium Industrial
Small Industrial
Large Neighborhood
Medium Neighbhorhood
Small Neighborhood
Corporation Boundary

Figure 5.44: Southwest Quadrant Typology Assignments



Smaller streets may appear to be mislabeled due to the scale of the maps.

Figure 5.45: Southeast Quadrant Typology Assignments



- Suburban Residential, SR-1
- Suburban Residential, SR-2
- Eclectic Residential, ER-3
- Eclectic Residential, ER-4
- Mature Residential, MR-5
- Suburban Multi-Family, SMF
- Eclectic Multi-Family, EMF
- Mature Multi-Family, MMF
- Manufactured Home, MH
- Central Business District, CBD
- Urban Business District, UBD
- Mature Neighborhood Commercial, MNC
- Eclectic Neighborhood Commercial, ENC
- Suburban Neighborhood Commercial, SNC
- Mature General Commercial, MGC
- Eclectic General Commercial, EGC
- Suburban General Commercial, SGC
- Transitional, T
- Light Industrial, I-1
- General Industrial, I-2
- Business Park, BP
- Campus-Institutional, CI
- Well Head Operation, WO
- Open Space, OS
- Very Large Mixed Use
- Large Mixed Use
- Medium Mixed Use
- Small Mixed Use
- Very Large Commuter
- Large Commuter
- Very Large Industrial
- Large Industrial
- Medium Industrial
- Small Industrial
- Large Neighborhood
- Medium Neighbhorhood
- Small Neighborhood
- Corporation Boundary

Smaller streets may appear to be mislabeled due to the scale of the maps.

CHAPTER 6: RECOMMENDATIONS

This chapter addresses overall implementation of Dayton's Complete Street plan, including implementation principles and considerations for near-, mid-, and long-term projects. It also reviews the steps that individual Complete Street projects follow, and provides a methodology for prioritizing projects.

Most communities implement their Complete Street policies through committees, stakeholder groups, and public involvement efforts. This informal process allows communities to test what methods work best for their needs when it comes to implementation. Some cities choose to standardize these processes once they are tried and proven. Other communities begin with formal implementation plans as a way to maintain the enthusiasm generated during policy development and keep stakeholders engaged. Such plans outline what steps are needed to transition from existing policies and procedures to updated practices that are aligned with Complete Streets principles.

6.1 Complete Streets Principles

To ensure that Dayton pursues feasible, reasonable, and equitable Complete Street's projects, these principles should be followed during implementation:

- ***Multimodal accommodations*** *for pedestrians, bicyclists, transit, freight, and vulnerable road users such as people with disabilities and children, are considered at the beginning of every project.*
- ***Community-initiated and supported*** *projects are encouraged.*
- ***The public has opportunities to participate*** *in the planning process and voice their concerns or support during the entire project, from planning through design and construction.*
- ***Complete Street Design Guidelines*** *apply to new and retrofit projects, including construction, reconstruction, rehabilitation, repair, and maintenance.*
- ***Special efforts to include*** *low-income, minority, and underserved communities are encouraged.*
- ***Lasting implications*** *and possible unintended consequences of a project are discussed and planned for.*
- ***Future land use*** *adjacent to the project is considered.*

6.2 Plan Implementation: Near-Term

Initially, The City should projects that will have an immediate and visible impact for relatively little cost. Public involvement efforts are an important component during this phase. Many communities face an uphill battle in public opinion when the first project that reallocates space from automobiles to other users is proposed. A robust and inclusive public discourse guided by Complete Street champions can help address such obstacles. Dayton should maintain or restructure the stakeholder group that was involved in creating this plan and use its members as an asset during planning, selection, and promotion of future projects. The National Complete Streets Coalition recommends establishing a task force or commission to work toward policy implementation as the first step for any successful Complete Streets implementation plan. Forming a Complete Streets steering committee with representatives from all relevant city departments, other public agencies, and community groups ensures that all voices will be heard. It also acts as a forum for exchanging ideas between groups who may not see eye to eye, resulting in a more comprehensive and mindful implementation process.

A broad and diverse group of stakeholders should be consulted during the selection and design of Complete Street projects. In addition to neighborhood associations and advocacy groups, many of these government agencies and departments should be involved, depending on the location and content of a particular project:

- City of Dayton Department of Planning and Community Development
- City of Dayton Department of Public Works
- City of Dayton Police Department
- City of Dayton Fire Department
- City of Dayton Landmarks Commission
- City of Dayton Office of Economic Development
- City of Dayton Department of Building Services
- City of Dayton Recreation and Youth Services
- City of Dayton Department of Water
- Montgomery County Engineer's Office
- Montgomery County Department of Environmental Services
- Montgomery County Department of Water Services
- Montgomery County Department of Parks and Grounds
- Montgomery County Planning Commission
- Public Health - Dayton & Montgomery County
- Miami Valley Regional Planning Commission
- Greater Dayton Regional Transit Authority

Figure 6.1: Potential Stakeholders

- Ohio Department of Transportation District 7
- Ohio Department of Health
- Dayton Public Schools

6.2.1 Public Involvement

In addition to traditional public involvement methods, such as public meetings, informational mailings, and website postings, the City could use the following public involvement tools during the initial rollout of the Plan:

Complete Streets Workshops: Offering workshops and other outreach activities to transportation professionals, community leaders, and residents will encourage public buy-in and possibly preempt confusion or resistance to future projects. The National Complete Streets Coalition's workshop series trains local and state transportation professionals in four key areas: Complete Streets Design Considerations, Policy Implementation, Policy Development, and Laying the Foundation for Complete Streets. Nationally-recognized practitioners lead workshop participants in experiential learning and tailor content to the needs of a particular city or region. For more information, visit the National Complete Streets Coalition's website: http://www.smartgrowthamerica.org/complete-streets/get-help/workshops.

Walk Audits: Many cities use walk audits or walkability assessments to measure pedestrian Level of Service, determine where facilities are lacking or in disrepair, and promote areas that are found to be highly walkable. City staff and residents walk the neighborhood together, assessing sidewalk conditions, connectivity, ADA compliance, crosswalks, street furniture, and landscaping. Walk audits also consider roadway attributes such as traffic volume and speed, presence of parked cars, transit stops, and type of land use that the road serves. The insight and data gathered during a walk audit can be used to justify pedestrian infrastructure improvements and prioritize funding, and are invaluable during the planning process. This same tool can be used to assess conditions for bicycling.

Figure 6.2: Walk audit

Figure 6.3: Public Involvement Meeting in Dayton

Charrettes: Charrettes are typically held while planning a specific project, and engage the public, city staff, and other stakeholders in an intense period of collaboration. Hands-on activities such as marking problem areas on maps and sketching potential solutions are common during these brainstorming sessions. A successful charrette allows all parties to have their voices heard during the planning process and claim ownership over the final product.

Online Platforms: Dayton has used interactive websites in the past to gather public comment about plans and gauge stakeholder interest. While this method does not reach all residents, it is still a useful tool and should be used to supplement in-person public outreach. The City can use mobile apps such as PollEverywhere to collect feedback about certain project proposals or ideas.

6.2.2 Routine Maintenance Projects

In addition to public involvement efforts, Complete Street design guidelines should be applied to routine resurfacing and maintenance projects as soon as the plan is adopted. These short-term projects can test new concepts included in the Complete Street design guidelines on a small scale before applying them to a larger project. In addition, this is a low-cost way to add Complete Streets elements to roadways when they are already being repaved as part of a resurfacing project. The City's resurfacing and maintenance schedule should be easily accessible to the public, providing opportunity for community involvement prior to the start of construction. In Salt Lake City, Utah, the City used input from public meetings and its Complete Streets ordinance to install 50 miles of bicycle lanes in one year through its Pavement Management System. Other substantial changes, such as installing pedestrian refuge islands, improved crosswalks, adjusted traffic signal phasing for pedestrians and bicyclists, and road diets, can also be implemented during near-term projects. These improvements are often less costly when they are included in routine maintenance work that is already necessary.

6.2.3 Review Existing Policies and Procedures

The City may wish to conduct an audit of its policies and procedures to determine where existing practices fall short of the Complete Streets design guidelines and take

appropriate steps to remedy potential conflicts between old and new policies. A formal review of existing policies and procedures also reveals the extent to which automobiles are prioritized over other modes in city processes, designs, and standards, and may provide direction as communities level the playing field to accommodate other road users.

6.2.4 Audit Development Regulations

As discussed in Chapter Two, zoning and subdivision regulations influence the degree to which a Complete Streets plan can be effectively implemented. A cursory examination of Dayton's zoning code revealed a strong emphasis on mulitmodal-oriented design and development, and augurs well for Dayton Transportation Plan 2040's success. However, a thorough audit of Dayton's development regulations would show what codes and ordinances encourage Complete Streets, and what sections may need to be modified.

6.2.5 Development Projects

As part of this study, a Right-of-Way (ROW) table was created (see Appendix B) that documents the minimum required ROW widths for each street segment based on the minimum complete streets elements for the assigned typology type. The table also includes maximum widths for the street segments related to the vehicle travel zone, including the maximum number and widths of travel lanes allowed. So when a development project is being considered at a specific site, City staff, property owners and developers can use this ROW table to determine what complete street elements and changes to existing right-of-way and curb-to-curb widths are required, recommended, and appropriate (or not appropriate).

6.3 Plan Implementation: Mid-Term

For a plan with a 25 year horizon such as this one, mid-term projects could take place between five and fifteen years from the plan's publication. There are three types of projects that should be prioritized during this phase: showcase projects, equity efforts, and spot improvements.

Figure 6.4 Patterson Boulevard Canal Parkway

Figure 6.5: Platoon of driverless vehicles

6.3.1 Showcase Projects

Initial mid-term projects should target high-visibility, showcase streets that will generate positive media coverage and public understanding of Complete Streets, and benefit a large number of residents. These projects often involve reconstruction of major streets, typically from building face to building face, with hardscape changes to curbs and sidewalks. Street furniture, traffic control, landscaping and green infrastructure improvements also feature in these projects. Showcase projects typically require a much greater investment than near-term activities.

The Patterson Boulevard Canal Parkway Project on the east side of Downtown Dayton is a prime example of a showcase Complete Streets project. Finished in 2013, the $2 million endeavor added new landscaping, lighting, public art, historical signage, sidewalks, and crosswalks on Patterson Blvd from Second to Sixth Street. These improvements complemented redevelopment along the corridor, with a growing number of recreational and entertainment attractions, and increased pedestrian safety.

6.3.2 Equity Efforts

Projects that provide the greatest benefit to as many people as possible are inherently attractive, but a narrow focus on high-visibility, showcase projects undermines a key component of Complete Streets philosophy: taking equity into account. The City should earmark funding for Complete Streets projects for people that are underserved: communities of color, low-income populations, the elderly, and people with disabilities. In other cities, health departments and neighborhood groups are strong allies in these areas, providing empirical data and local knowledge to identify what projects are most beneficial. Underserved groups often do not have access to private transportation and depend on transit or other modes of travel. Addressing their needs should be a pillar of Dayton's Complete Streets program.

6.3.3 Spot Improvements

During the mid-term phase of implementation, the City should fully incorporate Complete Streets into its policies and procedures and view every transportation project as an opportunity to improve the network for all users. Spot improvements, such as curb ramp replacements, tree plantings, and signal timing would allow the City to pursue Complete Streets on a routine basis. By this point, knowledge of and adherence to Complete Streets guidelines should be apparent in all levels of government activity.

6.4 Plan Implementation: Long-Term

6.4.1 Transit's Role

One of the many advantages of having public transit as a partner in any Complete Street program is the contribution it makes to attracting pedestrians and bicyclists. Few people drive to public transit and as more and more streets provide amenities for pedestrians and cyclists in Dayton, access to public transit will improve as well. By moving to Bus Rapid Transit (BRT) along selected transit routes, such as Commuter Streets, passengers will not only travel at higher speeds in priority mode, but transportation choices can be improved at a relatively low cost and boost the local economy.

As part of a Government Accountability Office (GAO) report, "*Bus Rapid Transit Projects Improve Transit Service and Can Contribute to Economic Development,*" the GAO surveyed 20 BRT projects regarding their features, design, performance, ridership, cost, and effect on the community.

The majority of projects included in the study had increases in ridership after one year of service, and half of those increases were over 30 percent. On average, travel times were reduced 10 to 35 percent over previous bus services. This has allowed places across the country to improve transit service with respect to their own needs, and demonstrate investment in their communities.

Several of the projects surveyed identified the BRT projects as catalysts for economic development. Officials in Cleveland, Ohio credit the Healthline BRT project, associated with major hospitals and universities, with attracting $4 and $5 billion of new investment to the corridor. In Seattle, several developers are interested in the corridor along the RapidRide A Line, and noted that other BRT corridors in the region are attracting transit-oriented development.

Project sponsors, local officials, and other stakeholders surveyed "emphasized the importance of BRT projects' physical features particularly those that are perceived as permanent—in helping to spur economic development." Sponsors went on to explain that "BRTs with dedicated running ways, substantial stations with enhanced amenities, and other fixed assets represent a larger investment in the corridor by the public sector and assure developers that the transit service and infrastructure will be maintained for decades into the future."

BRT is a long-term investment. As the City continues to collaborate with the Greater Dayton Regional Transit Authority on service improvements, it may consider the appropriateness and feasibility of BRT in Dayton in the coming years. The role of transit will likely change as another form of transportation takes the to the road: driverless vehicles.

What is Bus Rapid Transit?

BRT uses dedicated bus lanes, pay-to-enter stations, specially branded vehicles, and Intelligent Transportation Systems, such as traffic signal priority, to provide more convenient and faster service than a regular transit route typically offers.

What are Driverless Vehicles?

The Institute of Electrical and Electronics Engineers (IEEE) predicts that by 2040, 75 percent of cars on the road will be driverless. Given that this Transportation Plan has a horizon year of 2040, we would be remiss to ignore the potential impact that the next generation of vehicles may have on Dayton's future Complete Streets.

Driverless or autonomous vehicles use technology to sense and interpret their environment, making decisions based on the data they collect. Driverless vehicles use technology to navigate, perform complex maneuvers, and coordinate their movements with other smart vehicles and infrastructure. When fully autonomous vehicles reach a critical mass on the roadways, their efficiency may result in a surplus of capacity on the network. Excess lanes could be repurposed for active uses, such as separated trails and greenways, promenades, and landscaping.

6.4.2 Government's Role in Driverless Vehicles

In order to establish a safer and more efficient transportation network, policy makers and planners must keep pace with the development of driverless technology. Driverless vehicles will require changes to legislation, land use, parking requirements, and other regulations to confer the enhanced safety and convenience that many expect.

The federal government is increasingly involved in driverless vehicle funding, research, and regulation. President Obama committed $4 billion over the next ten years to support driverless vehicle research. The United States Department of Transportation and other agencies will play a leading role in establishing and enforcing policies and standards for safety, cyber security, and manufacturing of driverless vehicles. State and local governments, however, will manage more direct impacts of driverless vehicles, such as infrastructure and mobility. This section provides several recommendations for Dayton to plan ahead for driverless vehicles. By taking proactive steps, Dayton can establish itself as a regional leader in the field, enacting ordinances that take full advantage of the benefits of this new technology while balancing the needs of other roadway users. This section draws upon recommendations in the recent publication by WSP Parsons Brinckerhoff, Driving Towards Driverless: A Guide For Government Agencies.

Educate the Public: It is still early days in the development and deployment of driverless technology. Much of the driving public remains highly skeptical of relinquishing control on the road. Governments should partner with industry to promote public awareness campaigns that give objective, evidence-based information about driverless technology's safety benefits, especially with regards to sharing the road with bicyclists and pedestrians. Introducing small-scale, transit-based driverless operations at low speeds in dense, multimodal areas could familiarize the public with driverless technology before they encounter full-sized driverless vehicles on the road.

Revise Parking Requirements: If driverless vehicles are able to drop off their passengers and park themselves in remote locations, or continue onto the next passenger, parking garages and surface lots would become obsolete, rendering parking requirements for different land uses a moot point. Instead, passenger pick-up and drop-off zones would be needed in busy areas. On-street parking could still remain for privately owned vehicles, as it would continue to shield pedestrians from traffic and provide a calming effect on human-driven vehicles. This move would accommodate more infill development. For example, parking lots and garages currently occupy thirty percent of some cities' downtown real estate, more than many other land uses. Much of this land could be repurposed because driverless vehicles will park themselves more efficiently and be able to circulate on-street while waiting for passengers, and because they may cause a decline in vehicle ownership rates.

Plan for Changes in Revenue: If driverless vehicles reduce or even eliminate the need for most parking facilities, as experts predict, many cities could no longer rely on parking permits, tickets, and other revenue streams such as vehicle registration and speeding tickets, and may need to develop new sources to make up the difference. However, expenses on incident management and traffic enforcement may also decline, reducing costs and perhaps cancelling out the need to find new sources of revenue. Regardless, cities that are overly reliant on these income streams should take steps to diversify their revenue in preparation for a very different financial landscape.

Maintain Bicycle and Pedestrian Infrastructure: A recent study found that most pedestrians and bicyclists prefer separated facilities in a fully driverless environment. Although this preference may change as driverless vehicles prove their safety and reliability on the road, installing separated facilities like cycle tracks, paths, and wide sidewalks is a good way to preserve an equitable and pleasant environment for active transportation users.

6.4.3 Driverless Vehicles and Complete Streets

In a world with driverless vehicles, Complete Streets will still be relevant, as cities will always have different roadway users sharing space in the public realm. However, existing tools used to shape a safe and attractive travelling environment may become obsolete. For example, traffic calming techniques will not have the same effect on vehicles when humans are no longer in control. If vehicles are programmed to adhere to strict safety standards around other road users, traffic calming as we know it may no longer be necessary. Conversely, if the efficiency with which driverless vehicles travel increases average vehicle speeds, traffic "calming" infrastructure may become even more necessary along busy, multimodal roads. Most driverless vehicles will eventually be electric, resulting in a much cleaner travel environment. Green infrastructure that catches pollutants from gas- and diesel-fueled vehicles may be less important in a driverless, electric network.

In the near- and mid-term, Dayton should continue to invest in Complete Streets, improving bicycle and pedestrian infrastructure, greening the roadway, and creating a safe and comfortable transportation network for all modes. But for long-range planning efforts, the return on these investments is less certain, since we simply do not know what role they will play in a world with driverless vehicles. If properly planned for, the proliferation of driverless vehicles over the next several decades could be a boon to the livability of Dayton's streets, returning the public realm to pedestrians and bicyclists. Small and medium mixed-use streets could be converted to shared spaces, with driverless vehicles slowly navigating a dense, peopled street. Parking garages that currently occupy prime downtown real estate could be torn down and replaced with more productive uses.

Regardless of how and when driverless vehicles may change the built environment, as we look ahead it is imperative that policy makers and planners consider their increasing presence on the roads during long-range planning efforts. In this way, the benefits of driverless vehicles can be optimized and negative effects mitigated in a proactive and comprehensive manner.

1. Project Initiation
2. Project Funding
3. Planning
4. Design
5. Construction
6. Maintenance
7. Performance Measurement

6.5 Project Implementation

Individual Complete Street projects follow a seven step process:

6.5.1 Project Initiation

Various entities and stakeholders can propose projects, including:

City of Dayton: the City maintains an Infrastructure Project Schedule that lists roadway, bridge, and traffic signal projects through 2017. Some City plans and documents maintain separate project schedules, such as the 2025 Bicycle Action Plan, which specifies projects through 2025. Typically, city agencies, primarily the Departments of Planning and Community Development and Public Works, initiate these projects as part of ongoing, citywide improvements and planning initiatives.

Developers and property owners: developers must include new street construction and upgrades on retrofit projects in their planning and project budget. Property owners abutting sidewalks are responsible for their upkeep and repair. These projects may range from a minor sidewalk replacement in front of a private home, to multi-block improvements or new construction.

Other public agencies: county, state, and federal agencies may propose projects in their jurisdictions. For example, the Ohio Department of Transportation is involved in projects on State and US routes and interstates that traverse Dayton.

Initial project tasks include:

- Propose the basic project design
- Identify potential funding sources and lead agency
- Identify and initiate coordination with adjacent and overlapping projects
- Estimate project costs
- Propose initial design and construction time line

6.5.2 Project Funding

Funding can come from a variety of sources depending on the entity that proposed the project. Many projects have multiple funding sources for different tasks, such as design and construction. State and federally funded projects are listed in the Miami Valley Regional Planning Commission's Transportation Improvement Program, updated every two years with a four year horizon. Almost all of Dayton's planned bikeway projects are funded with Congestion Mitigation and Air Quality grants from the Federal Highway Administration. Other funding sources include Community Development Block Grants, Safe Routes to School, and various taxes and levies.

6.5.3 Planning

Project ideas and goals are developed with extensive public input and collaboration, using activities such as concept mapping, visioning exercises, needs assessments, and charrettes. Community meetings should be held throughout the planning and design phases, and individual meetings with abutting property owners may also be needed to coordinate right-of-way impacts. Stakeholders should develop a Complete Streets based vision statement for the project and ensure that all aspects of the project adhere to Dayton's Complete Street Design Guidelines. In addition to community-based planning, City staff also collect and analyze data to inform their decisions during the planning phase. Data include:

- Multimodal traffic and operations modeling, including traffic signal phasing
- Pedestrian, bicycle, and motor vehicle counts
- Crash data

Other tasks include:

- Integrate surrounding land use, environmental, social, and historical context into the design
- Develop design alternatives and select a final alternative
- Alignment and dimensions of sidewalks and crosswalks
- Lane and intersection functionality for bicycles, transit, and motor vehicles
- Accommodations for people with disabilities
- Green infrastructure features such as bioretention and pervious surfaces
- Smart infrastructure improvements that will accommodate connected and automated vehicles
- Flag potential right-of-way issues, easements, and conflicts with property owners and utilities

6.5.4 Design

At this stage, right-of-way plans, utility plans, multimodal accommodations, construction time lines, maintenance plans, renderings, environmental and historic resource protection plans, and final cost estimates are submitted. Government agencies review concepts and designs to ensure that the project is feasible and reasonable. City engineers conduct extensive review of the project to verify that all technical standards are met. City planners ensure that Complete Street Design Guidelines and concepts are followed and that the Complete Street Implementation Principles listed above are included in the process. County and/or state agencies may be involved depending on the project.

When final approvals have been granted, the project goes out to bid.

6.5.5 Construction

Construction is managed by the Department of Public Works in coordination with other agencies. Construction bids are reviewed and contractors are selected during this phase. A construction management plan is submitted to the DPW for review and approval. The plan should detail how quality standards will be met and include a mechanism for public input during construction, such as a point of contact to hear community concerns.

6.5.6 Maintenance

Maintenance is a crucial and often overlooked component of roadway projects. Projects should not move forward without a maintenance plan that details costs, including personnel and equipment needed to maintain any new facilities that are part of a Complete Streets project. For example, if a protected two-way cycle track is planned with a width of eight feet, but city snow plows require a minimum width of twelve feet, the facility would be unusable after inclement weather. A strong public involvement process that includes stakeholders with many areas of expertise and insight can help resolve these details during project planning, ensuring a maintainable final product.

6.5.7 Performance Measurement

Dayton will have to determine what performance measures are important and will most accurately reflect progress in its Complete Streets program. Other cities use a wide range of measures, including:

- Bicycle and pedestrian counts
- Walking and bicycling mode share
- Motor vehicle counts
- Vehicle-miles traveled per capita
- Crash data for all roadway users
- Percentage of children walking and bicycling to school
- Transit ridership
- Public health indicators (e.g. chronic disease rates)
- Economic indicators (e.g. number of new jobs/businesses on Complete Streets)
- Air quality and emissions
- Number of new or repaired facilities each year (e.g. blocks of sidewalks)
- Miles of streets retrofitted
- Miles of bicycle facilities added
- Number of spot improvements (e.g. curb ramps, crosswalks)
- Number of trees planted
- Changes in 85th percentile speeds (for traffic calming projects)
- Project level before and after studies

These measures provide a more accurate picture of how well a street is serving those using it than traditional indicators, such as vehicle Level of Service. Some cities set aside funding for performance measurement, which

covers personnel costs and equipment such as automated counters. Although it requires initial investment, tracking performance measures demonstrates that the community is making progress. The data collected can be used to apply for grant funding towards future projects and convince politicians and the public that Complete Streets work.

Public health agencies have a stronger tradition of evaluation than transportation professionals, and are often consulted during the development of new performance measures.

6.6 Methodology for Project Prioritization

The following process for selecting Complete Street projects and implementing standards in the City of Dayton includes three phases:

1. Project Identification
2. Feasibility Analysis
3. Project Selection

6.6.1 Phase 1: Project Identification

The first phase involves the identification of areas in the community where roadway improvements should be made. Each area is selected based on meeting certain criteria and is individually scored on a scale of one to three. Next, roadways (Opportunity Roadways) that lack sidewalks, bicycle lanes, and other amenities (but are served by transit) within each selected area are identified, evaluated, and scored. From this, a list of Candidate Roadways is prepared and a Design Workshop is held to define the types of investments that could occur on each roadway to address the identified issues.

Step 1.1

Identify Suitable Areas, which are areas where existing or future land use (private realm) promotes walking, biking, and transit.

Step 1.2

Identify Opportunity Roadways, which are roadways (public realm) that lack sidewalks, bicycle lanes, and other amenities but are served by transit. For a complete list of Opportunity Roadway Scoring Criteria, refer to Table 6.1.

Step 1.3: List of Candidate Roadways - A list of all roadways that could make good Complete Streets.

Step 1.4: Hold Design Workshop - Identify candidate projects supported by the City and define types of investments that could occur on each roadway.

6.6.2 Phase 2: Feasibility Analysis

In the second phase, each of the Candidate Projects are evaluated to determine if they support walking and biking along with existing modes, if they are supported by the neighborhood, and if they can be built by a target date.

6.6.3 Phase 3: Project Selection

For the last phase, the quality of the Candidate Projects is evaluated by ranking and recommending them based on

- Cost/benefit analysis
- Land uses supported
- Existing/programmed bike/pedestrian/transit
- Infrastructure supported
- Documented project support from neighborhood

6.6.4 Example Projects

To demonstrate how the methodology for project prioritization works, the process was applied to seven projects on the City's Infrastructure Project Schedule:

- Washington Street Reconstruction
  Reconstruction of Washington Street from Perry Street to Jefferson Street
- Warren Street Reconstruction
  Reconstruction of Warren Street and Brown Street from Buckeye Street to Wyoming Street
- Salem Avenue Bike Lanes
  Installation of bike lanes on Salem Avenue from Riverview Avenue to Grand Avenue
- Smithville Road Reconstruction, Phase 2
  Reconstruction of Smithville Road from Woodbine Avenue to Watervliet Avenue
- Springfield Street Reconstruction, Phase 3
  Reconstruction of Springfield Street from McFadden Avenue to the East Corp Line
- Valley Street Realignment
  Realigning Valley Street from Troy Street to Keowee Street
- West Third Street Transportation Enhancements Installation of transportation enhancements on West Third Street from Paul Laurence Dunbar to Orchard

Some of these projects are near completion, while others are not due to begin until 2019-2020.

A number of different data sources are used to calculate a project's score: Infrastructure, crash data, traffic volumes, housing data, demographics (race, income, age), as well as other contextual factors, such as proximity to schools, parks, historic districts, and other bicycle, pedestrian, and transit generators. All of this data is available through the City of Dayton, the Miami Valley Regional Planning Commission, and the US Census.

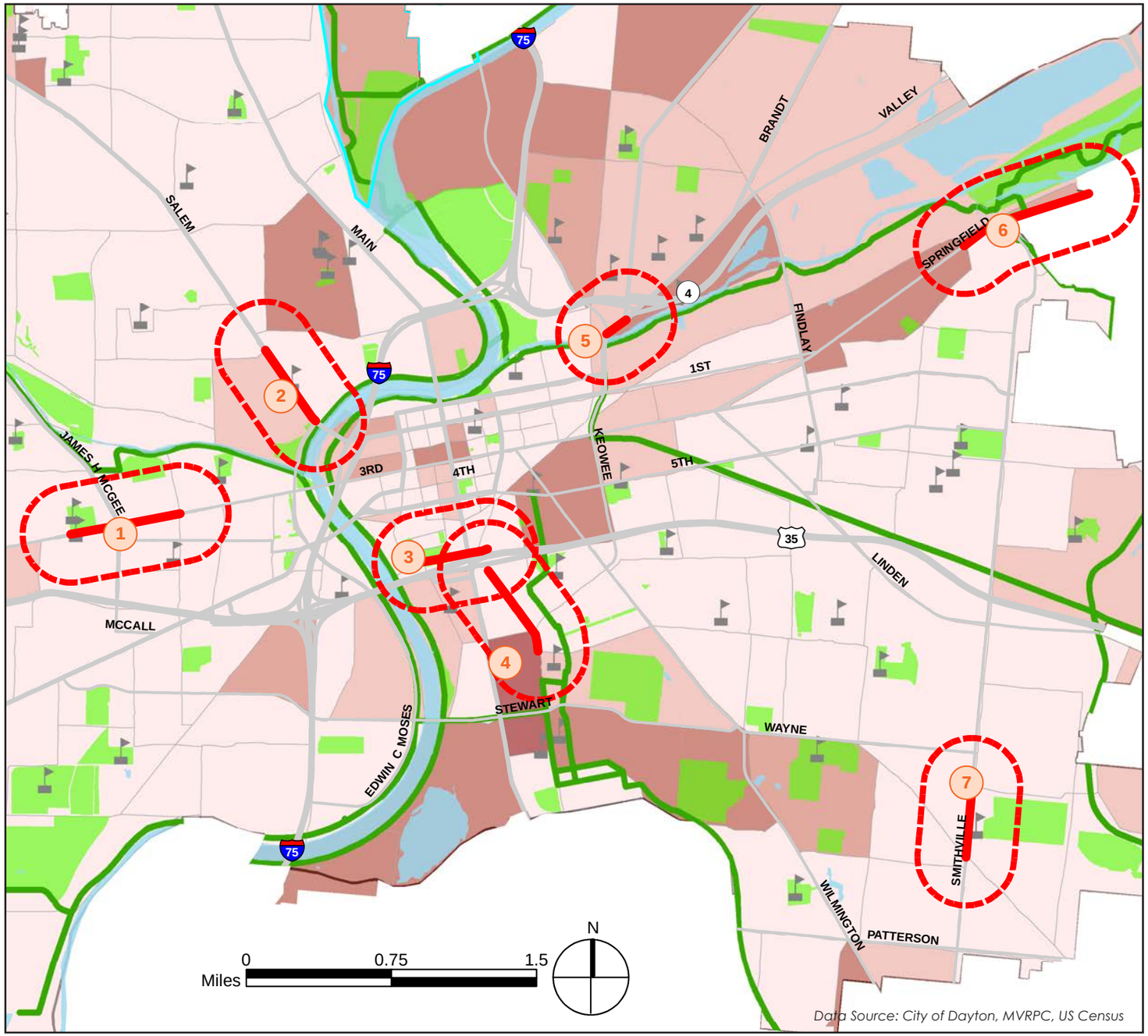
Project scores indicate how much use a redesigned street will likely see, as opposed to whether it is actually feasible. For example, it may be financially and practically feasible to install a standard bike lane on Smithville Road, but most people would not use it, preferring a buffered bike lane or cycle track due to fast, heavy motorized traffic. In that case, return on investment would be negligible. Initially, most of Dayton's Complete Street projects will likely take place in its urban core, expanding out to more suburban neighborhoods as time goes on.

As the ranking of example projects in Table 5.1 shows, Complete Streets criteria and scoring favor projects in dense, urban areas where the return on investment will be greater; in other words, where more people are likely to use a Complete Street.

Methodology for Project Prioritization				Example Projects						
Metric	Purpose	Criteria	Points	Salem Ave	Washington St	Warren/Brown St	W Third St	Valley St	Springfield St	Smithville Rd
Existing Bicycle, Pedestrian, and Transit Generators	Areas that actually generate bicycle, pedestrian, or transit trips	At least one of the following within ¼ mile:	N/A							
		Parks and recreation, rivers, and trails	1	1	1	1	1	1	1	1
		Schools	1	1	1	1	1	1	0	0
		> 50 zero auto households	1	0	0	0	1	0	1	1
		High intersection density (red or orange on heat map	1	1	1	1	1	1	0	0
		high job density > 4,500 workers	1	1	1	1	0	0	0	0
		Complete Streets-compatible zoning district	1	1	1	1	1	1	1	1
Future Bicycle, Pedestrian, and Transit Generators	Areas that will develop into pedestrian, bicycle, and transit friendly districts based on future land use	Areas designated in Comprehensive Plan or other plans	1	0	1	1	1	1	0	0
Tourism	Areas where investment will support economic development	Historic District, art district, or where two or more tourist sites are within ¼ mile	1	1	1	1	1	0	0	0
Safety	Sidewalks	Provided on both sides	0	0	0	0	0	0	0	0
		Missing on one side	1							
		Missing on both sides	2							
	Bicycle Lanes	ADT < 3,000 or four-foot shoulder provided with volumes greater than 3,000 ADT	0	0	0	0	0	0	0	0
		Missing on volumes greater than 3,000 ADT	1	1	0	0	1	1	1	1
	Pedestrian/ Bicycle Three-Year Crash Analysis	0 crashes	0	2	2	2	0	2	2	2
		1 crash	1							
		2-4 crashes	2							
		5 or more crashes	3							
		Fatality	4							
Support Existing Multi-Modal Facilities	Proximity to Existing Sidewalk or Bicycle Lane	New sidewalk would connect to existing walk or extend an existing walk	1	1	1	1	1	1	1	1
		New bike facility would connect to existing bicycle facility or extend existing facility	1	1	1	1	0	1	1	0
	Transit	One or more routes located along roadway	3	3	3	3	3	3	3	3
		One or more routes traverse the roadway	1	1	1	1	1	1	1	1
Compatibility with Multimodal Transportation	Posted Speed	25-30 mph	2	1	2	1	1	1	1	1
		35 mph	1							
		40-45 mph	0							
		Over 45 mph	N/A							
	Traffic Volumes	Under 3,000 ADT	2	1	0	1	1	0	1	0
		3,000 ADT to 16,000 ADT	1							
		Over 16,000 ADT	0							
Equity	At least one of the following within ¼ mile: low-income, minority, or elderly/disabled residents (over 65), homes in need of repair	> 50 households below $25,000 annual income	1	1	1	1	0	1	1	1
		> 40% minority population	1	1	0	0	1	0	0	0
		> 20% age 65 and over population	1	1	1	1	0	0	0	0
		> 30% vacancy rate	1	1	0	0	1	0	0	0
Total			38	21	19	19	17	16	15	13

Table 6.1: Methodology for Project Prioritization

Figure 6.6: Existing Bicycle, Pedestrian, and Transit Generators



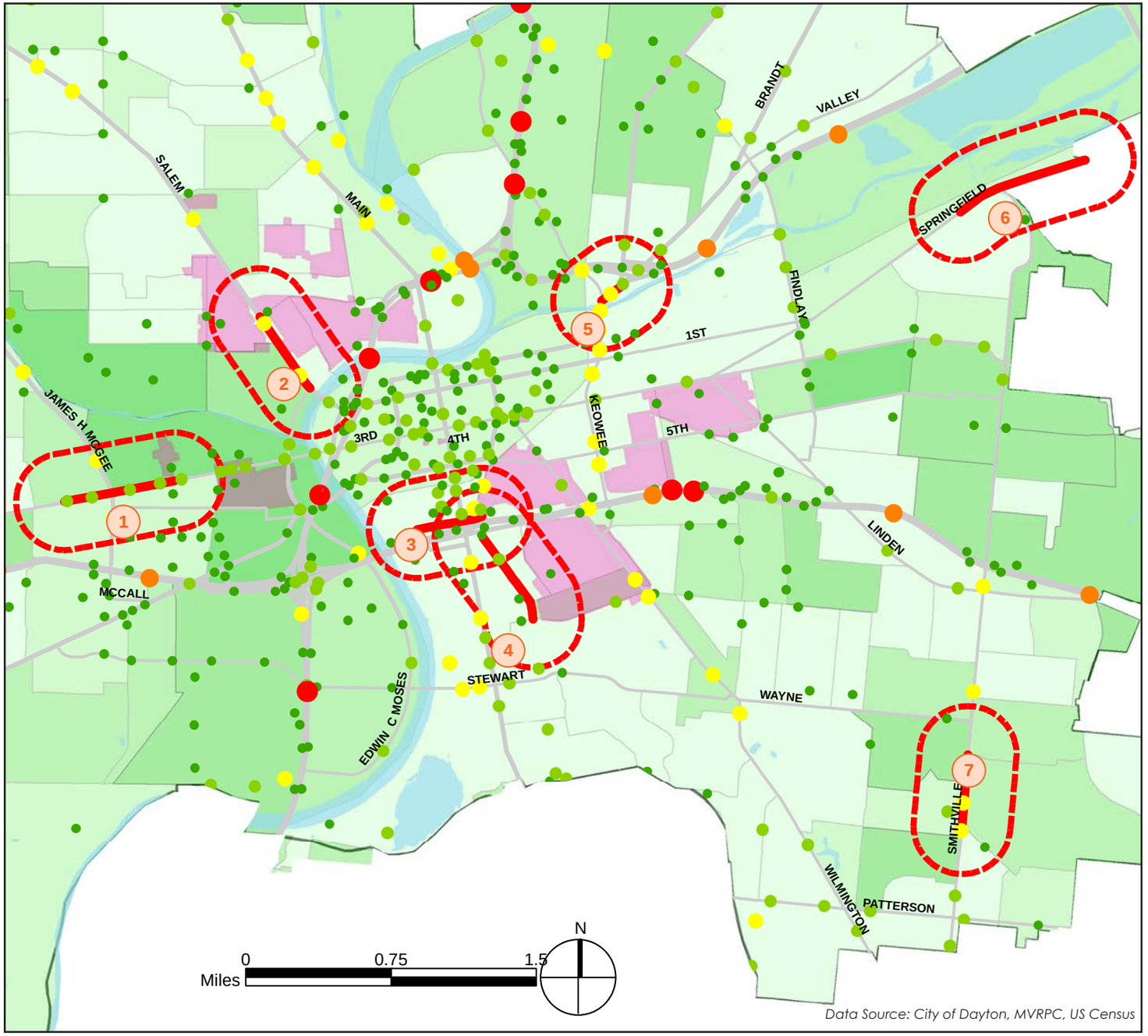
School
Trail
Parks and Open Space
2010 Employment (Workers by TAZ)
0 - 500
501 - 1000
1001 - 1500
1501 - 5000
5001 - 15000
Project Area
1/4 Mile Buffer
Major Roads
Corporation Boundary
Water

Figure 6.6 shows areas that currently generate bicycle, pedestrian, and transit trips: schools, trails, parks, and open space, and employment hubs.

Example Projects

1. W Third Street
2. Salem Avenue
3. Washington Street
4. Warren/Brown Streets
5. Valley Street
6. Springfield Street
7. Smithville Road

Figure 6.7: Existing Bicycle, Pedestrian, and Transit Generators, continued



Traffic Counts (AADT)

- 200 - 8000
- 8001 - 16000
- 16001 - 32000
- 32001 - 76000
- 76001 - 122000

Zero Auto Households (by Census Block)

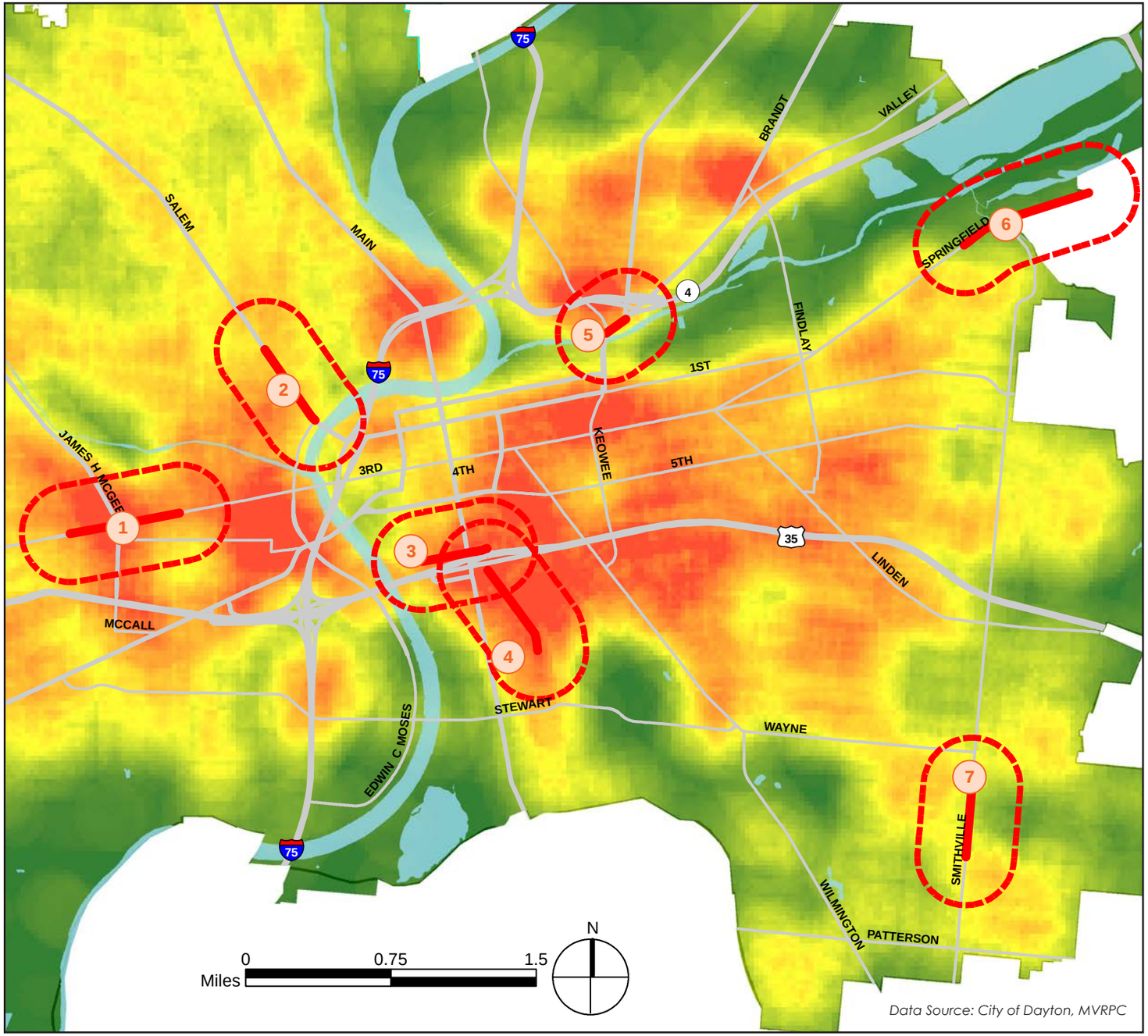
- 0
- 1 - 10
- 11 - 20
- 21 - 50
- 51 - 100
- Tourism (Historic Districts)
- Project Area
- 1/4 Mile Buffer
- Major Roads
- Corporation Boundary
- Water

Example Projects

1. W Third Street
2. Salem Avenue
3. Washington Street
4. Warren/Brown Streets
5. Valley Street
6. Springfield Street
7. Smithville Road

Figure 6.7 shows zero auto households and historic districts, two elements that contribute to bicycle, pedestrian, and transit trips. It also shows traffic volumes (Average Annual Daily Traffic).

Figure 6.8: Intersection Density



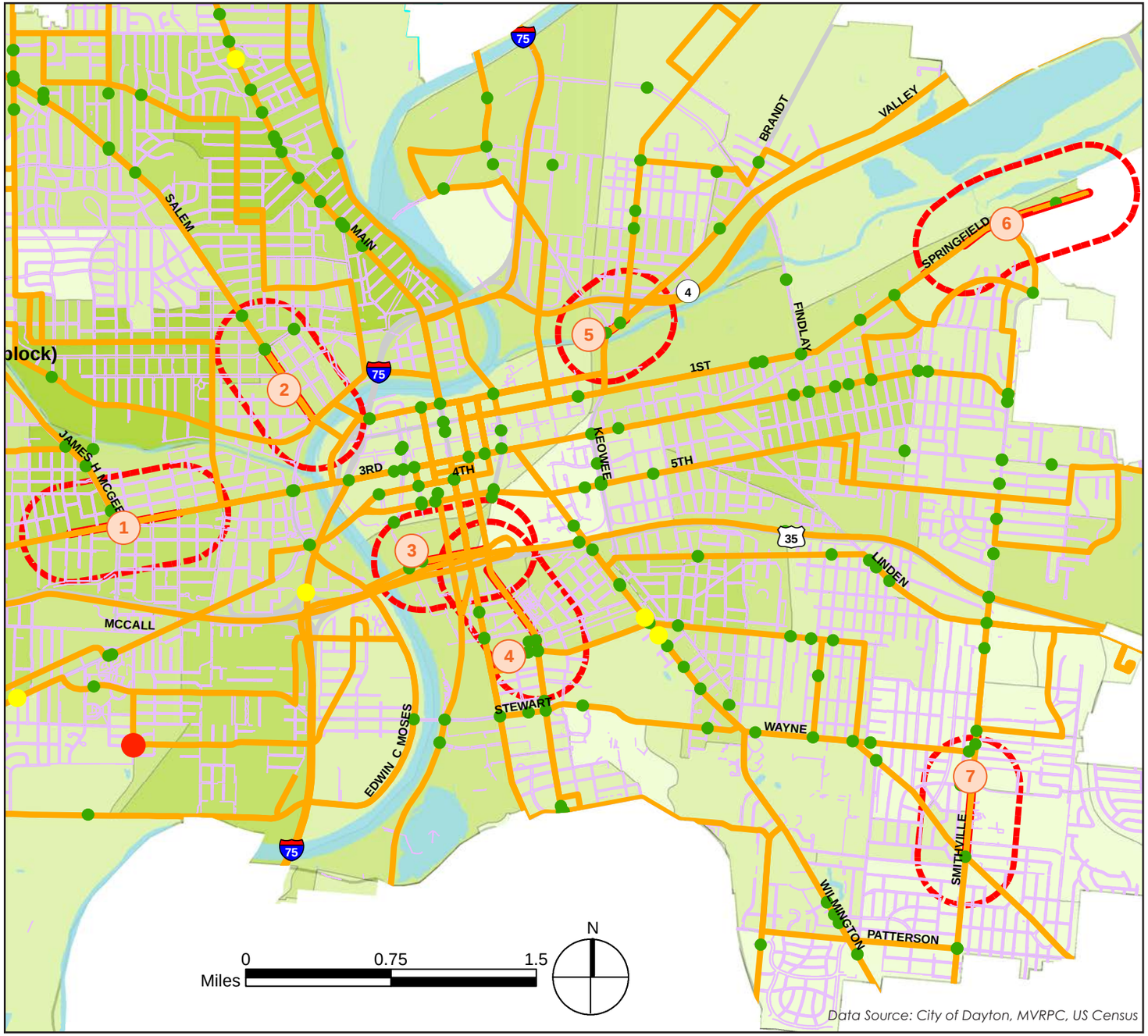
Intersection Density
High
Low
Project Area
1/4 Mile Buffer
Major Roads
Corporation Boundary
Water

Figure 6.8 shows intersection density, another element that contributes to bicycle, pedestrian, and transit trips.

Example Projects

1. W Third Street
2. Salem Avenue
3. Washington Street
4. Warren/Brown Streets
5. Valley Street
6. Springfield Street
7. Smithville Road

Figure 6.9: Existing Multimodal Facilities, Housing Vacancy, and Crash Sites



Housing vacancy rate (by census block)

- 0-10%
- 11-20%
- 21-30%
- 31-40%
- >41%

Pedestrian/bicyclist fatalities

- 0 (non-fatal crash)
- 1
- 2

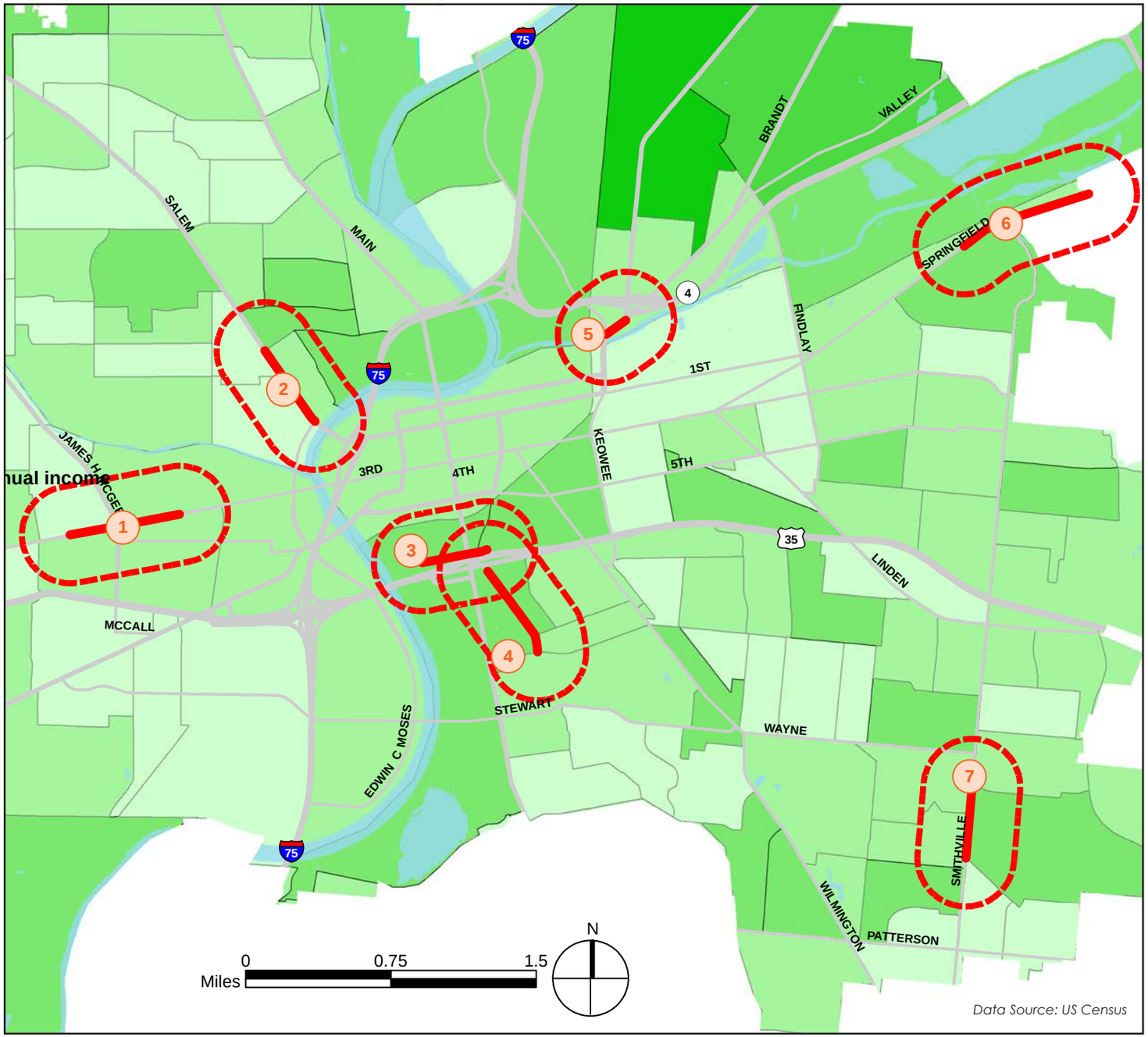
- Transit Routes
- Sidewalks
- Project Area
- 1/4 mile buffer
- Major Roads
- Corporation Boundary
- Water

Example Projects

1. W Third Street
2. Salem Avenue
3. Washington Street
4. Warren/Brown Streets
5. Valley Street
6. Springfield Street
7. Smithville Road

Figure 6.9 shows existing multimodal facilities: transit routes and sidewalks. It also shows elements that deter bicycle, pedestrian, and transit trips: housing vacancy rate and pedestrian/bicyclist crash locations.

Figure 6.10: Income by Census Block



Households Below $25,000 Annual Income (by Census Block)

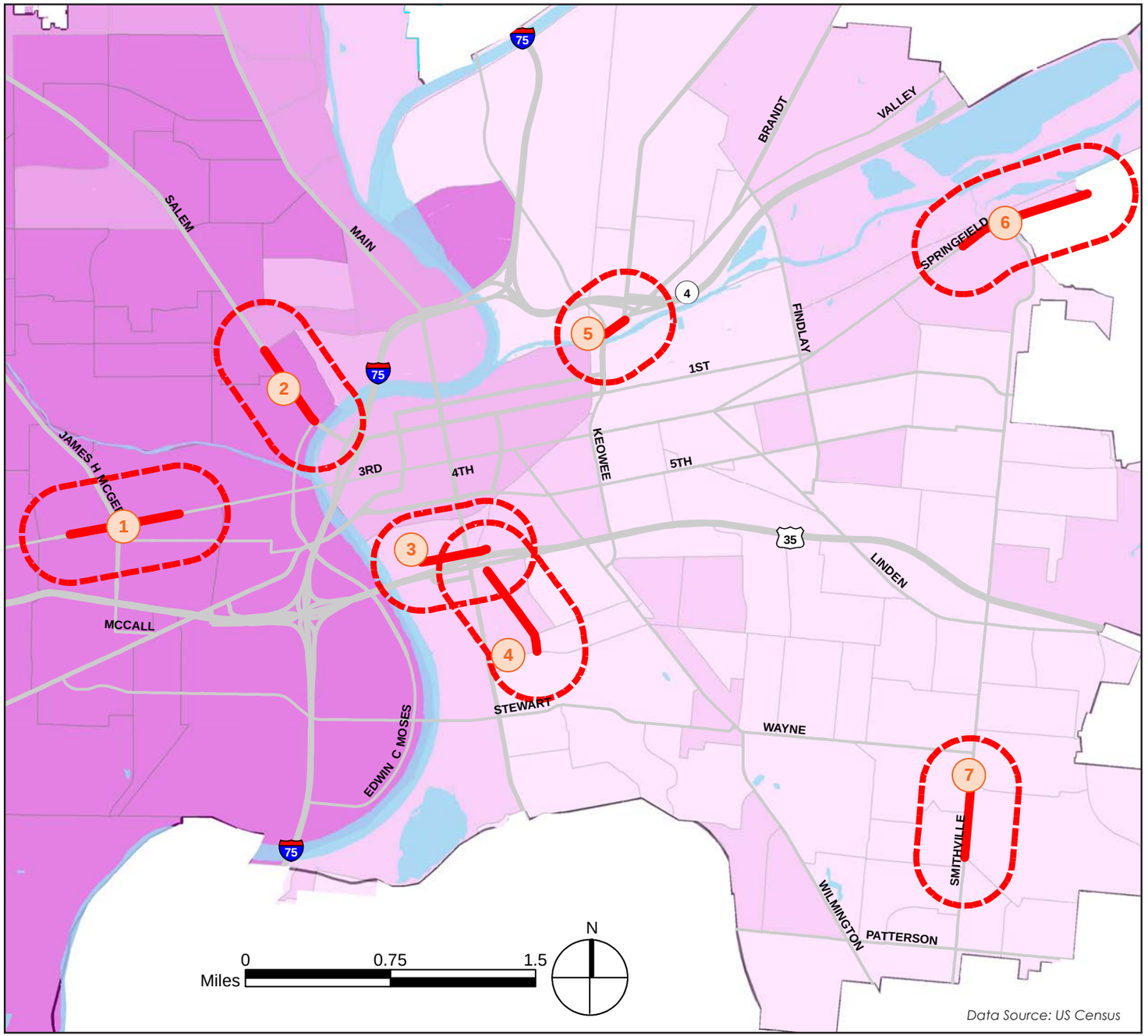
- 0 - 20
- 21 - 50
- 51 - 100
- 101 - 150
- >150
- Project Area
- 1/4 Mile Buffer
- Major Roads
- Corporation Boundary
- Water

Figure 6.10 shows low-income households, an important factor when considering a project's impact on equity.

Example Projects

1. W Third Street
2. Salem Avenue
3. Washington Street
4. Warren/Brown Streets
5. Valley Street
6. Springfield Street
7. Smithville Road

Figure 6.11: Race by Census Block



Minority Population (by Census Block)

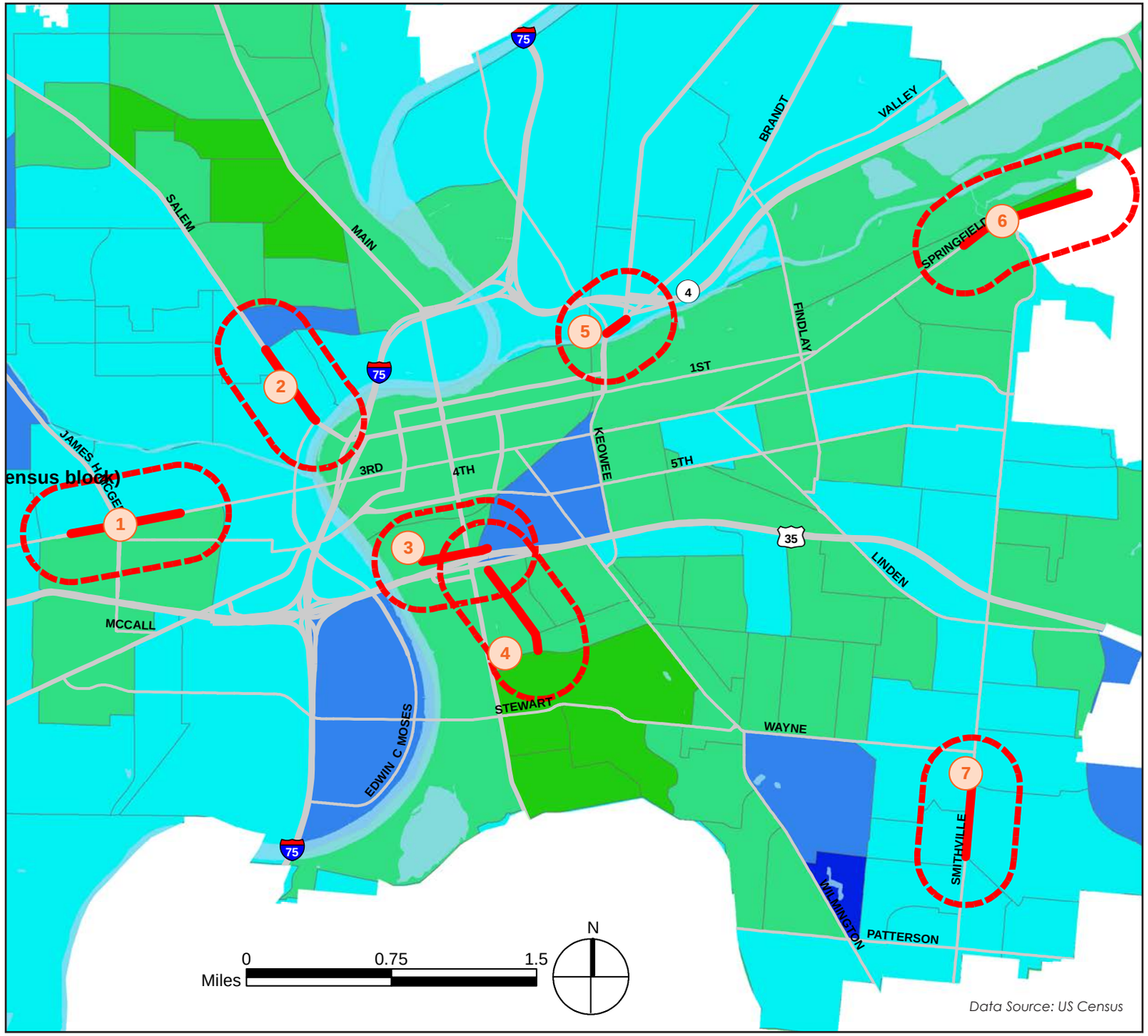
- 0-20%
- 21-40%
- 41-60%
- 61-80%
- 81-100%
- Project Area
- 1/4 Mile Buffer
- Major Roads
- Corporation Boundary
- Water

Figure 6.11 shows minority population, an important factor when considering a project's impact on equity.

Example Projects

1. W Third Street
2. Salem Avenue
3. Washington Street
4. Warren/Brown Streets
5. Valley Street
6. Springfield Street
7. Smithville Road

Figure 6.12: Age by Census Block



Population 65 Years and Over (by Census Block)

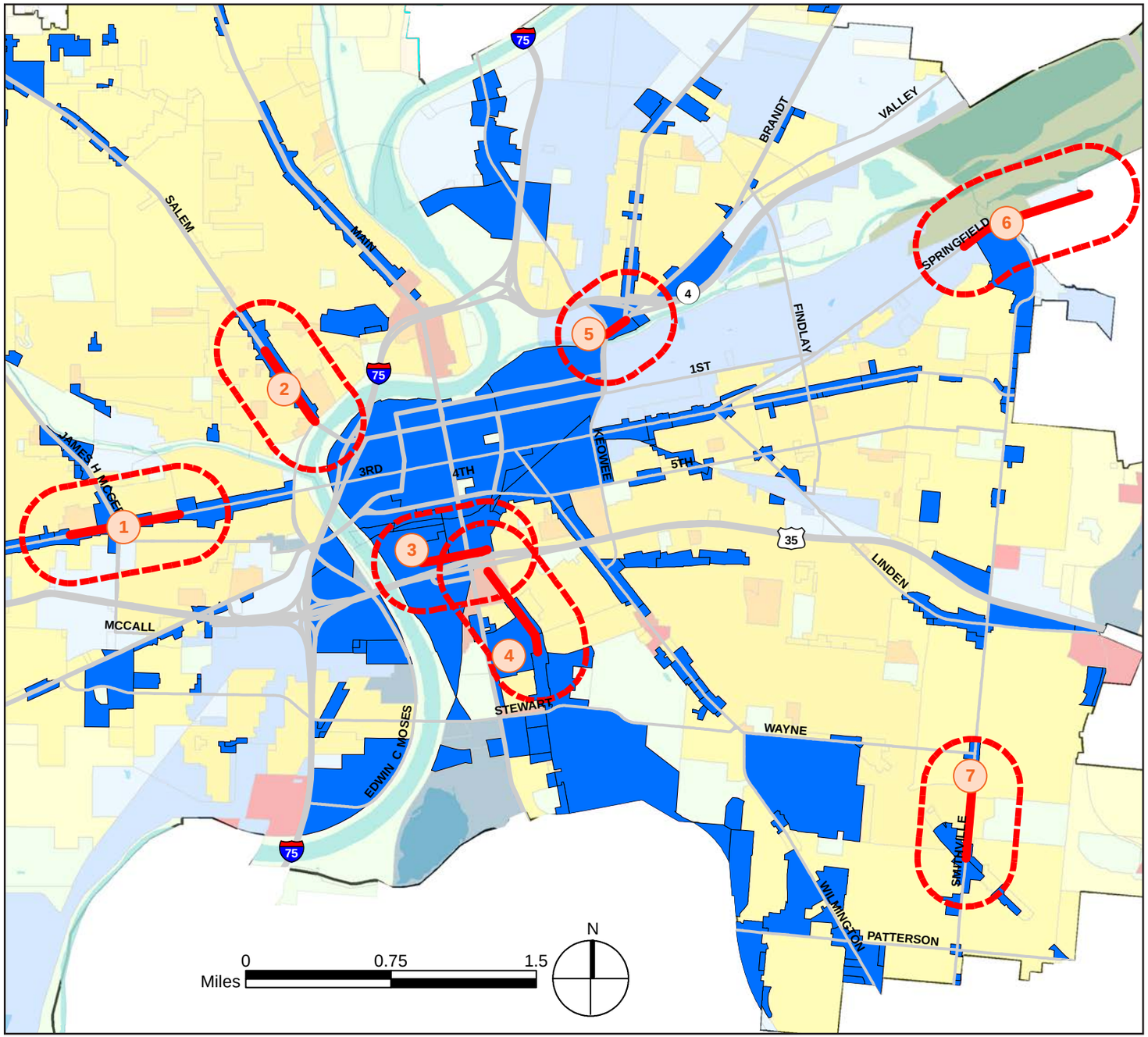
- 0-5%
- 6-10%
- 11-20%
- 21-40%
- >41%
- Project Area
- 1/4 Mile Buffer
- Major Roads
- Corporation Boundary
- Water

Figure 6.12 shows elderly populations, an important factor when considering a project's impact on equity.

Example Projects

1. W Third Street
2. Salem Avenue
3. Washington Street
4. Warren/Brown Streets
5. Valley Street
6. Springfield Street
7. Smithville Road

Figure 6.13: Complete Street-Compatible Zoning Districts



- Complete Streets-Compatible Zoning Districts
- Suburban Residential (SR-1)
- Suburban Residential (SR-2
- Eclectic Residential (ER-3)
- Eclectic Residential (ER-4)
- Mature Residential (MR-5)
- Suburban Multi-Family (SMF)
- Eclectic Multi-Family (EMF)
- Mature Multi-Family (MMF)
- Manufactured Home (MH)
- Central Business District (CBD)
- Urban Business District (UBD)
- Mature Neighborhood Commercial (MNC)
- Eclectic Neighborhood Commercial (ENC)
- Suburban Neighborhood Commercial (SNC)
- Mature General Commercial (MGC)
- Eclectic General Commercial (EGC)
- Suburban General Commercial (SGC)
- Transitional (T)
- Light Industrial (I-1)
- General Industrial (I-2)
- Business Park (BP)
- Campus-Institutional (CI)
- Well Head Operation (WO)
- Open Space (OS)
- Project Area
- 1/4 Mile Buffer
- Major Roads
- Corporation Boundary
- Water

Example Projects

1. W Third Street
2. Salem Avenue
3. Washington Street
4. Warren/Brown Streets
5. Valley Street
6. Springfield Street
7. Smithville Road

Figure 6.13 shows Complete Street-compatible zoning districts:

- Eclectic Neighborhood Commercial
- Mature Neighborhood Commercial
- Mixed-Use Hub
- Central Business District
- Urban Business District
- Campus Institutional

CHAPTER 7: CONCLUSION

Adopting a Complete Streets plan will continue Dayton's proud heritage of innovation. In 1892, a pair of brothers decided to capitalize on the bicycle craze sweeping the country, and opened a bike shop just west of Downtown. Orville and Wilbur Wright were strong proponents of what is now known as active transportation, and were responsible in part for the proliferation of bicyclists on Dayton's streets. More than 120 years later, the demand for bikeable, walkable, livable streets is resurgent, and implementing Complete Street projects will accommodate this demand.

Complete Streets are a means to an end. When a city can offer its residents safe and convenient travel no matter what mode they choose, people are more likely to shop, work, and recreate throughout town. A street full of people, not just cars, is a livable street, which entices residents, businesses, and visitors alike, in turn attracting more people. As detailed throughout this plan, Complete Streets have grown local economies, reduced crime, increased public health, and guided cities towards a brighter future.

Dayton Transportation Plan 2040 describes Dayton's roadway network today, and what it could become in the future. It provides the means to achieve a more sustainable, multimodal, livable travel environment, using clear and detailed proposals to guide the City during implementation. Were Dayton to adopt the plan today, it could take several immediate steps to maintain momentum, such as scoring existing roadway improvement projects using the methodology for project prioritization and acting on near-term recommendations listed in Chapter Five.

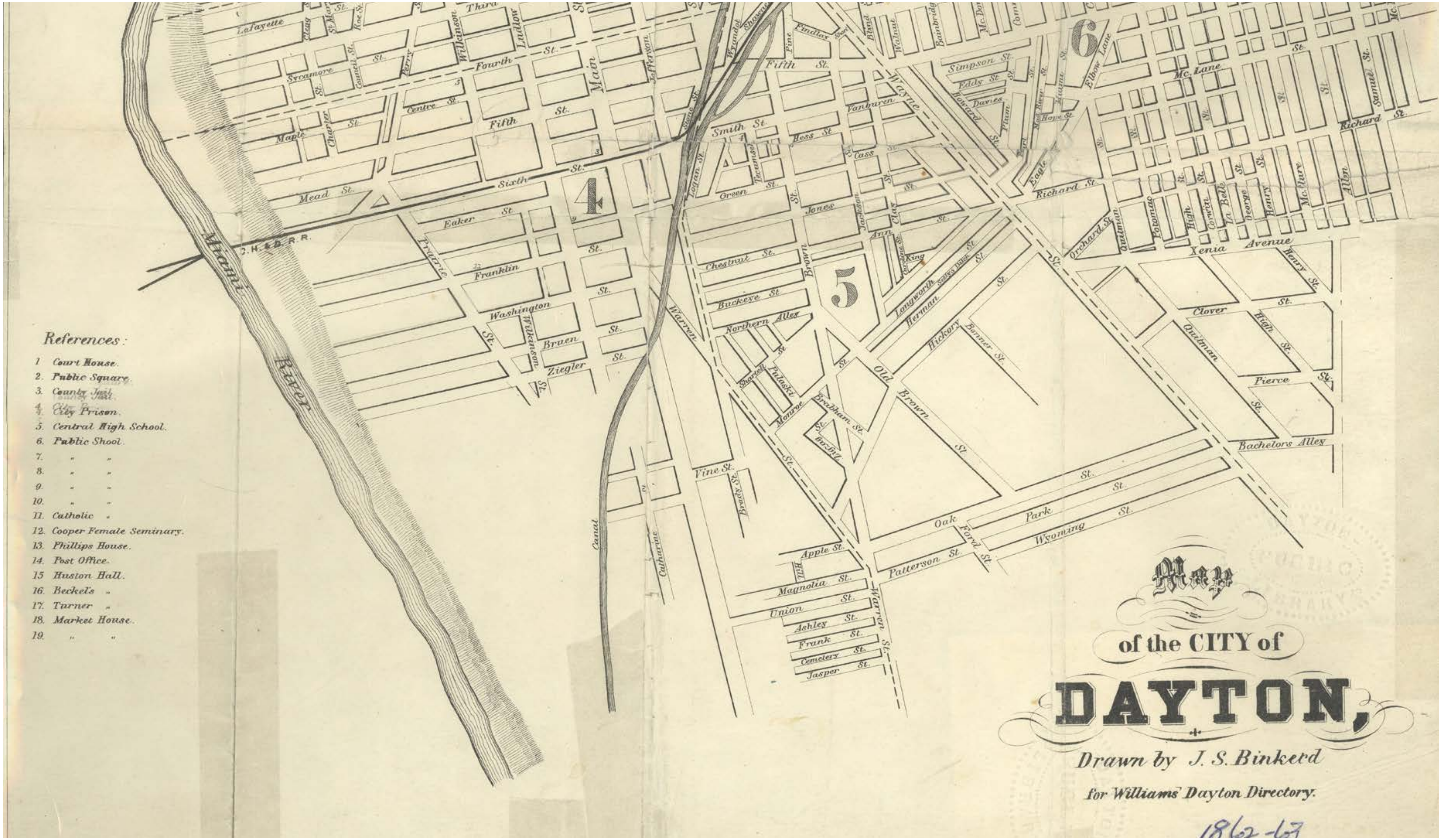
As the map on the following page shows, Dayton's transportation network has evolved significantly in the past 150 years. Major changes in transportation technology will likely transform cities across the world in the coming decades. If Daytonians could catch a glimpse of their city in 2040, they would see drastic changes alongside familiar sights. A fleet of driverless shuttles circulating around Downtown, for example, or a Fifth Street in the Oregon District that is full of bikes and pedestrians, closed off to vehicular traffic. Express transit routes with dedicated lanes are filled with electric buses, cutting travel time from the urban core to outlying areas down to minutes. And a surge of high-density, mixed-use development has repopulated forgotten neighborhoods, bringing new life to their streets.

These scenes may strike some as fanciful, but they are not beyond Dayton's reach. Implementing Dayton Transportation Plan 2040 will guide Dayton to a better tomorrow, setting the stage for improvements over the next 25 years. Dayton's commitment to Complete Streets shows a willingness to rethink transportation's role in the City's ongoing development, and to act as a regional leader in creative transportation solutions.

If Dayton takes the right steps now, it too, will be a successful case study for other cities to follow. While 25 years may sound like a long time, it is only a blink of the eye in the lifespan of a city. Dayton must act swiftly yet thoughtfully as it moves forward with Dayton Transportation Plan 2040.

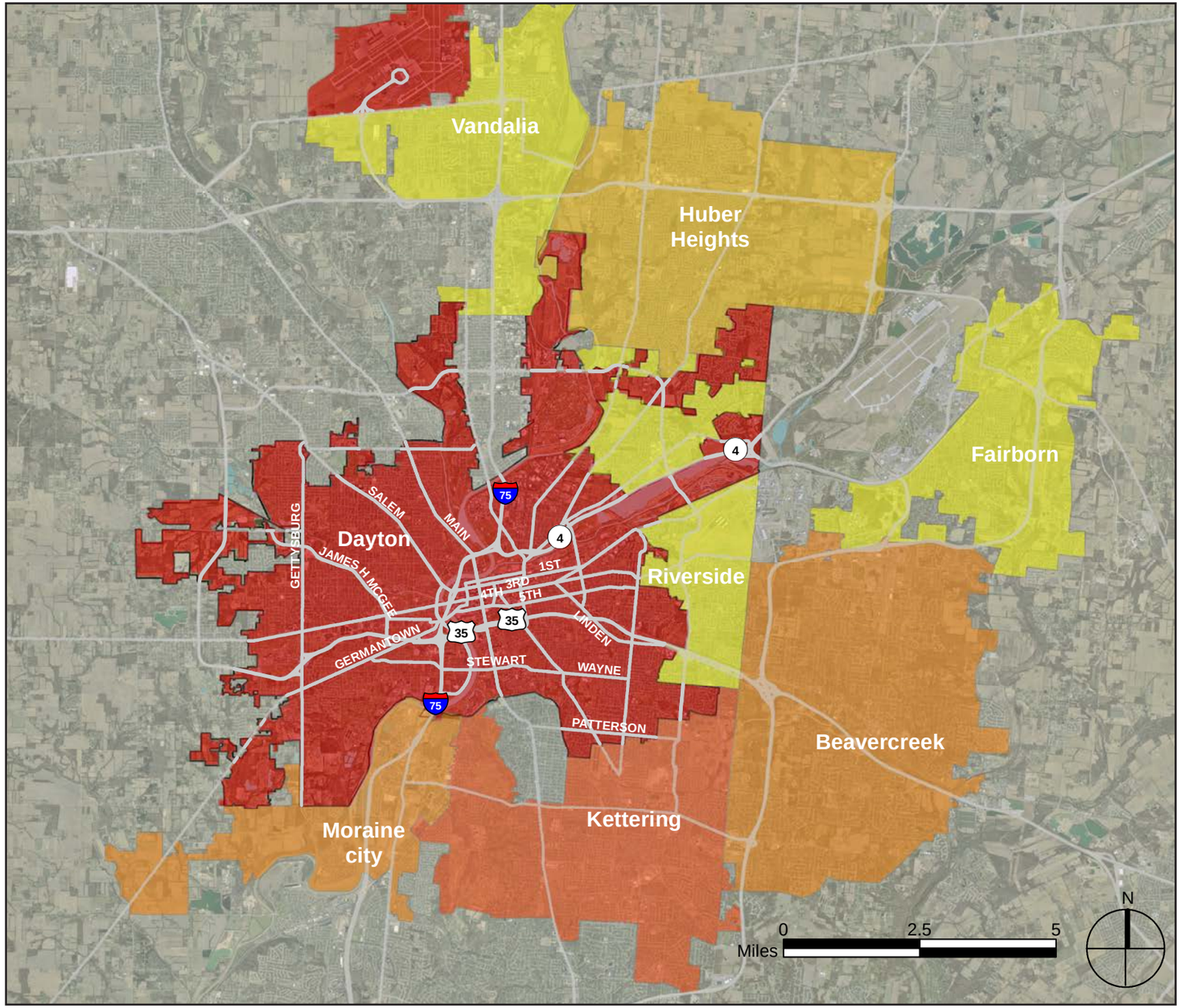
Figures 7.1-7.2: Downtown Main Street, then and now

Figure 7.3:1862 Map of Dayton



APPENDIX A: TRANSPORTATION NEEDS ASSESSMENT, ADDITIONAL MAPS AND TABLES

Figure A.1: Where Dayton Workers Live (by City)



Most Dayton workers live within the City, followed in descending order by Kettering, Beavercreek, and Moraine. Most commuting, therefore, takes place within City limits on major roads and highways. However, these maps also show Dayton's role in the region as an economic hub, attracting workers from all of its suburbs and from cities as far as Cincinnati and Columbus. Dayton residents work in at least ten different zip codes in the region.

Where Dayton Workers Live (by City)

- 677 - 819
- 820 - 1119
- 1120 - 1599
- 1600 - 3000
- 3001 - 15100
- Columbus: 1,525
- Cincinnati: 812
- Major Roads
- Corporation Boundary
- Water

Figure A.2: Where Dayton Residents Work (by Zip Code)

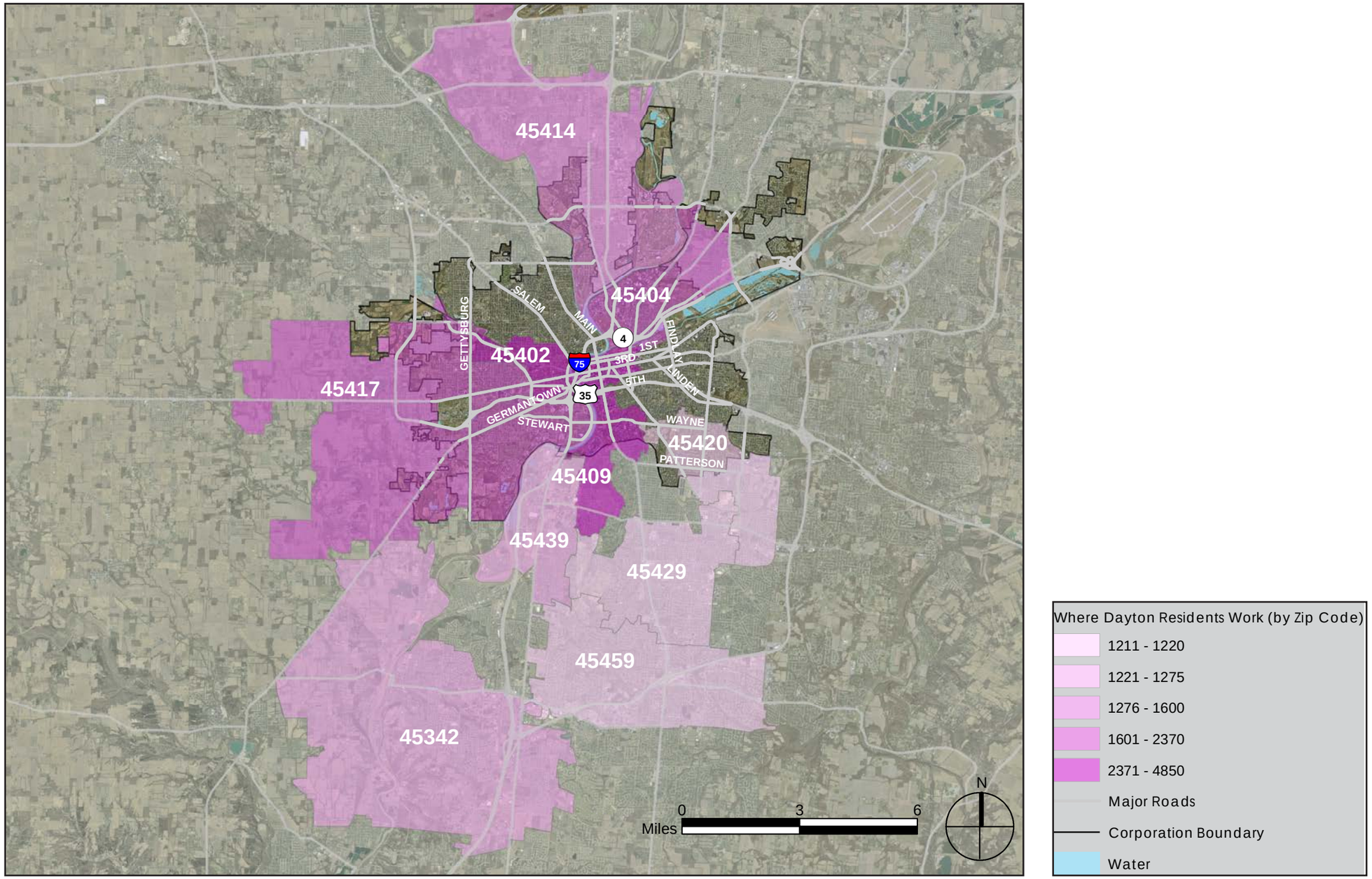


Table A.1: Large and Medium Mixed-Use Existing Conditions Inventory

	N Main St	Brown St
	Victor Ave to Marathon Ave	E Stewart St to Jasper St
Public Realm		
Curb to Curb Width (ft)	42	39
ROW (ft)	70	63
Speed Limit (MPH)	35	35
Number of Travel Lanes	4	3
Traffic Volume (AADT)	17,000	13,000
Surface Condition	Good	Excellent
Directionality	Two Way	Two Way
Parking	None	None
Bicycle Facilities	None	Bicycle Lanes
Sidewalks	Medium	Wide
ADA Curb Ramps	Yes	Yes
Marked Crosswalks	Signalized	Textured, Signalized
Signalized Intersections	Yes	Yes
Transit	Yes	Yes
Trees	Mature	None
Tree Lawn	None	None
Traffic Calming	None	None
Curb Cuts	Rare	Rare
Street Furniture	None	Yes
Lighting	Auto-Scaled	Decorative
Private Realm		
Land Use within 1/4 mile	Residential, Commercial, Open Space	Commercial, Institutional, Residential, Open Space
Zoning	Mature Neighborhood Commercial	Mature Neighborhood Commercial
Development Pattern	General Urban	Urban Center
Height (Stories)	1-2	1-2
Building Entrance	Front	Front
Setback (ft)	0	0-40
Parking Placement	Rear 20 Marked Spaces (two large unmarked areas)	Rear and Side 173 Marked Spaces

Figure A.3: Large Mixed-Use Aerial

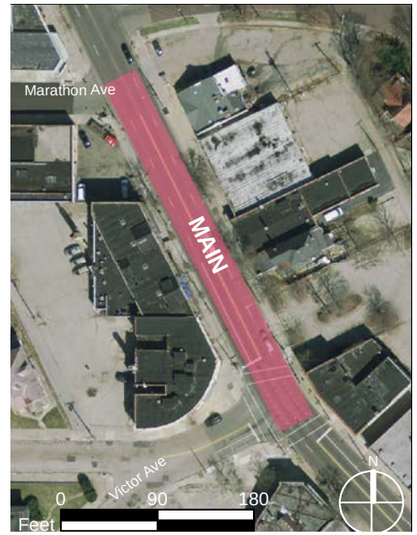


Figure A.4: Large Mixed-Use Street View

Figure A.5: Medium Mixed-Use Aerial

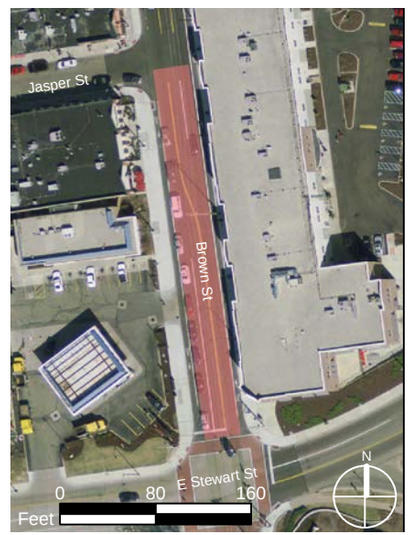


Figure A.6: Medium Mixed-Use Street View

Table A.2: Small Mixed-Use and Large Industrial Existing Conditions Inventory

	Fifth St	Springfield St
	Brown St to Wayne Ave	Winston Ave to McFadden Ave
Public Realm		
Curb to Curb Width (ft)	22-30	40
ROW (ft)	60	65
Speed Limit (MPH)	25	40
Number of Travel Lanes	2	4
Traffic Volume (AADT)	N/A	N/A
Surface Condition	Brick, Good	Good
Directionality	Two Way	Two Way
Parking	Parallel	None
Bicycle Facilities	None	None
Sidewalks	Medium	Narrow
ADA Curb Ramps	Yes	Partial
Marked Crosswalks	None	None
Signalized Intersections	Yes	None
Transit	Yes	Yes
Trees	Yes	Partial, mature
Tree Lawn	None	Yes
Traffic Calming	Curb Extensions	None
Curb Cuts	Rare	Frequent
Street Furniture	Partial	None
Lighting	Decorative, Pedestrian-Scaled	Auto-Scaled
Private Realm		
Land Use within 1/4 mile	Residential, Commercial, Industrial, Institutional, Open Space	Industrial, Commercial, Open Space, Residential
Zoning	Mature Neighborhood Commercial	General Industrial
Development Pattern	Urban Center	General Urban
Height (Stories)	1-3	1
Building Entrance	Front	Front and Side
Setback (ft)	0	8-80
Parking Placement	Rear and Side 266 Marked Spaces	Front, Side, and Rear 150 Marked and Unmarked Spaces

Figure A.7: Small Mixed-Use Aerial

Figure A.8: Small Mixed-Use Street View

Figure A.9: Large Industrial Aerial

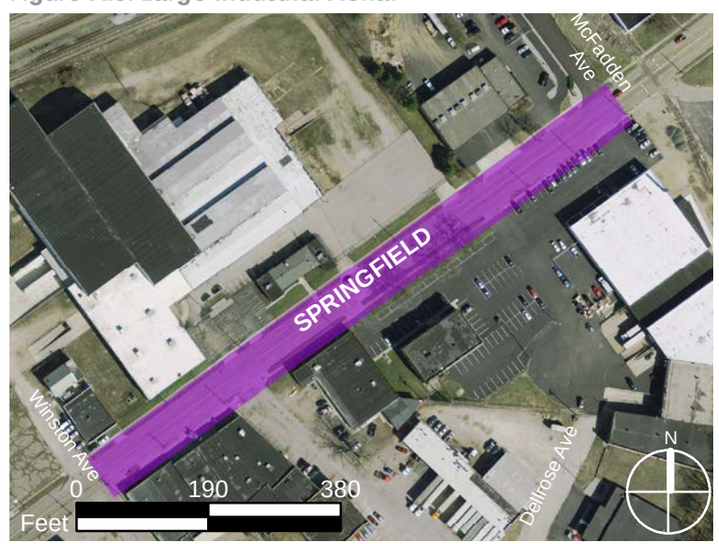


Figure A.10: Large Industrial Street View

Table A.3: Very Large and Large Commuter Existing Conditions Inventory

	James H McGee Blvd	Main St
	Hoover Ave to Rosedale Dr	W Burton Ave to Delaware Ave
Public Realm		
Curb to Curb Width (ft)	72	42
ROW (ft)	130	60
Speed Limit (MPH)	35	35
Number of Travel Lanes	4	4
Traffic Volume (AADT)	16,500	26,900
Surface Condition	Excellent	Good
Directionality	Two Way	Two Way
Parking	None	None
Bicycle Facilities	None	None
Sidewalks	Narrow	Medium
ADA Curb Ramps	Yes	Yes
Marked Crosswalks	Yes	None
Signalized Intersections	Yes	Yes
Transit	Yes	Yes
Trees	Forested	None
Tree Lawn	Yes	None
Traffic Calming	None	None
Curb Cuts	Rare	Frequent
Street Furniture	None	None
Lighting	Auto-Scaled	Auto-Scaled
Private Realm		
Land Use within 1/4 mile	Residential, Commercial, Industrial, Open Space	Residential, Commercial, Open Space
Zoning	Transitional	Mature Neighborhood Commercial
Development Pattern	General Urban	General Urban
Height (Stories)	1-2	1
Building Entrance	Front	Front and Side
Setback (ft)	60-138 ft	10-88
Parking Placement	Front, Rear, and Side (one large unmarked area)	Front 145 Marked Spaces
Realm Interactions	Public Defines Private	Public Defines Private

Figure A.11: Very Large Commuter Aerial

Figure A.12: Very Large Commuter Street View

Figure A.13: Large Commuter Aerial

Figure A.14: Large Commuter Street View

Table A.4: Large Neighborhood Existing Conditions Inventory

	N Broadway St	
	Edgewood Ave to Superior Ave	W 2nd St to W 1st St
Public Realm		
Curb to Curb Width (ft)	45	45
ROW (ft)	70	66
Speed Limit (MPH)	35	35
Number of Travel Lanes	2	2
Traffic Volume (AADT)	6,400	6,100
Surface Condition	Good	Good
Directionality	Two Way	Two Way
Parking	Parallel	None
Bicycle Facilities	None	None
Sidewalks	Narrow	Narrow
ADA Curb Ramps	Yes	Yes
Marked Crosswalks	Partial	None
Signalized Intersections	None	None
Transit	Yes	Yes
Trees	Mature and Young	None
Tree Lawn	Yes	Partial
Traffic Calming	None	None
Curb Cuts	Frequent	Rare
Street Furniture	Minimal	None
Lighting	Auto-Scaled	Auto-Scaled
Private Realm		
Land Use within 1/4 mile	Residential, Open Space, Commercial	Residential, Institutional, Commercial, Open Space
Zoning	Mature Residential	Mature Residential
Development Pattern	General Urban	General Urban
Height (Stories)	1-2	1-2
Building Entrance	Front	Front
Setback (ft)	30	0-50
Parking Placement	Rear Private Garages	Front and Side Fenced Private Lot
Realm Interactions	Private Defines Public	Private Defines Public

Figure A.15: Large Neighborhood Aerial 1

Figure A.16: Large Neighborhood Street View 1

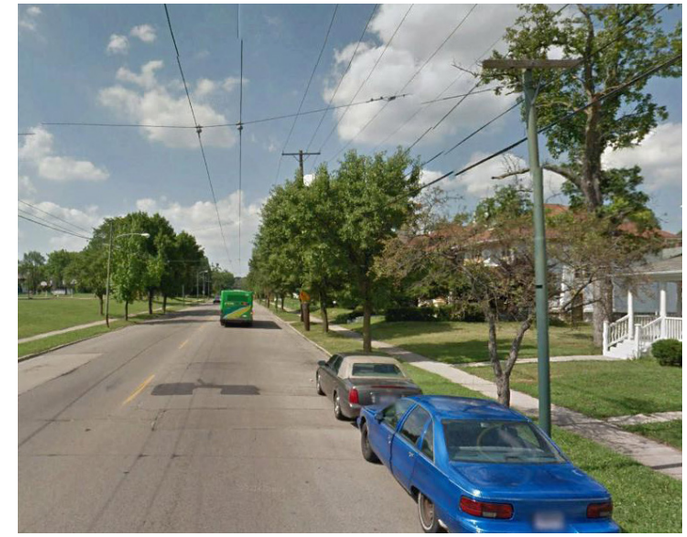


Figure A.17: Large Neighborhood Aerial 2

Figure A.18: Large Neighborhood Street View 2

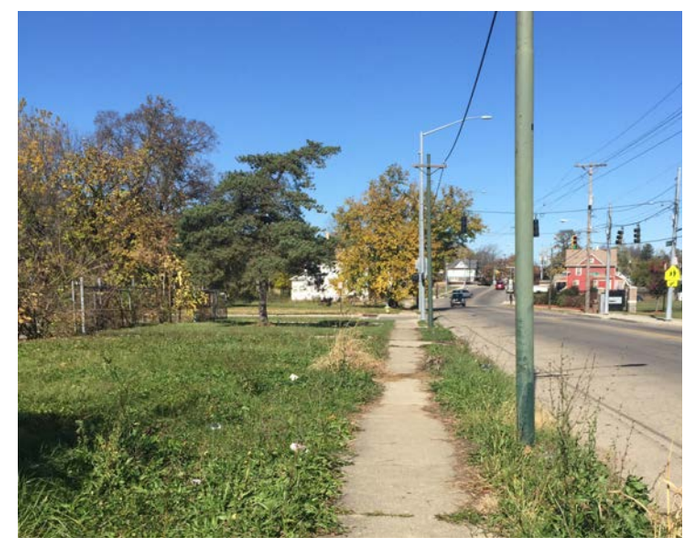


Table A.5: Medium Neighborhood Existing Conditions Inventory

	Fairview Ave	Russet Ave
	Cherry Dr to Birchwood Ave	Farnham Ave to Arcardia Blvd
Public Realm		
Curb to Curb Width (ft)	35	36
ROW (ft)	58	50
Speed Limit (MPH)	25	25
Number of Travel Lanes	2	2
Traffic Volume (AADT)	5,000	N/A
Surface Condition	Fair	Good
Directionality	Two Way	Two Way
Parking	Parallel	Parallel
Bicycle Facilities	None	None
Sidewalks	Narrow	Narrow
ADA Curb Ramps	None	Partial
Marked Crosswalks	None	None
Signalized Intersections	None	None
Transit	Yes	None
Trees	Mature	Mature
Tree Lawn	Yes	Yes
Traffic Calming	None	None
Curb Cuts	Rare	Frequent (one side only)
Street Furniture	None	None
Lighting	Infrequent, Auto-Scaled	Auto-Scaled
Private Realm		
Land Use within 1/4 mile	Residential, Institutional, Commercial	Residential
Zoning	Eclectic Residential	Eclectic and Suburban Residential
Development Pattern	General Urban	Suburban
Height (Stories)	2	2
Building Entrance	Front	Front
Setback (ft)	20	30-40
Parking Placement	Rear (Garages)	Side
Realm Interactions	Private Defines Public	Neutral

Figure A.20: Medium Neighborhood Street View 1

Figure A.21: Medium Neighborhood Aerial 2

Figure A.21: Medium Neighborhood Aerial 2

Figure A.22: Medium Neighborhood Street View 2

Table A.6: Small Neighborhood Existing Conditions Inventory

	Clay St	Lilac Ave
	Van Buren St to 5th St	Kammer Ave to Hoover Ave
Public Realm		
Curb to Curb Width (ft)	28	20
ROW (ft)	54	30
Speed Limit (MPH)	25	25
Number of Travel Lanes	2	2
Traffic Volume (AADT)	N/A	N/A
Surface Condition	Fair	Good
Directionality	Two Way	Two Way
Parking	Parallel	None
Bicycle Facilities	None	None
Sidewalks	Narrow	None
ADA Curb Ramps	None	None
Marked Crosswalks	None	None
Signalized Intersections	None	None
Transit	None	None
Trees	Mature	Partial
Tree Lawn	Yes	None
Traffic Calming	Yes	None
Curb Cuts	Rare	Frequent
Street Furniture	None	None
Lighting	Decorative, Pedestrian-Scaled	Auto-Scaled
Private Realm		
Land Use within 1/4 mile	Residential, Commercial, Industrial, Open Space	Residential, Commercial, Institutional, Industrial
Zoning	Mature Residential	Suburban Residential
Development Pattern	Urban Center	Suburban
Height (Stories)	2-3	1-2
Building Entrance	Front	Front
Setback (ft)	0-10	20-40
Parking Placement	Rear Private Garages	Front and Side Private Garages
Realm Interactions	Private Defines Public	Private Defines Public

Figure A.23: Small Neighborhood Aerial 1

Figure A.24: Small Neighborhood Street View 1

Figure A.25: Small Neighborhood Aerial 2

Figure A.26: Small Neighborhood Street View 2

APPENDIX B: STREET TYPOLOGY ASSIGNMENTS AND MINIMUM/MAXIMUM RIGHT-OF-WAY WIDTHS

Table C.1: Base/Minimum Complete Street Facilities, for Right-of-Way Width Estimation (total width, in feet)

	Mixed Use				Commuter		Industrial				Neighborhood		
	Very Large	Large	Medium	Small	Very Large	Large	Very Large	Large	Medium	Small	Large	Medium	Small
Pedestrian Facilities													
Sidewalk	16	16	10	10	10	10	10	10	10	10	10	10	10
Bicycle Facilities													
Shared Lane Marking	-	-	-	-	-	-	-	4	4	-	4	-	-
Standard Bicycle Lane	-	10	10	-	-	10	-	-	-	-	-	-	-
Protected Bicycle Lane	14	-	-	-	14	-	14	-	-	-	-	-	-
Traffic Calming													
Median/Ped Refuge Island	10	-	-	-	-	-	-	-	-	-	-	-	-
On-Street Parking	8	8	8	8	-	-	-	-	-	-	16	8	8
Amenity Zone													
Lawn/Trees/Furniture	6	6	6	-	6	6	8	6	-	-	8	-	-
Travel Lanes													
Through Travel Lane	40	20	20	20	40	20	44	22	22	20	20	20	20
Turn Lanes/TWLTL/Bus	10	10	-	-	10	10	10	10	-	-	-	-	-
Minimum Calculated ROW:	104	70	54	38	80	56	86	52	36	30	58	38	38
Existing ROW:	105-115	70-89	60-69	40-59	80-150	60-79	>105	60-105	40-59	30-40	60-70	40-59	30-55

Table C.2: Maximum Vehicle Travel Zone Width, for Right-of-Way Width Estimate (total width, in feet)*

	Mixed Use				Commuter		Industrial				Neighborhood		
	Very Large	Large	Medium	Small	Very Large	Large	Very Large	Large	Medium	Small	Large	Medium	Small*
Vehicle Zone													
Number of Through Lanes	6	4	2	2	6	4	4	2	2	2	2	2	2
Width of Through Lanes	12	12	12	12	12	12	14	14	14	14	12	12	12
Number of Turn Lanes/TWLTL	1	1	1	1	1	1	1	1	1	0	1	0	0
Width of Turn Lanes/TWLTL	14	14	14	14	14	14	14	14	14	14	12	12	12
Number of Bus Lanes	2	2	0	0	2	2	0	0	0	0	0	0	0
Width of Bus Lanes	14	14	14	14	14	14	14	14	14	14	12	12	12
Vehicle Zone Max Width:	114	90	38	38	114	90	70	42	42	28	36	24	24

*Max width for travelling vehicle facilities only; Does not include right-of-way width for on-street parking, bicycle facilities, sidewalks, and other amenities.

Note – Abreviations Used

NCL – Northern Corporate Limit	N.S. – North Side
SCL – Southern Corporate Limit	S.S. – South Side
ECL – Eastern Corporate Limit	E.S. – East Side
WCL – Western Corporate Limit	W.S. – West Side

Table C.3: Street Typology Assignments & Minimum/Maximum Right-of-Way Widths

Facility Name	Limits	Existing Distance to Centerline (ft)	Existing Total ROW Width (ft)	Typology Assignment	Minimum ROW Width (ft)	Maximum Vehicle Zone Width (ft)
Abbey Avenue	McCall Street to West Third Street	25	50	Medium Industrial	36	42
Arbor Avenue	Wyoming Street to Wayne Avenue	25	50	Medium Neighborhood	38	24
Arbor Boulevard	Carillon Boulevard to SCL	35	70	Large Industrial	52	42
Brandt Pike	Valley Street to Woodsdale Road	40	80	Large Neighborhood	58	36
Brandt Pike	Woodsdale Road to Kitridge Road	45	90	Large Mixed Use	70	90
Bridge Street	James H. McGee Blvd. to Riverview Avenue	25	50	Medium Neighborhood	38	24
Broadway Street	Harvard Boulevard to West Third Street	37.5	75	Large Neighborhood	58	36
Broadway Street	West Third Street to SCL	33	66	Various, See Below	-	-
Broadway Street	West Third Street to Germantown Street	33	66	Large Neighborhood	58	36
Broadway Street	Germantown Street to SCL	33	66	Large Industrial	52	42
Brooklyn Avenue	West Third Street to Hoover Avenue	25	50	Medium Neighborhood	38	24
Brown Street	Warren Street to Stewart Street	35	70	Large Mixed Use	70	90
Brown Street	Stewart Street to SCL	33	66	Medium Mixed Use	54	38
Brumbaugh Boulevard	S.R. 49 to Hillcrest Avenue	45	90	Large Neighborhood	58	36
Buckeye Street	Warren Street to Wayne Avenue	25	50	Medium Neighborhood	38	24
Burkhardt Avenue	East Fifth Street to Corporate Limit	25	50	Medium Neighborhood	38	24
Campbell Street	Albany Street to West Stewart Street	25	50	Various, See Below	-	-
Campbell Street	Albany Street to Pontiac Avenue	25	50	Medium Industrial	36	42
Campbell Street	Pontiac Avenue to West Stewart Street	25	50	Medium Neighborhood	38	24
Carillon Boulevard	Patterson Boulevard to SCL	35	70	Large Mixed Use	70	90

Facility Name	Limits	Existing Distance to Centerline (ft)	Existing Total ROW Width (ft)	Typology Assignment	Minimum ROW Width (ft)	Maximum Vehicle Zone Width (ft)
Catalpa Drive	Riverview Avenue to Hillcrest Avenue	30	60	Large Neighborhood	58	36
Catalpa Drive	Hillcrest Avenue to Rosemary Avenue	35	70	Large Neighborhood	58	36
Chambersburg Road	Rip Rap Road to ECL	40	80	Large Industrial	52	42
Chapel Street	Keowee Street to B&O Railroad	25	50	Medium Mixed Use	54	38
Community Drive	Old Troy Pike to Brandt Pike	30	60	Medium Neighborhood	38	24
Cornell Drive	Salem Avenue to Catalpa Drive	30	60	Large Neighborhood	58	36
Cornell Drive	Catalpa Drive to Wesleyan Road	35	70	Large Neighborhood	58	36
Danner Avenue	Guthrie Road to Germantown Street	25	50	Medium Neighborhood	38	24
Davis Avenue	Findlay Street to Linden Avenue	30	60	Large Industrial	52	42
Dayton-Liberty Road	Liscum Drive to Union Road	41	82	Large Neighborhood	58	36
Dearborn Avenue	McCall Street to Germantown Street	25	50	Medium Neighborhood	38	24
Dixie Drive, North	Keowee Street to Maxton Road	45	90	Large Mixed Use	70	90
Edwin C. Moses Blvd.	Nicholas Road to Stewart Street	35	70	Large Commuter	56	90
Edwin C. Moses Blvd.	Stewart Street to Washington Street	41	82	Very Large Commuter	80	114
Edwin C. Moses Blvd.	Washington St. to Edwin C. Moses Blvd. Bridge	41	82	Very Large Commuter	80	114
Fifth Street	West Fourth Street to Patterson Boulevard	45.5	91	Large Mixed Use	70	90
Fifth Street	Patterson Boulevard to Keowee Street	41	82	Various, See Below	-	-
Fifth Street	Patterson Boulevard to Wayne Avenue	41	82	Small Mixed Use	38	38
Fifth Street	Wayne Avenue to Keowee Street	41	82	Very Large Mixed Use	104	114
Fifth Street	Keowee Street to Burkhardt Avenue	25	50	Medium Neighborhood	38	24
Findlay Street	Mad River Bridge to East Third Street	35	70	Large Industrial	52	42
Findlay Street	East Third Street to Davis Avenue	30	60	Large Neighborhood	58	36
First Street	Holiday Lane to Patterson Boulevard	50	100	Very Large Mixed Use	104	114

Facility Name	Limits	Existing Distance to Centerline (ft)	Existing Total ROW Width (ft)	Typology Assignment	Minimum ROW Width (ft)	Maximum Vehicle Zone Width (ft)
First Street	Patterson Boulevard to Beckel Street	46.5	93	Large Mixed Use	70	90
First Street	Beckel Street to Springfield Street	35	70	Large Industrial	52	42
Fishburg Road	Rip Rap Road to ECL	35	70	N/A	-	-
Forest Avenue	Main Street to Riverview Avenue	30	60	Various, See Below	-	-
Forest Avenue	Main Street to Neal Avenue	30	60	Large Neighborhood	58	36
Forest Avenue	Neal Avenue to West Grand Avenue	30	60	Medium Mixed Use	54	38
Forest Avenue	West Grand Avenue to Riverview Avenue	30	60	Large Neighborhood	58	36
Fourth Street	Robert Drive to Wayne Avenue	50	100	Very Large Mixed Use	104	114
Frederick Pike	North Dixie Drive to Needmore Road	30	60	Various, See Below	-	-
Frederick Pike	North Dixie Drive to Nortcutt Place	30	60	Large Neighborhood	58	36
Frederick Pike	Northcutt Place to Needmore Road	30	60	Medium Mixed Use	54	38
Frederick Pike	Needmore Road to NCL	25	50	Medium Neighbor-hood	38	24
Free Pike	Denlinger Road to Salem Avenue	35	70	Large Neighborhood	58	36
Frytown Road	Infirmary Road to South Gettysburg Avenue	35	70	Large Neighborhood	58	36
Germantown Street	Miami River to South Gettysburg Avenue	35	70	Large Neighborhood	58	36
Germantown Street	South Gettysburg Avenue to SCL	40	80	Large Mixed Use	70	90
Germantown Street	S.R. 4 to within Corporate Limits	60	120	Very Large Commuter	80	114
Gettysburg Avenue	NCL to SCL	45	90	Various, See Below	-	-
Gettysburg Avenue	NCL to West Third Street	45	90	Very Large Commuter	80	114
Gettysburg Avenue	West Third Street to SCL	45	90	Large Mixed Use	70	90
Grand Avenue	Great Miami Boulevard to Forest Avenue	25	50	Small Mixed Use	38	38
Grand Avenue	Forest Avenue to Grafton Avenue	30	60	Medium Mixed Use	54	38
Grand Avenue	Grafton Avenue to Salem Avenue	37.5	75	Large Neighborhood	58	36
Great Miami Boulevard	Riverside Drive to Grand Avenue	50	100	Very Large Mixed Use	104	114
Guenther Road	Hoover Avenue to Little Richmond Road	35	70	Large Neighborhood	58	36
Guthrie Road	Danner Avenue to Gettysburg Avenue	30	60	Large Industrial	52	42

Facility Name	Limits	Existing Distance to Centerline (ft)	Existing Total ROW Width (ft)	Typology Assignment	Minimum ROW Width (ft)	Maximum Vehicle Zone Width (ft)
Hamilton Avenue	East Fifth Street to Linden Avenue	25	50	Small Industrial	30	28
Harvard Boulevard	Salem Avenue to Broadway Street	25	50	Medium Neighborhood	38	24
Harshman Road	Brandt Pike to Airway Road	60	120	Very Large Commuter	80	114
Helena Street	Forest Avenue to North Keowee Street	25	50	Small Mixed Use	38	38
Hillcrest Avenue	Riverside Drive to North Main Street	25	50	Medium Neighborhood	38	24
Hillcrest Avenue	North Main Street to Catalpa Drive	35	70	Large Neighborhood	58	36
Hillcrest Avenue	Catalpa Drive to West Terminus	30	60	Medium Mixed Use	54	38
Hoover Avenue	James H. McGee Blvd. to Olive Road	25	50	Medium Neighborhood	38	24
Hoover Avenue	Gettysburg Avenue to WCL	35	70	Small Mixed Use	38	38
Huffman Avenue	East Fifth Street to Smithville Road	30	60	Large Neighborhood	58	36
Infirmary Road	West Third Street to S.R. 4	40	80	Large Neighborhood	58	36
Infirmary Road	Germantown St. to Farmersville-West Carrollton	35	70	N/A	-	-
Irving Avenue	Brown Street to Wilmington Avenue	25	50	Medium Mixed Use	54	38
James H. McGee Blvd.	McCall Street to Gettysburg Avenue	35	70	Large Commuter	56	90
James H. McGee Blvd.	Gettysburg Avenue to Little Richmond Road	45	90	Very Large Commuter	80	114
James H. McGee Blvd.	Little Richmond Road to Corporate Limit	35	70	Large Commuter	56	90
Jefferson Street	Warren Street to Monument Avenue	49.5	99	Large Mixed Use	70	90
Keowee Street	Great Miami River Bridge to Mad River Bridge	32.5	65	Large Commuter	56	90
Keowee Street	Mad River Bridge to East Fifth Street	55	110	Very Large Commuter	80	114
Keowee Street	East Fifth Street to Wayne Avenue	45	90	Very Large Commuter	80	114
Kirkham Street	Albany Street to West Stewart Street	25	50	Small Mixed Use	38	38
Kiser Street	Chapel Street to Milburn Avenue	27.5	55	Medium Industrial	36	42
Kitridge Road	Brandt Pike to ECL	35	70	Large Neighborhood	58	36
Klepinger Road	Salem Avenue to Turner Road	35	70	Large Mixed Use	70	90

Facility Name	Limits	Existing Distance to Centerline (ft)	Existing Total ROW Width (ft)	Typology Assignment	Minimum ROW Width (ft)	Maximum Vehicle Zone Width (ft)
Leo Street	Stanley Avenue to McCook Avenue	25	50	Medium Industrial	36	42
Leo Street	McCook Avenue to I-75 Bridge	30	60	Medium Mixed Use	54	38
Leo Street	I-75 Bridge to Stanley Avenue	25	50	Various, See Below	-	-
Leo Street	I-75 Bridge to North Keowee Street	25	50	Small Mixed Use	38	38
Leo Street	North Keowee Street to Stanley Avenue	25	50	Medium Industrial	36	42
Linden Avenue	East Third Street to Smithville Road	30	60	Various, See Below	-	-
Linden Avenue	East Third Street to Huffman Avenue	30	60	Large Neighborhood	58	36
Linden Avenue	Huffman Avenue to US-35 Underpass	30	60	Large Industrial	52	42
Linden Avenue	US-35 Underpass to Kolping Avenue	30	60	Large Neighborhood	58	36
Linden Avenue	Kolping Avenue to Smithville Road	30	60	Medium Mixed Use	54	38
Linden Avenue	Smithville Road to ECL	37.5	75	Large Neighborhood	58	36
Liscum Drive	West Third Street to Germantown Street	35	70	Large Neighborhood	58	36
Little Richmond Road	Gettysburg Avenue to Diamond Mill Road	40	80	Large Mixed Use	70	90
Longworth Street	Proctor Lane to Stout Street	35	70	Large Mixed Use	70	90
Ludlow Street	Monument Avenue to Patterson Boulevard	49.5	99	Very Large Mixed Use	104	114
Main Street	NCL to Main Street Bridge	35	70	Large Commuter	56	90
Main Street	Monument Avenue to Washington Street	66	132	Very Large Mixed Use	104	114
Main Street	Washington Street to Buckeye Street	50	100	Very Large Commuter	80	114
Main Street	Buckeye Street to SCL	35	70	Large Mixed Use	70	90
McArthur Avenue	Germantown Street to Guthrie Road	25	50	Medium Neighborhood	38	24
McCall Street	Gettysburg Avenue to Germantown Street	35	70	Large Neighborhood	58	36
McCook Avenue	Helena Street to Leo Street	30	60	Large Industrial	52	42
Mead Street	Perry Street to Robert Boulevard	25	50	Medium Mixed Use	54	38
Miller Avenue	Hoover Avenue to West Third Street	30	60	Large Neighborhood	58	36
Monument Avenue	Robert Drive to Patterson Boulevard	50	100	Very Large Mixed Use	104	114
Monument Avenue	Patterson Boulevard to Keowee Street	41.5	83	Large Mixed Use	70	90
Monument Avenue	Keowee Street to Findlay Street	35	70	Large Industrial	52	42

Facility Name	Limits	Existing Distance to Centerline (ft)	Existing Total ROW Width (ft)	Typology Assignment	Minimum ROW Width (ft)	Maximum Vehicle Zone Width (ft)
Needmore Road	Shoup Mill Road to Harshman Road	60	120	Very Large Commuter	80	114
Nicholas Road	Gettysburg Avenue to Edwin C. Moses Blvd.	35	70	Various, See Below	-	-
Nicholas Road	Gettysburg Avenue to Railroad Tracks	35	70	Large Neighborhood	58	36
Nicholas Road	Railroad Tracks to Edwin C. Moses Blvd.	35	70	Large Industrial	52	42
Old Troy Pike	Valley Street to Leo Street	30	60	Various, See Below	-	-
Old Troy Pike	Valley Street to Hart Street	30	60	Medium Mixed Use	54	38
Old Troy Pike	Hart Street to Leo Street	30	60	Large Neighborhood	58	36
Old Troy Pike	Leo Street to Avondale Drive	40	80	Large Industrial	52	42
Old Troy Pike	Avondale Drive to Corporate Limit	45	90	Large Neighborhood	58	36
Olive Road	Corporate Limit to West Third Street	41	82	Large Industrial	52	42
Patterson Boulevard	Monument Avenue to Stout Street	42.5	85	Large Mixed Use	70	90
Patterson Boulevard	Stout Street to SCL	50	100	Very Large Commuter	80	114
Patterson Road	Watervliet Avenue to SCL	25	50	Medium Neighborhood	38	24
Perry Street	Monument Avenue to West Fifth Street	45	90	Large Mixed Use	70	90
Perry Street	Eaker Street to Stout Street	35	70	Large Mixed Use	70	90
Philadelphia Drive	Riverview Avenue to Athens Avenue	37.5	75	Large Neighborhood	58	36
Philadelphia Drive	Athens Avenue to Forest Grove Avenue	45	90	Large Neighborhood	58	36
Philadelphia Drive	Forest Grove Avenue to Salem Avenue	35	70	Large Neighborhood	58	36
Philadelphia Drive	Salem Avenue to NCL	30	60	Various, See Below	-	-
Philadelphia Drive	Salem Avenue to Hillcrest Avenue	30	60	Medium Mixed Use	54	38
Philadelphia Drive	Hillcrest Avenue to NCL	30	60	Large Neighborhood	58	36
Phillips Avenue	Wayne Avenue to Wyoming Street	25	50	Medium Neighborhood	38	24
Post Town Road	Little Richmond Road to Union Road	35	70	Large Neighborhood	58	36

Facility Name	Limits	Existing Distance to Centerline (ft)	Existing Total ROW Width (ft)	Typology Assignment	Minimum ROW Width (ft)	Maximum Vehicle Zone Width (ft)
Revere Avenue	Patterson Road to Watervliet Avenue	25	50	Medium Neighborhood	38	24
Ridge Avenue	North Main Street to Siebenthaler Avenue	25	50	Medium Neighborhood	38	24
Rip Rap Road	Needmore Road to NCL	35	70	N/A	-	-
Riverside Drive	Shoup Mill Road to Patterson Boulevard	40	80	Very Large Commuter	80	114
Riverview Avenue	Main Street to Forest Avenue	25	50	Medium Neighborhood	38	24
Riverview Avenue	Forest Avenue to Philadelphia Drive	35	70	Large Neighborhood	58	36
Robert Drive	Monument Avenue to Mead Street	41	82	Large Mixed Use	70	90
Rosedale Avenue	James H. McGee Blvd. To Riverview Avenue	25	50	Medium Industrial	36	42
Rosedale Avenue	Riverview Avenue to Cornell Drive	30	60	Medium Neighborhood	38	24
Salem Avenue	Robert Drive to Grand Avenue	40	80	Very Large Commuter	80	114
Salem Avenue	Grand Avenue to Catalpa Drive	35	70	Large Commuter	56	90
Salem Avenue	Catalpa Drive to Wolf Road	40	80	Very Large Commuter	80	114
Salem Avenue	Wolf Road to Corporate Limit	60	120	Very Large Commuter	80	114
Schwinn Drive	Troy Pike to Brandt Pike	30	60	Large Industrial	52	42
Second Street	Robert Drive to Patterson Boulevard	50	100	Very Large Mixed Use	104	114
Second Street	Patterson Boulevard to Webster Street	41.5	83	Large Mixed Use	70	90
Shoup Mill Road	Turner Road to Needmore Road	60	120	Very Large Commuter	80	114
Shroyer Road	Wilmington Avenue to SCL	25	50	Medium Neighborhood	38	24
Siebenthaler Avenue	North Dixie Drive to Salem Avenue	25	50	Various, See Below	-	-
Siebenthaler Avenue	1st WCL to 1st ECL	25	50	Small Mixed Use	38	38
Siebenthaler Avenue	2nd WCL to 2nd ECL	25	50	Medium Neighborhood	38	24
Sixth Street	St. Clair Street to Wilkinson Street	25	50	Small Mixed Use	38	38

Facility Name	Limits	Existing Distance to Centerline (ft)	Existing Total ROW Width (ft)	Typology Assignment	Minimum ROW Width (ft)	Maximum Vehicle Zone Width (ft)
Smithville Road	Springfield Street to East Third Street	35	70	Large Commuter	56	90
Smithville Road	East Third Street to U.S. 35 East Bridge	45	90	Very Large Commuter	80	114
Smithville Road	U.S. 35 East Bridge to Watervliet Avenue	35	70	Large Commuter	56	90
Smithville Road	Watervliet Avenue to SCL	40	80	Very Large Commuter	80	114
Springfield Street	East Third Street to ECL	35	70	Large Industrial	52	42
St. Clair Street	Patterson Boulevard to Monument Avenue	49.5	99	Large Mixed Use	70	90
St. Mary's Street	West Second Street to West Third Street	40	80	N/A	-	-
St. Mary's Street	West Fourth Street to West Fifth Street	40	80	Large Mixed Use	70	90
Stanley Avenue	Helena Street to Leo Street	25	50	Medium Industrial	36	42
Stanley Avenue	Leo Street to North Keowee Street	30	60	Large Industrial	52	42
Stanley Avenue	North Keowee Street to Stanley Ave. Bridge	35	70	Large Industrial	52	42
Stewart Street	Germantown Street to Edwin C. Moses Blvd.	30	60	Large Neighborhood	58	36
Stewart Street	Edwin C. Moses Blvd. to Rubicon Road	35	70	Large Mixed Use	70	90
Stewart Street	Brown Street to Rubicon Road N.S.	48	78	Large Mixed Use	70	90
Stewart Street	Brown Street to Rubicon Road S.S.	30			0	0
Stewart Street	Brown Street to Alberta Street N.S.	55	85	Large Mixed Use	70	90
Stewart Street	Brown Street S.S. to Alberta Street S.S.	30			0	0
Stewart Street	Alberta Street to Wayne Avenue	30	60	Various, See Below	-	-
Stewart Street	Alberta Street to Nellie Avenue	30	60	Medium Mixed Use	54	38
Stewart Street	Nellie Avenue to Wayne Avenue	30	60	Large Neighborhood	58	36
Stout Street	Longworth Street to Ludlow Street	35	70	Large Mixed Use	70	90
Third Street	Robert Drive to Patterson Boulevard	50	100	Very Large Mixed Use	104	114
Third Street	Robert Drive to Gettysburg Avenue	35	70	Large Mixed Use	70	90
Third Street	Gettysburg Avenue to WCL	40	80	Large Mixed Use	70	90
Third Street	WCL to ECL	45	90	Large Mixed Use	70	90
Third Street	Patterson Boulevard to Linden Avenue	45	90	Large Mixed Use	70	90
Third Street	Linden Avenue to Smithville Road	35	70	Large Mixed Use	70	90
Third Street	Smithville Road to ECL	45	90	Large Mixed Use	70	90

Facility Name	Limits	Existing Distance to Centerline (ft)	Existing Total ROW Width (ft)	Typology Assignment	Minimum ROW Width (ft)	Maximum Vehicle Zone Width (ft)
Union Schoolhouse Road	Valley Street to Corporate Limit	41	82	Large Neighborhood	58	36
Vance Road	Gutherie Road to SCL	35	70	Large Industrial	52	42
Valley Street	Keowee Street to Brandt Pike	30	60	Medium Mixed Use	54	38
Valley Street	Brandt Pike to NCL	35	70	Various, See Below	-	-
Valley Street	Brandt Pike to St Adalbert Avenue	35	70	Large Neighborhood	58	36
Valley Street	St Adalbert Avenue to NCL	35	70	Large Industrial	52	42
Valley Street	NCL to S.R. 4 Interchange	41	82	N/A	-	-
Washington Street	Patterson Boulevard to Germantown Street	30	60	Various, See Below	-	-
Washington Street	Patterson Boulevard to I-75 Underpass	30	60	Medium Mixed Use	54	38
Washington Street	I-75 Underpass to Germantown Street	30	60	Large Industrial	52	42
Watervliet Avenue	Wayne Avenue to Patterson Road	25	50	Medium Neighborhood	38	24
Wayne Avenue	East Third Street to Keowee Street	35	70	Large Mixed Use	70	90
Wayne Avenue	Keowee Street to Smithville Road	30	60	Medium Mixed Use	54	38
Webster Street	East Third Street to Stanley Avenue	35	70	Various, See Below	-	-
Webster Street	East Third Street to SR-4 Underpass	35	70	Large Mixed Use	70	90
Webster Street	SR-4 Underpass to North Keowee Street	35	70	Large Neighborhood	58	36
Webster Street	North Keowee Street to Stanley Avenue	35	70	Large Industrial	52	42
Webster Street	Wagoner Ford Road to Stop Eight Road	35	70	Large Industrial	52	42
Wilkinson Street	Monument Avenue to Sixth Street	49.5	99	Large Mixed Use	70	90
Wilmington Avenue	Wayne Avenue to Patterson Road	40	80	Various, See Below	-	-
Wilmington Avenue	Wayne Avenue to Shroyer Road	40	80	Large Mixed Use	70	90
Wilmington Avenue	Shroyer Road to Patterson Road	40	80	Large Neighborhood	58	36
Wilmington Avenue	Patterson Road to SCL	35	70	Large Mixed Use	70	90
Woodbine Avenue	Watervliet to Smithville Road	25	50	Medium Neighborhood	38	24
Woodman Drive	Harshman Road to SCL	60	120	Very Large Commuter	80	114
Wyoming Street	South Main Street to Wayne Avenue	30	60	Various, See Below	-	-

Facility Name	Limits	Existing Distance to Centerline (ft)	Existing Total ROW Width (ft)	Typology Assignment	Minimum ROW Width (ft)	Maximum Vehicle Zone Width (ft)
Wyoming Street	South Main Street to Nathan Place	30	60	Medium Mixed Use	54	38
Wyoming Street	Nathan Place to Wayne Avenue	30	60	Large Neighborhood	58	36
Wyoming Street	Wayne Avenue to Terminus	25	50	Medium Neighborhood	38	24
Xenia Avenue	Keowee Street to Linden Avenue	25	50	Various, See Below	-	-
Xenia Avenue	Keowee Street to St Paul Avenue	25	50	Small Mixed Use	38	38
Xenia Avenue	Saint Paul Avenue to Linden Avenue	25	50	Medium Neighborhood	38	24

APPENDIX C: TYPOLOGY ASSIGNMENT INVENTORY TABLE

Street	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	Segment 8
2nd St	Very Large Mixed Use	Large Mixed Use	Small Industrial	Medium Industrial				
	Robert Dr to Jefferson Ave	Jefferson Ave to Meigs St	Clinton St to Alley west of Webb St	Alley west of Webb St to Burlington Ave				
3rd St	Large Mixed Use	Very Large Mixed Use	Large Mixed Use	Large Neighborhood				
	Corp. Limit to Robert Dr	Robert Dr to Linden Ave	Linden Ave to Sperling Ave	Sperling Ave to Corp. Limit				
4th St	Large Mixed Use	Medium Mixed Use	Small Neighborhood	Medium Neighborhood	Small Neighborhood			
	Robert Dr to Wayne Ave	Wayne Ave to Dutoit St	Dutoit St to Findlay St	Findlay St to Smithville Rd	Smithville Rd to Corp. Limit			
5th St	Medium Neighborhood	Large Commuter	Large Mixed Use	Small Mixed Use	Very Large Mixed Use	Large Mixed Use	Medium Mixed Use	Medium Neighborhood
	James H McGee Blvd to Mound St	Edwin C Moses Blvd to Robert Dr	Robert Dr to railroad bridge east of Patterson Blvd	Railroad bridge east of Patterson Blvd To Wayne Ave	Wayne Ave to Keowee St	Keowee St to High St	High St to Hamilton Ave	Hamilton Ave to Smithville Rd
6th St	Large Mixed Use							
	Wilkinson St to Jefferson St							
Ashley St	Medium Mixed Use							
	Main St to Wyoming St							
Brandt St	Large Neighborhood	Medium Industrial						
	Valley St to north of Bickmore Ave	North of Bickmore Ave to Corp. Limit						
Broadway St	Large Neighborhood	Large Mixed Use	Medium Neighborhood					
	Amherst Pl to Negley Pl	Negley Pl to 4th St	4th St to Dona Av					
Brown St	Large Mixed Use	Medium Mixed Use						
	Oak St to Stewart St	Stewart St to Corp. Limit						
Cincinnatti Ave	Medium Mixed Use	Medium Industrial	Medium Mixed Use					
	South of Hamlet St to north of Decatur Ave	North of Decatur Ave to Fluhart Ave	North of Decatur Ave to Edwin C Moses Blvd					
Eaker St	Medium Industrial							
	Longworth St to Ludlow St							
Edwin C Moses Blvd	Very Large Commuter							
	Salem Ave to Broadway St							
Findlay St	Large Industrial	Small Neighborhood	Medium Neighborhood	Small Neighborhood				
	Gateway St to south of Springfield St	South of Springfield St to 3rd St	3rd St to 5th St	5th St to Davis Ave				
First St	Very Large Commuter	Large Mixed Use	Very Large Mixed Use	Large Mixed Use	Very Large Mixed Use	Very Large industrial	Large Industrial	
	Salem Ave Bridge to Red Cross Ln	Red Cross Ln to Ludlow St	Ludlow St to Patterson Blvd	Patterson Blvd to Sears St	Sears St to Keowee St	Keowee St to Terry St	Terry St to Phildalephia St	
Germantown St	Large Neighborhood							
	Corp. Limit to Edwin C Moses Blvd							

While the maps in Chapter Four (Figures 4.41-45) offer an overview of the City's typology assignments, this table provides a more detailed examination of street typology assignments. It assigns typologies to all major and some minor roads by street segment, rather than by corridor. Each street listed occupies two rows: the first row defines typology by street segment, which reflects any change in street width or land use on a block-by-block level. These rows are color coded to match the typology assignment maps in Chapter Four. The second row names the segment of street in question. This analysis involved site visits, satellite imagery, land use inventories, and dimensional readings; assigning typologies to every street segment within the City is beyond the scope of this plan. This table is an example of how a more detailed inventory could be conducted in the future.

Table C.1: Typology Assignment Inventory Table (by street segment)

Street	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	Segment 8	Segment 9	Segment 10
Gettysburg Ave	Very Large Commuter	Very Large Mixed Use								
	Corp. Limit to 3rd St	3rd St to Corp. Limit								
Harshman Rd	Very Large Commuter	Very Large Commuter								
	Brandt Pike to Corp. Limit	Corp. Limit to Corp. Limit								
Helena St	Small Neighborhood	Medium Neighborhood	Very Large industrial							
	Forest Ave to Bridge	Bridge to North Bend Blvd	North Bend Blvd to Keowee St							
Home Ave	Small Neighborhood	Small Industrial	Very Large industrial	Medium Industrial	Medium Neighborhood					
	Lakeside Dr to east of Adelite Ave	East of Adelie Ave to Kilmer St	Kilmer St to James H McGee Blvd	James H McGee Blvd to College St	College St to Williams St					
Hoover Ave	Small Neighborhood	Medium Neighborhood								
	Corp. Limit to Whitmore Ave	Whitmore Ave to Riverside Dr								
Huffman Ave	Medium Neighborhood	Medium Industrial	Medium Neighborhood							
	3rd St to 5th St	5th St to Torrence St	Torrence St to Shedborne Ave							
James H McGee Blvd	Very Large Commuter									
	Little Richmond Rd to Germantown St									
Jefferson St	Large Mixed Use									
	Monument Ave to Buckeye St									
Keowee St	Large Commuter	Medium Mixed Use	Large Commuter	Very Large Commuter	Large Commuter	Very Large Commuter				
	Corp. Limit to Ewing St	Ewing St to Chapel St	Chapel St to north of Herbert St	North of Herbet St to Valley St	Valley St to Pitt St	Pitt St to Wayne Ave				
Leo St	Large Industrial	Large Mixed Use	Small Industrial	Small Neighborhood						
	North Bend Blvd to Keowee St	Keowee St to I-75 underpass	I-75 underpass to Deeds Ave	Deeds Ave to Stanley Ave						
Linden Ave	Medium Neighborhood	Medium Industrial	Large Mixed Use							
	3rd St to Huffman Ave	Huffman Ave to US 35	US 35 to Corp. Limit							
Longworth St	Medium Mixed Use									
	Perry St to Stout St									
Ludlow St	Large Mixed Use									
	Monument St to Patterson Blvd									
Main St	Large Commuter	Large Mixed Use	Large Commuter	Very Large Commuter	Large Commuter	Very Large Commuter	Very Large Mixed Use	Very Large Commuter	Medium Mixed Use	Large Mixed Use
	Corp. Limit to Fairview Ave	Fairview Ave to Alley east of Main St 1900 block	Alley east of Main St 1900 block to south of Hershey St	South of Hershey St to north of Babbitt St	North of Babbitt St to Riverview Ave	Riverview Ave to Monument Ave	Monument Ave to Washington St	Washington St to Ludlow St Ramp to US 35 E	Ludlow St Ramp to US 35 E to Jasper St	Jasper St to Corp. Limit
McCall St	Large Neighborhood	Medium Neighborhood	Medium Industrial							
	Gettsyburg Ave to Dearborn Ave	Dearborn Ave to Whitmore Ave	Whitemore Ave to Germantown St							

Street	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	Segment 8	Segment 9	Segment 10
Miami Chapel Rd	Small Neighborhood	Small Industrial	Small Neighborhood	Small Mixed Use	Medium Industrial	Medium Neighborhood				
	End of Road to Euclid Ave	Euclid Ave to Alley third south off Miami Chapel Rd 1300 block	Alley third south off Miami Chapel Rd 1300 block to Alwildy Ave	Alwildy Ave to east of Wisconsin Blvd	East of Wisconsin Blvd to Specialty Pl	Specialty Pl to south of Harriet St				
Monument Ave	Large Mixed Use	Large Industrial	Medium Industrial	Small Industrial						
	Riverview Ave to Sears St	Sears St to Keowee St	Keowee St to Findlay St	Findlay St to End of Road						
Mound St	Medium Mixed Use									
	5th St to Germantown St									
Norwood Ave	Medium Mixed Use									
	Mound St to 5th St									
Patterson Blvd	Large Mixed Use	Medium Mixed Use	Very Large Mixed Use	Very Large Commuter						
	Riverside Dr to 2nd St	2nd St to 5th St	5th St to Stewart St	Stewart St to Corp. Limit						
Patterson Rd	Small Neighborhood									
	Corp. Limit to Corp. Limit									
Perry St	Medium Mixed Use	Large Mixed Use	Small Mixed Use							
	Monument St to 2nd St	2nd St to Mead St	Eaker St to Patterson Blvd							
Riverside Dr	Very Large Commuter	Large Commuter								
	Corp. Limit to Ridge Ave	Ridge Ave to Patterson Blvd								
Riverview Ave	Large Mixed Use	Very Large Mixed Use								
	Monument Ave to River St	River St to Main St								
Rubicon St	Medium Neighborhood	Medium Mixed Use								
	Wyoming St to Stewart St	Stewart St to Corp. Limit								
Salem Ave	Large Commuter	Very Large Commuter								
	Corp. Limit to Lexington Ave	Lexington Ave to N Robert Dr								
Shoup Mill Rd/Needmore Rd	Very Large Commuter	Very Large Commuter	Very Large Commuter							
	Corp. Limit to Corp. Limit	Corp. Limit to Corp. Limit	Corp. Limit to Corp. Limit							
Siebenthaler Ave	Large Mixed Use	Medium Neighborhood	Small Neighborhood							
	Corp. Limit to Corp. Limit	Corp. Limit to DeWeese Pkwy	DeWeese Pkwy to Corp. Limit							
Smithville Rd	Small Neighborhood	Medium Neighborhood	Large Neighborhood	Large Commuter						
	Springfield St to north of Woodley Rd	North of Woodley Rd to north of Murray Hill Dr	North of Murray Hill Dr to 3rd St	3rd St to Corp. Limit						
Springfield St	Large Industrial									
	3rd St to Corp. Limit									

Street	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	Segment 8	Segment 9	Segment 10
St Claire St	Large Mixed Use									
	Monument Ave to Patterson Blvd									
Stanley Ave	Medium Industrial	Very Large industrial	Very Large Commuter	Very Large industrial						
	Henela St to I-75 S Ramp	I-75 S Ramp to Farr Dr	Farr Dr to Brandt St	Brandt St to SR 4 S Ramp						
Stewart Ave	Medium Neighborhood	Large Neighborhood	Large Mixed Use	Medium Neighborhood						
	Germantown St to Carr St	Carr St to Edwin C Moses Blvd	Patterson Blvd to west of Nellie Ave	West of Nellie Ave to Wayne Ave						
Stone St	Large Mixed Use									
	Jefferson St to Patterson Blvd									
Stout St	Medium Mixed Use									
	Longworth St to Main St									
Troy St	Large Neighborhood	Large Industrial	Medium Neighborhood							
	Valley St to Melberth Ave	Melberth Ave to Jergens Rd	Jergens Rd to Corp. Limit							
Valley St	Very Large Mixed Use	Large Mixed Use	Large Neighborhood	Small Industrial						
	Keowee St to Ohio St	Ohio St to Stanley Ave	Stanley Ave to east of Saint Adalbert Ave	East of Saint Adalbert Ave to Corp. Limit						
Warren St	Large Mixed Use									
	Buckeye St to Oak St									
Watervliet Ave	Medium Neighborhood	Medium Mixed Use	Medium Neighborhood							
	Wayne Ave to Mundale Ave	Mundal Ave to Glenarm Ave	Glenarm Ave to Corp. Limit							
Wayne Ave	Large Mixed Use	Large Neighborhood	Medium Neighborhood							
	3rd St to Wyoming St	Wyoming St to Wilmington Ave	Wilmington Ave to Smithville Rd							
Webster St	Large Industrial	Large Mixed Use	Large Industrial	Large Mixed Use						
	North Bend Blvd to Leonhand St	Leonhand St to Detrick St	Detrick St to Monument Ave	Monument Ave to 3rd St						
Wilkinson St	Medium Mixed Use	Large Mixed Use								
	Monument St to 3rd St	3rd St to 6th St								
Wilmington Ave	Large Neighborhood									
	Wayne Ave to Corp. Limit									
Woodman Dr	Very Large Commuter									
	Corp. Limit to Corp. Limit									
Wyoming St	Medium Mixed Use	Large Neighborhood	Medium Neighborhood							
	Ashley St to Brown St	Brown St to Wayne Ave	Wayne Ave to End of Road							

APPENDIX D: SOURCES

FIGURE	CAPTION	SOURCE
Cover Page	Dayton Riverscape	Brian Schoenharl
Title Page		
CHAPTER ONE: INTRODUCTION		
Figure 1.1	Street life in Dayton, past and present: E Third St Downtown	Dayton Metropolitan Library, Dayton Remembers Collection
Figure 1.2	Street life in Dayton, past and present: E Fifth St in the Oregon District	https://planning-org-uploaded-media.s3.amazonaws.com/legacy_resources/greatplaces/streets/2015/img/fifth01.jpg
CHAPTER TWO: PROJECT BACKGROUND		
Figure 2.1	Stakeholder Votes	BPS
CHAPTER THREE: TRANSPORTATION NEEDS ASSESSMENT		
Figures 3.1-3.2	Downtown living in Dayton	Bruce Soifer
Figure 3.3	2000 Population	Robin Feld
Figure 3.4	2010 Population	BPS
Figure 3.5	2040 Population (projected)	BPS
Figure 3.6	2000 Employment	BPS
Figure 3.7	2010 Employment	BPS
Figure 3.8	2040 Employment (projected)	BPS
Figure 3.9	Bicycle Facilities on Brown Street near University of Dayton	BPS
Figure 3.10	Main entrance to VA Medical Center	BPS
Figure 3.11	Existing Land Use	BPS
Figure 3.12	Adopted Land Use	BPS
Figure 3.13	Zoning	BPS

Figure 3.14	Traffic Counts	BPS
Figure 3.15	Downtown Traffic Counts	BPS
Figure 3.16	Traffic Flow in Dayton	BPS
Figure 3.17	Traffic Flow in Dayton	BPS
Figure 3.18	Traffic Flow in Dayton	BPS
Figure 3.19	Traffic Flow in Dayton	BPS
Figure 3.20	Freight Facilities	BPS
Figure 3.21	Northeast Quadrant, Industrial District	BPS
Figure 3.22	Freight movement and facilities in Dayton	BPS
Figure 3.23	Freight movement and facilities in Dayton	http://www.terminalcold.com/img/Home-Lower-Left.jpg
Figure 3.24	Freight movement and facilities in Dayton	http://www.greshamsmith.com/GreshamSmith/media/Showcase-Projects/Showcase%205/Dayton%20International%20Airport,%20Land%20Use%20and%20Develop/01_aerialmap.jpg?width=980&height=606&ext=.jpg
Figure 3.25	Freight movement and facilities in Dayton	http://511enews.com/wp-content/uploads/2015/12/image-1270.jpg
Figure 3.26	Transit Routes	BPS
Figure 3.27	Downtown Transit Routes	BPS
Figure 3.28	Transit facilities in Dayton	BPS
Figure 3.29	Transit facilities in Dayton	BPS
Figure 3.30	Transit facilities in Dayton	BPS
Figure 3.31	Transit facilities in Dayton	BPS
Figure 3.32	Pedestrian Facilities	BPS
Figure 3.33	Downtown Pedestrian Facilities	BPS
Figure 3.34	Pedestrian facilities in Dayton	BPS
Figure 3.35	Pedestrian facilities in Dayton	BPS
Figure 3.36	Pedestrian facilities in Dayton	BPS

Figure 3.37	Pedestrian facilities in Dayton	BPS
Figure 3.38	Bicycle Facilities	BPS
Figure 3.39	Downtown Bicycle Facilities	BPS
Figure 3.40	Bicycle facilities in Dayton	BPS
Figure 3.41	Bicycle facilities in Dayton	BPS
Figure 3.42	Bicycle facilities in Dayton	BPS
Figure 3.43	Bicycle facilities in Dayton	BPS
Figure 3.44	Existing Conditions Study Area Locations	BPS
Figure 3.45	Downtown Third St Aerial	BPS
Figure 3.46	Downtown Third St Street View	BPS
Figure 3.47	E Third St Aerial	BPS
Figure 3.48	E Third St Street View	BPS
Figure 3.49	Historic E Third St	Dayton Metropolitan Library, Dayton Remembers Collection
CHAPTER FOUR: COMPLETE STREET ELEMENTS		
Figure 4.1	Fifth St in the Oregon District	BPS
Figure 4.2	Curb Ramp	BPS
Figure 4.3	Raised Crosswalk	BPS
Figure 4.4	High Visibility Crosswalk	BPS
Figure 4.5	Pedestrian Refuge Island	BPS
Figure 4.6	Los Angeles, CA Case Study	MALA311
Figure 4.7	Pedestrian Hybrid Beacon	https://michigancompletestreets.wordpress.com/2013/11/26/pedestrian-hybrid-beacons-hawk-signals-explained/
Figure 4.8	Singapore Case Study	http://gizmodo.com/every-city-should-give-seniors-a-card-that-extends-the-1617659811
Figure 4.9	Granville, OH Case Study	City of Granville, OH

Figure 4.10	Shared Lane Marking	BPS
Figure 4.11	Standard Bike Lane	City of Dayton
Figure 4.12	Columbus, OH Case Study	BPS
Figure 4.13	Bicycle Boulevard	http://nacto.org/wp-content/uploads/gallery/neighborhoodgreenway_coreelements_photos/marking-berkeley-ca_0.jpg
Figure 4.14	Pittsburgh, PA Case Study	http://rustyredriding.blogspot.com/2015/04/bike-lane-woes-and-wows-pittsburgh-slow.html
Figure 4.15	Protected Bike Lane	http://nacto.org/wp-content/uploads/gallery/2012_onewayprotectedcycletrack/protectedcycletrack_2_chicago_il.jpg
Figure 4.16	Cycle Track	BPS
Figure 4.17	Indianapolis, IN Case Study	https://circlecitybicycles.com/pages/cycling-for-fitness-and-weight-loss
Figure 4.18	Bicycle Actuated Signal	http://nacto.org/wp-content/uploads/gallery/2012_detectionactuation/loopdetector_slo-02.jpg
Figure 4.19	Wayfinding Signage	http://nacto.org/wp-content/uploads/gallery/2012_wayfinding/wayfinding_portlandnew_01.jpg
Figure 4.20	Asheville, NC Case Study	BPS
Figure 4.21	Bike Box	http://nacto.org/wp-content/uploads/gallery/2012_bikebox/bikebox_21_victoria_sept08.png
Figure 4.22	Two-Stage Turn Queue Box	http://nacto.org/publication/urban-bikeway-design-guide/intersection-treatments/two-stage-turn-queue-boxes/
Figure 4.23	Salt Lake City, UT Case Study	https://www.youtube.com/watch?v=rVswICVFlEQ
Figure 4.24	Bus Stop	https://commons.wikimedia.org/wiki/File:2000s-style_TriMet_bus_stop_sign,_close-up.jpg
Figure 4.25	Bus Shelter	BPS
Figure 4.26	Bus Bulb Out	http://www.pedbikesafe.org/PEDSAFE/cm_images/BusBul1.jpg
Figure 4.27	Median	BPS
Figure 4.28	Lane Narrowing	http://nacto.org/wp-content/themes/sink_nacto/views/design-guides/retrofit/urban-street-design-guide/images/lane-width/carousel//SFCTA.jpg
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Figure 4.34	Raised Intersection	http://la.streetsblog.org/2013/07/23/santa-monica-beyond-regulating-traffic-flows-safety-with-repeated-stop-signs-part-2-of-2/
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Figure 4.49	Pervious Concrete	http://static1.squarespace.com/static/54da7a28e4b02b7088616db4/54da8eb1e4b0abb71ba97c63/56c211429f726660ff0ad279/1456867863119/?format=1000w
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