



Cleveland Complete and Green Streets

Typologies Plan - 8/20/2013



CITY OF CLEVELAND
Mayor Frank G. Jackson



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Cover Photo: Euclid Ave in Cleveland. Steven Litt, Art and Architecture Critic at The Plain Dealer
Table of Contents Photo: Cleveland Skyline. Courtesy of Tom Baker



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Chapter 1 - Introduction



Euclid Ave. in Cleveland is a good example of an existing complete and green street: one that gives equal consideration to all users and addresses sustainability.

Overview

City streets serve a multitude of functions: providing access to places, goods and services, serving as public space, capturing, channeling and sometimes filtering stormwater, and serving as corridors for key utility systems. Streets are such an integral part of everyday life, it is important that we maximize their value and their safety. Because Cleveland's streets make up a large portion of the urban landscape and are the main way in which the City channels stormwater, it is also important that they are ecologically sound and energy efficient.

Cleveland's streets take several forms and serve several functions in terms of how they are used for transportation and public space. They can provide a safe, peaceful route for children to walk or bicycle to school; a way for employees to get to work by bicycle, automobile or public transit; a place for residents and visitors to shop, dine or just sit and relax; and corridors that move people and goods efficiently. When total preference is given to a particular use, this usually comes at the expense of other uses. Therefore, Cleveland's streets should be designed to give sufficient consideration to all uses.

In Cleveland, like most of the United States since the end of WWII, automobiles were given priority in the design of streets. This means that streets are primarily designed for cars and not for walking, bicycling and transit, or the natural environment. By contrast, the concept of Complete and Green Streets takes into consideration context, roadway users and environmental concerns to ensure that streets are designed to reasonably balance the needs of all roadway users and uses. There are additional benefits of increased health, safety, and environmental improvements.

The purpose of the Cleveland Complete and Green Streets Typologies Manual is to provide a framework and guide for Cleveland to use in its efforts towards developing a network of Complete and Green Streets throughout the City, for the benefit of all residents and visitors.

Definition of Complete and Green Streets: *Complete Streets are streets for everyone. They are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists, and public transportation users of all ages and abilities are able to safely move along and across a complete street. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work. They allow buses to run on time and make it safe for people to walk to and from train stations.*

Many elements of street design, construction, and operation can work in favor of achieving both Complete Streets that work for all travelers and 'green' streets that serve environmental sustainability. Of particular concern are drainage and stormwater runoff issues too common in traditional streets. Optimal stormwater management looks beyond simply removing rainfall as quickly as possible, which risks negative environmental impacts associated with both stormwater quality and quantity, like polluted runoff, sedimentation,

and bank erosion. Instead it focuses on efforts to retain and treat – or even eliminate – runoff at the source through cost-effective green infrastructure, improving water quality and complementing Complete Streets efforts.¹

This Plan is presented in the following chapters:

Chapter 1 provides background information about the Typologies and the planning process that contributed to the development of this Plan.

Chapter 2 provides an overview of what the City, planners and developers should consider when planning a Complete Street and the different treatments that can be applied to Cleveland's streets to make a street more "complete."

Chapter 3 presents the street typologies developed for Cleveland and potential treatments appropriate for each. This section also presents maps that show Complete Streets typologies applied to the entire Cleveland street network.

Project Background

The City of Cleveland is committed to becoming a more bicycle and pedestrian-friendly community, while reducing its ecological footprint. These commitments, combined with world-class service provided by the Greater Cleveland RTA, are putting Cleveland on a path to a sustainable transportation network.

In September 2011, the City of Cleveland passed Ordinance 798-11 which states that the City of Cleveland is committed to the creation of a network of Complete and Green Streets that will improve the economic, environmental and social well-being of its citizens. Cleveland's network of Complete and Green Streets will provide safe and desirable travel for users of all ages and abilities by promoting alternative modes of transportation to accommodate pe-

destrians, cyclists, motorists and transit while also creating opportunities for the development of sustainable solutions and their application to urban streets in accordance with best management practices in green infrastructure.

The ordinance was crafted by the Complete and Green Streets Task Force (CGST). This same Task Force initiated the Typologies project to create an agreed-upon framework for decision making in the right-of-way that is in compliance with the City's Complete and Green Streets Ordinance. This guiding document will allow the City and other stakeholders to understand the preferred designs and the criteria for implementing those designs in the right-of-way.

In addition to the Complete and Green Streets Ordinance, City Council passed a bicycle transportation safety ordinance in June 2012 to help protect cyclists on the road. Among other features, the policy requires motorists overtaking a bicycle proceeding in the same direction to leave a safe distance, not less than 3 feet, when passing (commercial vehicles required to leave at least 6 feet).

As one sign of progress, the League of American Bicyclists has recognized Cleveland as a Bronze level Bicycle Friendly Community (BFC). The Bronze BFC award highlights our community's commitment to improving conditions for bicycling through investment in bicycling promotion, education programs, infrastructure and pro-bicycling policies.

Cleveland Complete and Green Streets Typologies Goals

The primary goals of the Cleveland Complete and Green Streets Typologies are as follows:

“Two-thirds of adults and one-third of children are overweight or obese. Left unchecked, obesity’s effects on health, health care costs, and our productivity as a nation could become catastrophic.”

In May 2012, the Institute of Medicine committee released Accelerating Progress in Obesity Prevention and offered five recommendations along with strategies for implementation.

“Recommendation 1: Communities, transportation officials, community planners, health professionals, and governments should make promotion of physical activity a priority by substantially increasing access to places and opportunities for such activity.”

“Strategy 1-1: Enhance the physical and built environment.” (Institute of Medicine, 2012)²

- Build upon the vision and requirements contained in the Complete and Green Streets Ordinance.
- Provide a practical, cost-effective, guide to roadway infrastructure investments that provide safety, convenience and comfort for all transportation modes and users.
- Create approaches tailored to existing conditions in Cleveland and to community objectives; and provide a catalogue of best practices for Complete and Green Streets design that builds upon current Cleveland practices with nationally accepted best practices.
- Build consensus and remove barriers between City government departments and external stakeholders in implementing Complete and Green Streets in Cleveland.
- Serve as a tool for the efficient pre-planning of roadways, a guide that sets internal and external expectations for Cleveland’s roads.

The Need for Complete Streets

The benefits of Complete Streets within communities are numerous and have been documented by planners, engineers, state legislatures, non-profit coalitions, state and county health departments, and others. The National Complete Streets Coalition (www.completestreets.com) has published fact sheets on the many direct and indirect benefits Complete Streets provide. Some of the benefits that Cleveland can expect to realize in the implementation of the Complete Streets Plan and Ordinance include the following:

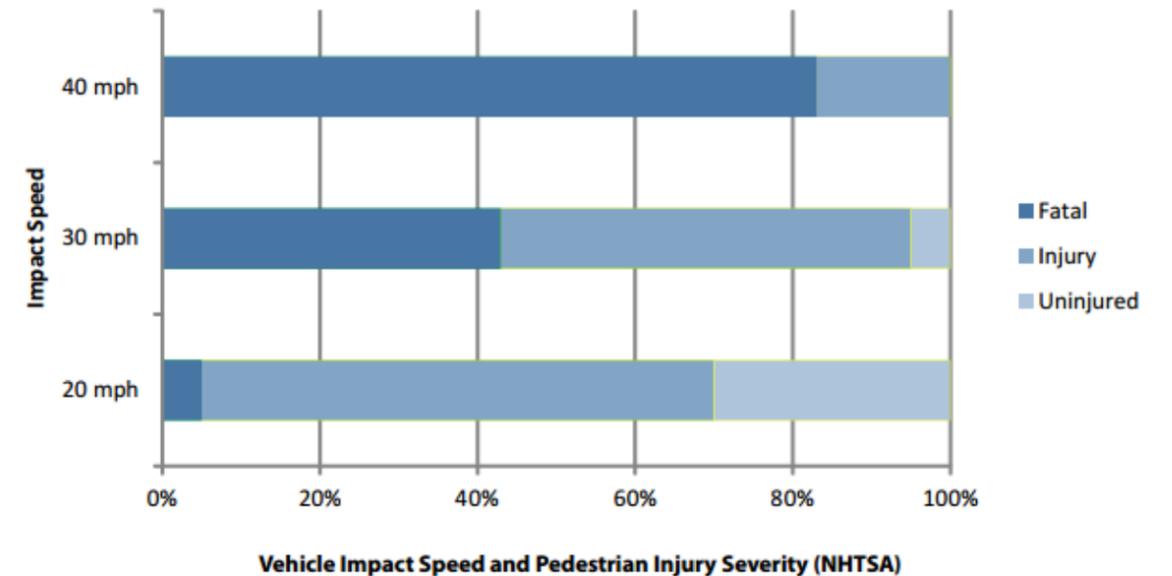
Healthy and Livable Communities

Today, many local governments and businesses are facing a crisis as they attempt to cope with the growing healthcare costs associated with chronic diseases, many of which are preventable. Obesity and sedentary lifestyles are major contributors to chronic disease for both adults and children.

The public health community recognizes that nonmotorized or “active” travel helps citizens meet recommended levels of physical activity, thereby reducing the risk of chronic disease and associated health care costs.³ In 2009, the Centers for Disease Control and Prevention (CDC) released Recommended Community Strategies and Measurements to Prevent Obesity in the United States, a report recommending Complete Streets policy adoption as a strategy for obesity prevention.⁴ Complete Streets are a way of providing an environment that will encourage and promote healthier, more active lifestyles for residents.

Air Quality

Reducing congestion along a roadway results in less vehicle idle times, thus reducing smog and ground level ozone, which are both large contributors of greenhouse gases. Complete Streets-designed corridors improve traffic flow by lessening the stop-and-go pace of vehicular



traffic, help regulate vehicle speeds to appropriate levels for the corridor’s function, and reduce the number of cars on the road as some motorists become choice pedestrians, bicyclists, and transit riders.

Improved Safety

A recent review of bicyclist safety studies found that the addition of well-designed bicycle-specific infrastructure tends to reduce injury and crash risk. On-road bicycle lanes reduced these rates by about 50%.⁵

Streets without safe places to walk, cross, catch a bus, or bicycle put people at risk. The National Complete Streets Coalition publishes some sobering national statistics:⁵

“Pedestrian crashes are more than twice as likely to occur in places without sidewalks; streets with sidewalks on both sides have the fewest crashes. Of pedestrians killed in 2007 and 2008, more than 50% died on arterial roadways, typically designed to be wide and fast. More than 40% of pedestrian fatalities occurred where no crosswalk was available...Speed reduction has a dramatic impact on pedestrian fatalities. **Eighty percent of pedestrians struck by a car**

going 40 mph will die; at 30 mph the likelihood of death is 40 percent. At 20 mph, the fatality rate drops to just 5 percent.”

Roadway design and engineering approaches commonly found in complete streets create long-lasting speed reduction. Such methods include enlarging sidewalks, installing medians, and adding bike lanes. All road users - motorists, pedestrians and bicyclists - benefit from slower speeds.

Improved Access

Access to jobs, education, grocery shopping, healthcare, and other destinations is vital in our urban areas. In Cleveland, about 25% of households do not own a car. In addition, many seniors and disabled Clevelanders are limited in their ability to drive. Creating safe streets allows access and travel by pedestrians, wheelchair users, cyclists, transit users and builds a more livable, accessible community for people of all ages, abilities, and income levels.⁶

Changing demographics

America’s young people, including the ‘Generation Y’ and the maturing ‘Millennials’, are decreasing the amount they drive and increasing their use of transportation alternatives.⁷ National Household Transportation Survey Data

The estimated replacement cost of Portland's entire 300+ mile bikeway network—acknowledged as the best in North America—is approximately \$60 million (in 2008 dollars), which is roughly the cost of one mile of four-lane urban freeway.

The monetary investment on bicycle specific infrastructure represents just less than one percent of the funding the metropolitan area spent on transportation between 1995 and 2010.⁸

compared between 2001 and 2009 has shown that America's 16-34 year olds are driving less and walking, bicycling and taking transit more. Downtown Cleveland's population grew 96% over the last 20 years with residential totals increasing from 4,651 to 9,098. Downtown residential occupancy rates now stand over 95% and developers are eagerly looking to meet residential demand. The majority of the population increase is made up of 22 to 24-year olds (51%). Closely followed by 25 to 34-year olds.⁹

Young people's transportation priorities and preferences differ from those of older generations. Preferences for living in places where they can easily walk, bike or take public transportation are clearly exhibited by a recent study by the National Association of Realtors. Environmental consciousness is also becoming more evident with nearly twice as many 18 to 34 year olds stating that they drive less to protect the environment than older generations (16 percent versus 9 percent). The trend toward reduced driving among young people is likely to persist as a result of technological advancements that reduce the need to travel and increased legal and financial barriers to driving.

Economic Development

In Cleveland, Euclid Avenue and its Healthline is a Complete and Green Street which includes Bus Rapid Transit, bicycle lanes, hundreds of trees and green medians, and enhanced pedestrian infrastructure. The HealthLine's role in Euclid Avenue's revitalization has been demonstrated in a first year ridership increase of 46 percent over the previous year's bus service, moving 3.8 million people. Ridership has consistently increased ever since. Even before starting operations, the Healthline helped spur \$4.3 billion in development projects in the corridor. Key accomplishments include the following:

- The \$200 million investment in the HealthLine BRT project attracted at least \$4.3 billion in development investment.
- Development activity along Euclid Avenue resulted in the clean-up and redevelopment of numerous vacant and abandoned properties and infrastructure.
- The Institute for Transportation and Development Policy rated the HealthLine as the best BRT line in the country based on service planning, infrastructure, station design, quality of service, and access.

- Between 2002 and 2009, \$1.9 billion in development occurred in the University Circle district on Euclid Avenue, including the addition of 22,000 square feet of retail space.
- It has also spurred the creation of 5,000 jobs since 2005.

Intent and Use of the Guide

The Cleveland Complete and Green Streets Guidelines will provide a toolbox for those who design, build and maintain streets, as well as citizens who live and travel on those streets.

For designers, the typologies and guidelines presented in this Plan do not dictate rigid standards for roadway design; rather, they provide examples of appropriate design elements and dimensions used in unison, depending on the location of the roadway, its function and the nature of the surrounding area. **The typologies presented in this plan do not necessarily show what treatments should be applied to a particular roadway, but rather what treatments can be applied to a particular roadway. Further planning studies, engineering studies and outreach should be conducted to weigh all available options and the desired balance of transportation modes.**

The Complete Streets elements presented in this document are compliant with nationally accepted best practices such as the *AASHTO Guide for the Development of Bicycle Facilities* (2012), the *NACTO Urban Bikeway Design Guide* (2012), the *AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities* (2004), *ITE and CNU's Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* (2010), and the *Manual on Uniform Traffic Control Devices* (2009)

For citizens, the Complete Streets Guidelines are intended to be an accessible and easy to understand document that show potential improvements that can be applied to Cleveland's streets to make them more "complete. and

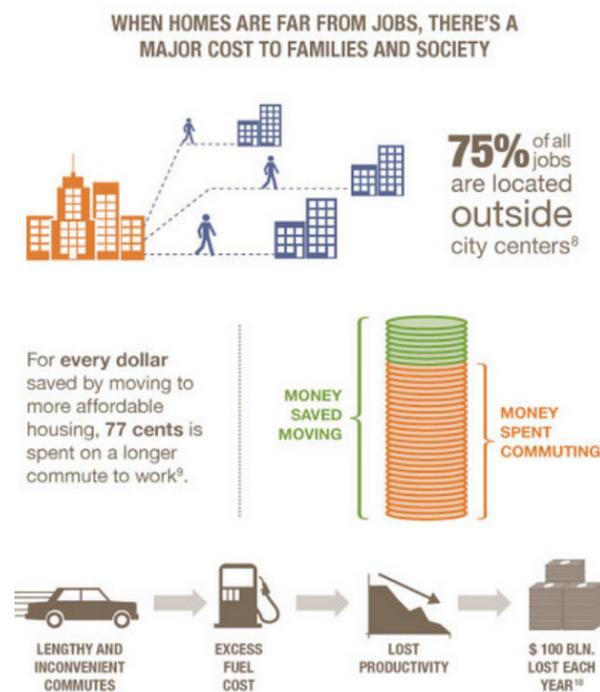
green." These guidelines will allow designers and citizens to use a common language while working together to create roadways that meet the current and future needs of Cleveland's communities.

Future Considerations

The typologies developed for this document are intended to show what improvements can be made to Cleveland's streets with a focus on the near future. Typologies show what treatments can be applied to Cleveland's streets without changing the curb-to-curb width of the street, making it feasible that many of the improvements shown in this Plan can be included as a part of roadway resurfacing or restriping projects. Roadway resurfacing projects provide a quick and relatively inexpensive means of implementing changes to the roadway; roadway re-engineering projects such as those that widen or add lanes tend to be more costly and occur less frequently.

However, roadway contexts and uses change over time, as well as accepted best practices. For example, the City may see it necessary in the future to recommend making changes to the overall width of some of its roadways due to changes in context.

The City may update this document to ensure that guidelines remain relevant especially if changes are made to the Bikeway Master Plan, and other citywide planning documents.



Graphic Source: Robert Wood Johnson Foundation (www.newpublichealth.org)



Planning Process

The Cleveland Complete and Green Streets Task Force with the consulting guidance of the Alta Planning + Design team led to the development of the Typologies. The planning effort kicked off with a stakeholder workshop in January 2013, which included members of the Complete and Green Streets Task Force as well as local, regional, and state stakeholders.

Stakeholder Workshop

The workshop in January brought together key stakeholders from the Cleveland region and throughout the State to provide input on the development of the typologies. Stakeholders included representatives from:

- The Cleveland Urban Design Collaborative
- LAND Studio
- The Northeast Ohio Regional Sewer District
- The Downtown Cleveland Alliance
- The GreenCityBlueLake Institute
- YMCA of Greater Cleveland
- The City of Cleveland Department of Aging

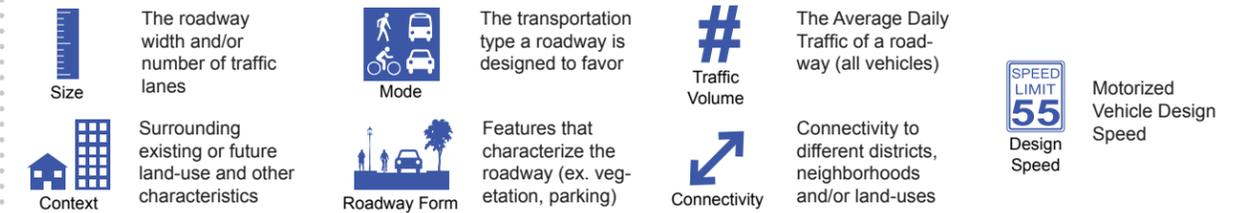
- The Northeast Ohio Areawide Coordinating Agency
- Cuyahoga County
- Ohio Department of Transportation
- The Greater Cleveland Regional Transit Authority
- Metroparks
- Cleveland City Council
- University Circle Incorporated

The workshop began with an overview that showed the need for Complete and Green Streets in Cleveland, showed how other cities are addressing Complete Streets and presented possible treatments that can be applied to roadways to help balance user needs and address context.

After this presentation, the participants were divided into groups and asked to develop Complete Streets Typologies for Cleveland and then select the traffic calming treatments they most preferred for each of these typologies. The results of these exercises were used to help generate typology names and determine potential Complete and Green Streets treatments.

Figure 1.1 - Review of Street Characteristics Considered in Complete Streets Typologies of Peer Cities

Street Typology Characteristics



Characteristics Included in Complete Streets Guidelines

Complete Streets Document	Size	Context	Mode	Roadway Form	Traffic Volume	Connectivity	Motorized Vehicle Design Speed
(Draft) NACTO Urban Street Design Guide (2012)	Primary	Primary	Primary	Primary	Secondary	Secondary	Primary
(Draft) Chicago Safe Streets Guidelines (2012)	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Minneapolis, MN Design Guidelines for Streets and Sidewalks (2008)	Secondary	Primary	Primary	Secondary	Primary	Primary	Secondary
Charlotte, NC Urban Street Design Guidelines (2007)	Secondary	Primary	Primary	Secondary	Secondary	Secondary	Secondary
New York City, NY Street Design Manual (2009)	Secondary	Primary	Primary	Primary	Secondary	Secondary	Secondary
Street Typologies for Brunswick, ME (2011)	Primary	Primary	Primary	Primary	Primary	Primary	Primary



A detailed summary of the January Stakeholder Workshop can be found in Appendix A.

Complete Streets Plan Peer Review

To help with the development of Cleveland's typologies, the Alta team conducted a review of Complete Streets Plans, mostly those of cities with similar land use, weather or socio-economic characteristics of Cleveland. These plans included:

- (Draft) *The NACTO Urban Street Design Guide* (2012)
- (Draft) *Chicago Safe Streets Guidelines* (2012)
- *Minneapolis, MN Design Guidelines for Streets and Sidewalks* (2008)
- *Charlotte, NC Urban Street Design Guidelines* (2007)
- *New York City, NY Street Design Manual* (2009)
- *Street Typologies for Brunswick, ME* (2011)

These documents were compared to see what elements defined roadway typologies. Seven principal characteristics were used to define complete streets typologies throughout the documents, although different plans emphasized different characteristics. These characteristics include:

- Roadway Size
- Roadway Context
- Transportation Mode
- Roadway Form
- Traffic Volume
- Connectivity, and
- Design Speed

A graphic summarizing the results of this review can be seen in **Figure 1.1**. The results of this review influenced the definition of Cleveland's typologies, which are explained in Chapter

Chapter 1 Endnotes

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Euclid Avenue

Chapter 2 - Complete and Green Streets Design



Overview

There are many considerations that factor into the design of a Complete and Green Street. This chapter explains the elements that comprise a Complete and Green Street, as well as explain how considerations such as land use, expected users, and connectivity can affect the overall design of the roadway.

A street serves as a **place** and as a **link**. In the United States following WWII, most roadways have been designed with the primary focus being to connect destinations via automobile. Roadways designed in this fashion typically function as a link that is designed only to connect point A to point B in a manner that facili-

tates quick motor vehicle travel. However, roadways also function as a social space and have a relationship with the places where people live, work and play. Treating streets simply as links often ignores the other important contexts and functions that streets should address. The Complete Streets design philosophy is a shift to use both link and place concepts in designing roadways. Designing for all modes with both link and place considerations has the potential to add value to Cleveland's roadway system. This will help the city transition to a network that is more sustainable and safe, while providing public spaces that are inviting for people and businesses.

Since ample guidelines exist on the accommodation of automobiles along roadways, and Cleveland roadways are, for the most part, designed to give these users priority, this guide is intended to focus on the design considerations for bicyclists, pedestrians and transit users.

Design for Pedestrians

The transportation network should accommodate pedestrians with a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing.

The Manual of Uniform Traffic Control Devices (MUTCD) recommends a normal walking speed of three and a half feet per second when calculating the pedestrian clearance interval at traffic signals. Typical walking speeds can drop to three feet per second in areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent.

Sidewalks

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel that is separated from vehicle traffic. Sidewalks are typically constructed of concrete and are separated from the roadway by a curb and gutter and preferably a landscaped planting strip area. Sidewalks are a common application in both urban and subur-

Sidewalks should be more than areas to travel; they should provide places for people to interact. There should be places for standing, visiting, and sitting. Sidewalks should contribute to the character of neighborhoods and business districts, strengthen their identity, and be an area where adults and children can safely participate in public life.

ban environments. Attributes of well-designed sidewalks include the following:

Accessibility: A network of sidewalks should be accessible to all users. Roadway crossing distances and distances between crossings should be minimized to accommodate and encourage pedestrian travel.

Adequate width: Two people should be able to walk side-by-side. Different walking speeds should be possible. In areas of intense pedestrian use, sidewalks should accommodate the high volume of walkers.

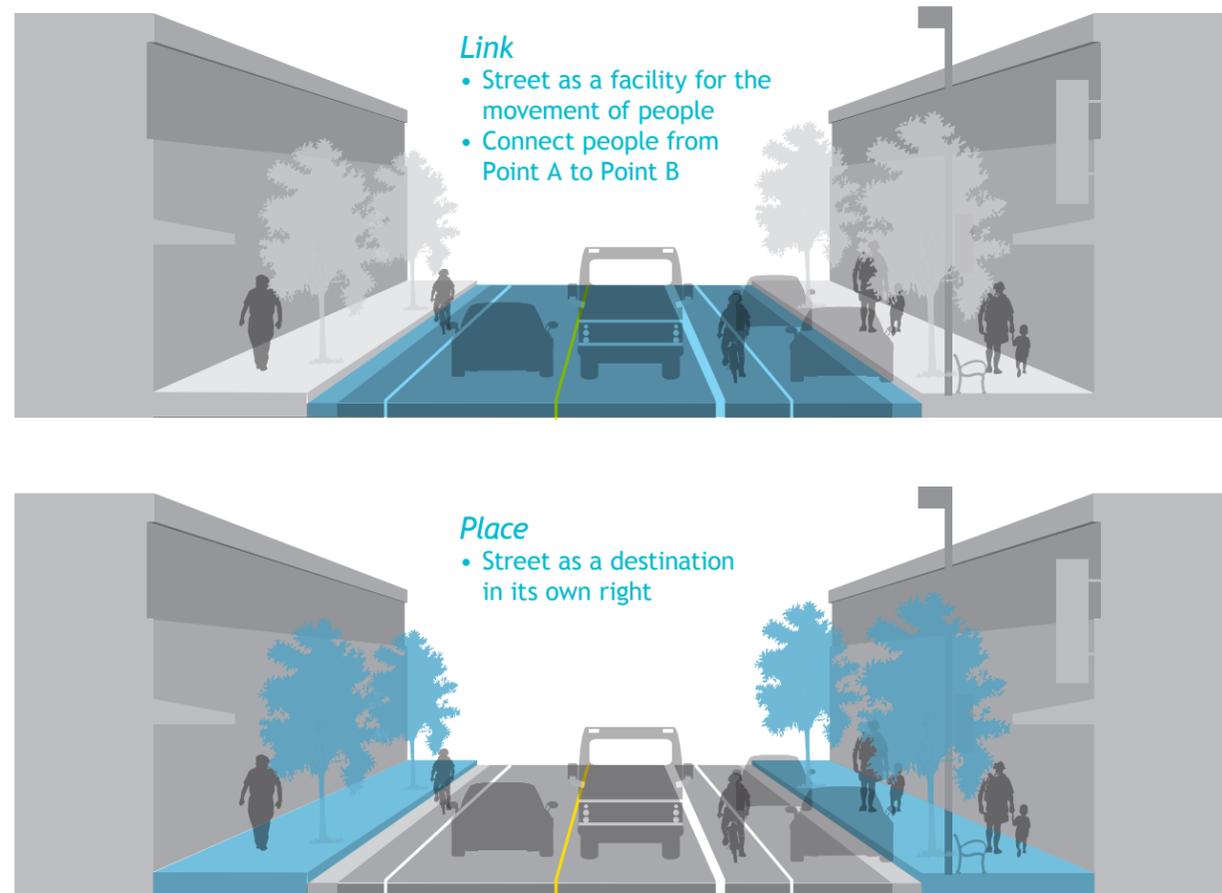
Safety: Design features of the sidewalk should allow pedestrians to have a sense of security and predictability. Sidewalk users should not feel they are at risk due to the presence of adjacent traffic.

Continuity: Walking routes should be obvious and should not require pedestrians to travel out of their way unnecessarily.

Landscaping: Plantings and street trees should contribute to the overall psychological and visual comfort of sidewalk users, and be designed in a manner that contributes to the safety of people.

Drainage: Sidewalks and curb ramps should be designed so that standing water is minimized.

Figure 2.1 - The Street as a Link and a Place



Social space: There should be places for standing, visiting, and sitting. The sidewalk area should be a place where adults and children can safely participate in public life.

Quality of place: Sidewalks should contribute to the character of neighborhoods and business districts.

Sidewalk Zones

The sidewalk area can be broken down into four distinct zones as seen in **Figure 2.2** below. The concept of sidewalk zones should be strictly followed for a sidewalk to function properly and provide safe passage for all users. This is especially important for users with visual or physical impairments to be able to effectively navigate the corridor.

Other considerations such as sidewalk obstructions, driveways, width and access through

construction areas are important to consider as well. More guidance on these topics will be included in the companion Complete and Green Streets Design Guidelines to come at a later date.

Intersections

Intersections are also an important piece of the pedestrian realm. Attributes of pedestrian-friendly intersection design include:

Clear Space: Corners should be clear of obstructions. They should also have enough room for curb ramps, for transit stops where appropriate, and for street conversations where pedestrians might congregate.

Visibility: It is critical that pedestrians on the corner have a good view of vehicle travel lanes and that motorists in the travel lanes can easily see waiting pedestrians.

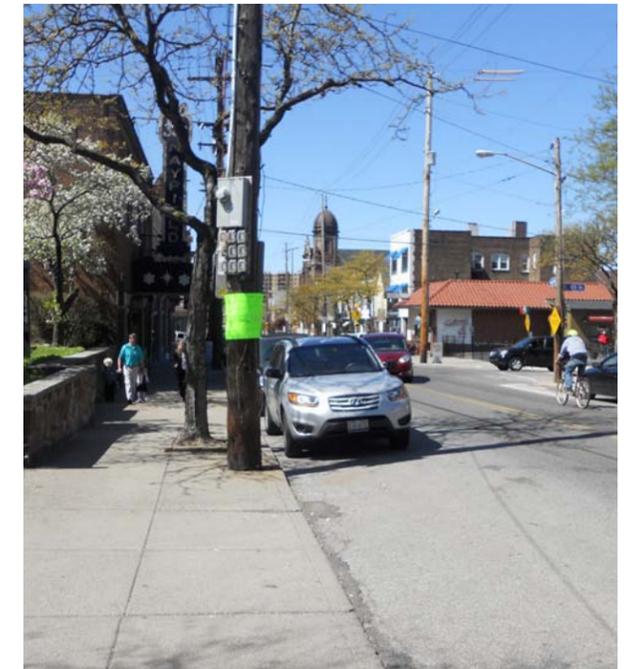
Legibility: Symbols, markings, and signs used at corners should clearly indicate what actions the pedestrian should take.

Accessibility: All corner features, such as curb ramps, landings, call buttons, signs, symbols, markings, and textures, should meet accessibility standards and follow universal design principles.

Separation from Traffic: Corner design and construction should be effective in discouraging turning vehicles from driving over the pedestrian area. Crossing distances should be minimized.

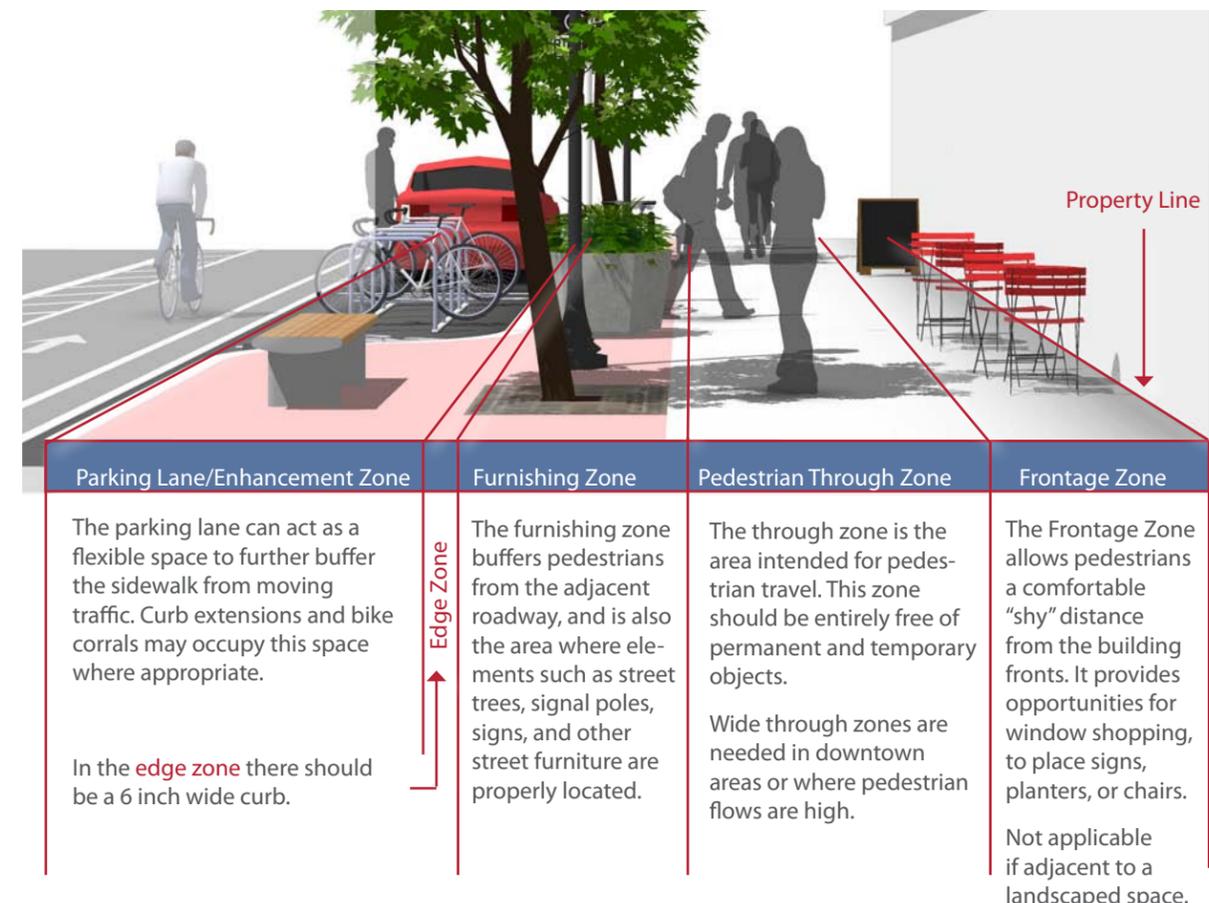
Lighting: Good lighting is an important aspect of visibility, legibility, and accessibility.

These attributes will vary with context but should be considered in all design processes. For example, more remote intersections may have limited or no signing. However, legibility regarding appropriate pedestrian movements should still be taken into account during design.



Mayfield Rd. in Little Italy is a popular street for pedestrians and bicyclists. The concept of Complete Streets looks at the principles that make streets like this one pleasant and accessible for all roadway users, builds upon these principles and applies them to all streets.

Figure 2.2 - Elements of the Sidewalk Corridor



Design for Bicyclists

Bicyclists, by nature, are much more affected by poor facility design, construction and maintenance practices than motor vehicle drivers. Bicyclists lack the protection from the elements and roadway hazards provided by an automobile's structure and safety features. By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk.

Similar to motor vehicles, bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the bicyclist). The design of a bikeway should consider reasonably expected bicycle types on the facility and utilize the appropriate dimensions.

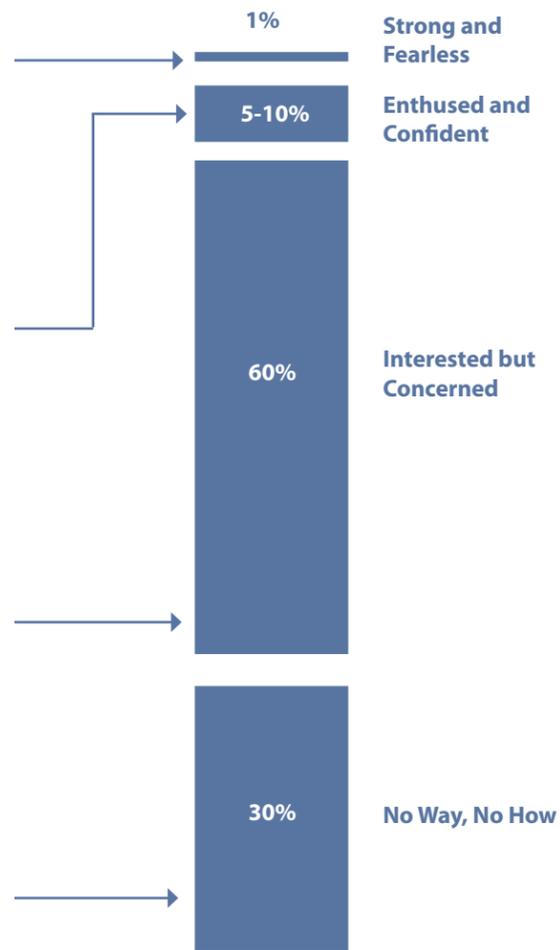
It is important to consider bicyclists of all skill levels when creating a non-motorized plan or project. Bicyclist skill level greatly influences expected speeds and behavior, both in separated bikeways and on shared roadways. Bicycle infrastructure should accommodate as many user types as possible, with decisions for separate or parallel facilities based on providing a comfortable experience for the greatest number of people.

The bicycle planning and engineering professions currently use several systems to classify the population, which can assist in understanding the characteristics and infrastructure preferences of different bicyclists. The most conventional framework classifies the "design cyclist" as *Advanced*, *Basic*, or *Child*.¹ A more detailed understanding of the US population as a whole is illustrated in **Figure 2.3**. Developed by planners in Portland, OR² and supported by

¹ *Selecting Roadway Design Treatments to Accommodate Bicycles*. (1994). Publication No. FHWA-RD-92-073

² *Four Types of Cyclists*. (2009). Roger Geller, City of Portland

Figure 2.3 - Four Types of Cyclists



all types of bikeways but usually choose low traffic streets or shared use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreationalists, racers and utilitarian bicyclists.

- Interested but Concerned** (approximately 60% of population) – This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or multi-use trails under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues. These people may become “Enthused & Confident” with encouragement, education and experience and higher level facilities, such as buffered and protected bike lanes.
- No Way, No How** (approximately 30% of population) – Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.

data collected nationally since 2005, this classification provides the following alternative categories to address varying attitudes towards bicycling in the US:

- Strong and Fearless** (approximately 1% of population) – Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections -- even if shared with vehicles -- over separate bicycle facilities such as shared use paths.
- Enthused and Confident** (5-10% of population) - This user group encompasses bicyclists who are fairly comfortable riding on

Bicycle Facility Types

Consistent with bicycle facility classifications throughout the nation, the facility types presented in the figures below identify classes of facilities by degree of separation from motor vehicle traffic. In general, the wider the roadway, the higher the traffic volume, and the greater the traffic speed, the more separation is necessary to provide safe and comfortable riding conditions for bicyclists. The most common bicycle facility types are as follows:



Shared Roadways are bikeways where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. The most basic type of bikeway is a signed shared roadway. This facility provides continuity with other bicycle facilities (usually bike lanes), or designates preferred routes through high-demand corridors.



Shared Roadways with Pavement Markings Shared roadways may also be designated by pavement markings, signage and other treatments including directional signage, traffic diverters, chicanes, chokers and /or other traffic calming devices to reduce vehicle speeds or volumes. Such treatments often are associated with **Neighborhood Greenways** (also known as Bicycle Boulevards).



Separated Bikeways, such as bike lanes and buffered bike lanes, use signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movements by both bicyclists and motorists.



Cycle Tracks are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes. These are also referred to as protected bicycle lanes.



Shared Use Paths are facilities separated from roadways for use by bicyclists and pedestrians. Sidepaths usually refer to shared use paths immediately adjacent to the roadway.

Bicycle Parking

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of two hours or less, or long-term parking for employees, students, residents, and commuters. In order to encourage bicycling in Cleveland, plentiful, convenient and attractive bicycle parking must be provided.

Transit Design

According to the South Florida East Coast Corridor (SFECC) *Transit Analysis: Station Design Guidelines*³, successful transit design depends on 6 elements. These include:

- Integration into the contextual fabric** - ensuring that transit stops are coherent with surrounding visual themes and that

³ [http://www.sfecstudy.com/draft_docs/\(3.4.1.2\)Station%20Design%20Guidelines%20Final%20122309.pdf](http://www.sfecstudy.com/draft_docs/(3.4.1.2)Station%20Design%20Guidelines%20Final%20122309.pdf)

transit stops serve transit-compatible land uses such as day-cares, shopping areas, employment areas and schools.

- **Accessibility via multiple modes** - making sure that transit stations and routes connect other modes such as pedestrians, bicyclists, park and ride centers, and airports.
- **Functional simplicity** - Transit stops should provide users with clear and informative system information and provide easy access and payment options.
- **Security** - Transit stops and systems should look, feel and be clean and secure. This can be accomplished through a number of methods including call boxes and lighting.
- **Comprehensive systems sustainability** - The design of transit should be environmentally conscious and be a tool to promote sustainable development.
- **Articulation of form and identity** - Transit stops should respond to public art or community landmarks; or local, relevant art should be incorporated into the stops and stations themselves.
- **The incorporation of arts in transit** - Incorporating art and design into all aspects of the transit system.

In most cases, transit shelters and waiting platforms should be placed in the Enhancement or Furnishing Zone (see **Figure 2.2**). Transit stops can be incorporated into curb extensions where appropriate. It is important to also consider the accommodation of bicycles at transit stops. Designs that reduce bicycle travel/bus stop conflict, include secure bicycle parking, and provide ample loading space for bicycles on bus-mounted bicycle racks are all part of bicycle-friendly transit system design.

The location and design of transit stops along a block is also an important consideration. Where feasible, transit stops should be located immediately

after the intersection to reduce conflict with turning vehicles and resolve sight line issues at the intersection. Bus stops should be designed so that busses can pull out of the vehicular travel lane when stopping to preserve traffic flow, especially on major streets.

Traffic Calming Treatments

Motor vehicle speeds affect the frequency at which automobiles pass bicyclists as well as the severity of bicycle and pedestrian crashes that can occur on a roadway. Slower vehicular speeds also improve motorists' ability to see and react to non-motorized users, minimize conflicts at driveways and other turning locations and in many cases can improve vehicular throughput. Maintaining slower motor vehicle speeds and reducing traffic in areas where pedestrian and bicycle traffic is regularly expected greatly improves comfort and safety for non-motorized users on a street.

This section presents an overview of traffic calming treatments that can be applied to Cleveland's roadways. Traffic calming treatments can be divided into two different types:

- **"Hard" traffic calming** are engineering measures taken with the sole intent of slowing traffic and reducing conflict.
- **"Soft" traffic calming** includes placemaking design measures that have the added effect of traffic calming, as well as educational and enforcement measures.

Not all treatments listed here are appropriate for all roadways. **Figure 3.1** shows a matrix of which treatments are appropriate for certain roadway typologies. The treatments are as follows:

Hard Traffic Calming Treatments

Speed limit reduction - A reduction in speed limit is a simple way to make the roadway a safer place for pedestrians and bicyclists. Statisti-

cally, eighty percent of pedestrians struck by a car going 40 mph will die; at 30 mph the likelihood of death is 40 percent. At 20 mph, the fatality rate drops to just 5 percent (The National Highway Traffic Safety Administration)



Road diet - Road diets are a reduction in the number of lanes along a roadway. Typically, these are four lane roads reduced to three lanes (although larger road diets are done as well), often with the addition of bike lanes. This not only improves conditions for bicyclists, but it enhances the pedestrian environment and often improves traffic flow and vehicle-on-vehicle collision rates as well.



Lane narrowing - Lane narrowing is when an excessively large lane is reduced through the striping of a shoulder or the addition of bike lanes. This helps reduce traffic speed and adds dedicated space for bicyclists.



Speed humps/Speed tables - Speed humps are raised areas usually placed in a series

across both travel lanes. Longer humps reduce impacts to emergency vehicles. Some speed hump designs can be challenging for bicyclists, however gaps can be provided in the center or by the curb for bicyclists and to improve drainage. Speed humps can also be offset to accommodate emergency vehicles as seen in the image above. The City currently has not approved a policy for the installation of these devices, although their use is common in US cities with similar climates and street types such as Chicago and Minneapolis. The use of speed humps in Cleveland warrants further discussion.



Traffic Diversion - Motor vehicle traffic volumes affect comfort for bicyclists and pedestrians on local streets. Higher vehicle volumes reduce bicycle and pedestrian comfort and can result in more conflicts. Traffic diversion treatments reduce motor vehicle volumes by completely or partially restricting through traffic on select neighborhood streets such as bicycle boulevards.



Pinchpoints/neckdowns - These are curb extensions placed on both sides of the street, narrowing the travel lane and encouraging all road users to slow down. When placed at intersections, pinchpoints are known as chokers or neckdowns. They reduce curb radii and further lower motor vehicle speeds.



Chicanes - Chicanes are essentially curb extensions arranged in an alternating pattern that require cars to oscillate along a roadway to avoid them. These are effective on long-straight neighborhood streets where speeding is an issue.

Soft Traffic Calming Treatments



Image: www.planetizen.com

Setback reduction - Large setbacks in roadside development are a result of car-oriented development practices which typically locate a large parking lot in the front of the building. Redeveloping these properties with little or no setback creates a sense of enclosure, adds visual stimuli, and creates a seemingly pedestrian environment, all of which help to slow traffic.



Street trees, landscaping and other aesthetic elements - Street trees, landscaping and other aesthetic elements such as art or banners produce a feeling of enclosure and add visual stimuli along a roadway corridor. Green ele-

ments often have added environmental benefits as well.



Street material - Textured street material, such as the use of pavers, creates visual stimuli and a feeling of a special district or pedestrian-oriented area which can help to calm traffic.



Appropriately scaled street lighting - Appropriately scaled street lighting can provide a safer, more inviting and more visible environment for all roadway users. Pedestrian-scaled street lighting along with other improvements such as street trees can alert motorists to a potential presence of pedestrians and bicycles, slowing down traffic in these areas.



Enforcement and awareness measures - Enforcement and awareness measures such as signage, speed traps and educational programs can help to reduce speeding in problem areas. However, the effectiveness of these programs depends adequate frequency and duration.

Intersection Improvements



Minimize curb radius - The size of a curb's radius can have a significant impact on pedestrian comfort and safety. A smaller curb radius provides more pedestrian area at the corner, allows more flexibility in the placement of curb ramps, results in a shorter crossing distance and requires vehicles to slow more on the intersection approach. During the design phase, the chosen radius should be the smallest possible for the circumstances. One effective way of minimizing the curb ramp radius is by adding curb extensions.



High-visibility crosswalks - A marked crosswalk signals to motorists that they must stop for pedestrians and encourages pedestrians to cross at designated locations. Installing crosswalks alone will not necessarily make crossings safer, especially on multi-lane roadways. However, high-visibility crosswalks make crossings more visible to motorists and add a sense of security for pedestrians. High-visibility crosswalks should be combined with advanced stop bars and other tools to increase safety. At mid-block locations, crosswalks can be marked where there is a demand for crossing and there are no nearby marked crosswalks.



Median pedestrian refuge: intersections - Median pedestrian refuges at intersections provide pedestrians with a secure place to stand in case they are unable to walk the entire distance of the crossing in one movement. This is especially important for young, elderly and disabled users in areas where crossing distances are great.



Raised crosswalks and intersections - A raised crosswalk or intersection can eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street. Raised crosswalks should be used where a special emphasis on pedestrians is desired.



Traffic circles - Traffic circles are a type of Horizontal Traffic Calming that can be used at minor street intersections. Traffic circles reduce conflict potential and severity while providing traffic calming to the corridor.



Bicycle intersection treatments - Designs for intersections with bicycle facilities should reduce conflict between bicyclists (and other vulnerable road users) and vehicles by heightening the level of visibility, denoting clear right-of-way and facilitating eye contact and awareness with other modes. Intersection treatments can improve both queuing and merging maneuvers for bicyclists, and are often coordinated with timed or specialized signals.

The configuration of a safe intersection for bicyclists may include elements such as color, signage, medians, signal detection and pavement markings. Intersection design should take into consideration existing and anticipated bicyclist, pedestrian and motorist movements. In all cases, the degree of mixing or separation between bicyclists and other modes is intended to reduce the risk of crashes and increase bicyclist comfort. The level of treatment required for bicyclists at an intersection will depend on the bicycle facility type used, whether bicycle facilities are intersecting, and the adjacent street function and land use.



Curb extensions/bulbouts - Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They are appropriate for any crosswalk where it is desirable

to shorten the crossing distance and there is a parking lane adjacent to the curb.

Intersection parking control - Parking control involves restricting or reducing on-street parking near intersections with high pedestrian activity. Locating parking away from the intersection improves motorist's visibility on the approach to the intersection and crosswalk. Improved sight lines at intersections reduces conflicts between motorists and pedestrians. This can be accomplished in part through the use of bulbouts.



ADA compliant curb ramps - Curb ramps are the design elements that allow all users to make the transition from the street to the sidewalk. There are a number of factors to be considered in the design and placement of curb ramps at corners. Properly designed curb ramps ensure that the sidewalk is accessible from the roadway. A sidewalk without a curb ramp can be useless to someone in a wheelchair, forcing them back to a driveway and out into the street for access.

Mid-block Crossing Treatments



Median pedestrian refuge: island - Median refuge islands are located at the mid-point of a marked crossing and help improve pedestrian safety by allowing pedestrians to cross

one direction of traffic at a time. Refuge islands minimize pedestrian exposure by shortening crossing distance and increasing the number of available gaps for crossing. These can be combined with curb extensions for added traffic calming.



Active warning beacons - Active warning beacons are pedestrian or bicyclist actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways.

Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB).



In-street pedestrian crossing signs - In-street pedestrian crossing signs reinforce the presence of crosswalks and remind motorists of their legal obligation to yield for pedestrians in marked or unmarked crosswalks. This signage is often placed at high-volume pedestrian crossings that are not signalized. This is a low-cost treatment that has shown significant improvements to driver slowing and yielding rates at crosswalks.

Bicycle and Pedestrian Signalized Crossings



Countdown pedestrian signals - Pedestrian signal indicators demonstrate to pedestrians when to cross at a signalized crosswalk. Ideally, all traffic signals should be equipped with pedestrian signal indications except where pedestrian crossing is prohibited by signage.

Countdown pedestrian signals are particularly valuable for pedestrians, as they indicate whether a pedestrian has time to cross the street before the signal phase ends. Countdown signals should be used at all signalized intersections. Designers should allow greater signal timing for crossing along large roadways, areas with a high frequency of pedestrian crossing and areas where seniors or disabled persons are expected.

Accessible pedestrian signals should be used in locations where visual or hearing impaired individuals can be expected. Also consider utilizing a leading pedestrian interval, where pedestrians are allowed in the intersection 3 seconds in advance of vehicles, in areas with frequent motor vehicle and pedestrian traffic



Hybrid Beacons - A hybrid beacon, previously known as a High-intensity Activated Crosswalk (HAWK), consists of a signal-head with two red lenses over a single yellow lens on the major

street, and pedestrian and/or bicycle signal heads for the minor street.

Hybrid beacons are primarily applied at mid-block pedestrian or trail crossings where non-motorized crossing volumes and crossing distance and/or motorized traffic volumes and speeds raise significant safety and accessibility concerns. Hybrid Beacons are also sometimes used to improve non-motorized crossings of major streets at intersections where side-street volumes do not support installation of a conventional traffic signal (or where there are concerns that a conventional signal will encourage additional motor vehicle traffic on the minor street).

Green Infrastructure for the Right of Way

A Contributing factor for including “Green” into the city’s Complete and Green Streets ordinance is the Consent Decree between the Northeast Ohio Regional Sewer District (NEORS) and the Environmental Protection Agency in 2010. A large amount of contaminated stormwater was entering Cleveland’s surrounding water bodies as a result of stress on the combined sewer overflow sewer system (CSO) within the city. For that reason, NEORS has a duty to eliminate or treat 98% of the sewage that exits the CSO system into the surrounding waterways.

Large amounts of impervious surfaces are the main cause of the overburden on the CSO sewer system. Impervious surfaces are those that water cannot freely pass through. These include any surfaces covered by traditional asphalt or concrete such as roadways, parking lots, or buildings. Therefore, reducing the amount of impervious surfaces in Cleveland and increasing opportunities for stormwater infiltration into underlying soils are simple solutions that will help address this problem.

Green infrastructure is an emerging suite of strategies for cleaning polluted runoff and

managing stormwater in the urban environment by mimicking the way water acts in a natural environment: soaking into the ground, being filtered by aquifers or trees and then returning to the water cycle.

During the process of urbanization, the land’s natural cycle is broken due to the loss of pervious, vegetated ecosystems – the oak-hickory forests that blanketed northern Ohio and their replacement by impervious surfaces like pavements and rooftops. These surfaces increase the rate and volume of water that flows into creeks, rivers and lakes, harming aquatic habitat. Streets, in particular, create water-borne pollution due to the various oil and petroleum products that drip on them and heavy metals that fall from vehicles during routine operations like braking.

Additionally, for much of Cleveland the stormwater system and the sewer system are combined into the same pipes. During normal operations, both types of water are cleaned at a treatment plant before entering Lake Erie. However, during extreme weather events, the system overflows due to the high volume of stormwater runoff. These combined sewer overflows (CSOs) discharge raw sewage into Lake Erie.

Consequently, streets are one of the best places to invest in green infrastructure since they can play an outsized role in preventing polluted runoff from entering Lake Erie. Since streets are one of the largest types of impervious surfaces in the City, streetside green infrastructure can help diminish peak stormwater runoff volumes and can treat and infiltrate stormwater before it ever enters the piped system.

The first steps to creating a greener stormwater strategy are a connected street grid, which Cleveland already has to a large degree, and reducing lane widths for automobiles. There are also significant opportunities to increase the right-of-way performance by reducing stormwater runoff through a series of small-scale

green infrastructure facilities that complement the mobility concerns of the Cleveland’s Complete Streets Guidelines. These include: amended soils, street trees, sheet flow dispersion, bio-retention systems and pervious pavements.

In addition to stormwater benefits, streets can also be greened to save energy and reduce greenhouse gas emissions through use of efficient street lighting, recycled construction materials, green construction practices and tree planting.

Amended Soils

Healthy soil provides important stormwater functions: it helps clean pollutants from runoff, supports the growth of trees that contribute to the urban forest and slows the release of stormwater into urban waterways. By protecting and creating healthy soils, Cleveland can do much to protect its streamsides and lakeshores. In the urban environment, soil health can be damaged by excavation, clearing, grubbing and the use of heavy equipment can cause erosion, remove topsoil and compact soil, killing soil microorganisms, removing nutrients, and compressing the voids within soil structure that retain air and water. As streets are constructed preventing such damage during construction can be the most cost-effective way of managing soil quality on-site.

Where construction damage cannot be avoided or existing soils need revitalization, rototilling compost, organic waste, gravelly sand and/or other amendments into existing soils can restore permeability, increase infiltration capacity and improve soil health. Soil amendments can be tailored to provide optimum growing conditions for particular plant communities or to meet different stormwater management goals. Restoring disturbed soils can improve fertility and support vigorous plant growth, allow bio-filtration of urban pollutants and reduce irrigation needs.

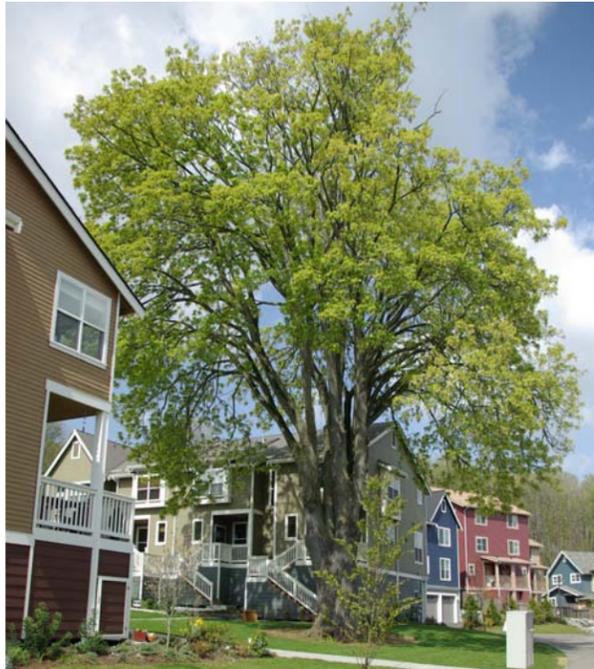


Amended Soils: Amended soils are placed in a bioretention swale (top). Compost amended soils are prepared for shrub (middle) and tree (bottom) planting.

Street Trees

A robust tree canopy is one of the great contributors to a healthy and livable urban landscape. Trees provide many benefits in terms of stormwater flow regulation and water quality treatment. Mechanisms for these benefits include interception, transpiration, and increased infiltration. Additional benefits provided by trees include enhancing the visual and spatial character of a place; improving air quality; reducing noise and light pollution; traffic-calming and reducing the heat island effect. Trees provide numerous habitat benefits, including refuge from predators, food and nesting resources and habitat patches. Trees enhance the quality of open space and provide visual relief within the urban environment, leading to stress reduction and other health benefits. A healthy urban forest also increases property values. Because

trees can take fifteen years or more to develop a full canopy, preserving healthy existing trees wherever practicable is a cost effective and efficient way to obtain the most value from trees.



Street Trees: As part of the urban forest, street trees are incredibly important assets for stormwater capture and storage.

Sheet Flow Dispersion

Using sheet flow dispersion, paved surfaces are graded to evenly spread flows across the entire surface rather than concentrating them. As a result, only a narrow layer of vegetation is needed to further attenuate flows. This technique works well where there are continuous vegetated surfaces adjoining impervious areas.



Sheet Flow Dispersion: The impervious surface is sloped to direct runoff to the side of the street where runoff is treated/infiltrated by the adjacent vegetated surface.

Bioretention

Bioretention facilities use amended soils and vegetation to absorb, hold, evaporate and clean polluted runoff from the streets. By reducing the peak rate and the total runoff volume, these facilities decrease the negative downstream or downslope impacts of storm events. With the right underlying geologic conditions, bioretention systems can be designed to clean stormwater then allow it to infiltrate, thus decreasing transport of some pollutants and recharging groundwater supply. In the right-of-way, bioretention systems can be integrated into site design as linear features (e.g. bioretention swales) or as cells (e.g. rain gardens and stormwater planters). Additional community benefits from bioretention facilities can include improved property values, increased habitat, a better environment for walking, and traffic calming.

Opportunity areas for using bioretention systems in streets include within traffic calming curb bulbouts, in roadside bioswales, and in place of standard landscape plantings on streets.



Bioretention Cells: Bioretention cells are used to treat stormwater and serve as a traffic-calming device, by narrowing travel lanes and reducing pedestrian crossing distances.

Bioretention Cells/Bioretention Swales

Bioretention cells are shallow planted depressions that utilize climate-appropriate plants and soils to retain and treat stormwater. Bioretention cells promote transpiration of stormwater through the vegetation; detention of stormwater in the pores of amended and native soils; cleansing of stormwater through various mechanisms that include sedimentation, filtration, adsorption, and phytoremediation; and retention of stormwater via infiltration into native soils.

Bioretention cells may have underdrains to help convey excess water below the soil surface. Conveyance may be a secondary, but not the primary purpose for bioretention cells. All bioswales perform some amount of conveyance, but those considered to be bioretention systems also allow infiltration of stormwater into surrounding soils.

Bioswales have been shown to remove 70% of total suspended solids, 30% of total phosphorus, 25% of total nitrogen, 50-90% of certain metals, and 67-93% of oil and grease pollutants in stormwater (Davis & McCuen 2005, p. 236). Bioswales are recommended for use adjacent to drive lanes, in place of conventional in-road features (such as curbs and gutters) and as vegetated buffers vehicular and pedestrian areas.

Rain gardens are typically designed with a ponding depth of less than 18" in order to meet small scale flow control and water quality requirements and may be formed in any shape. An overflow, either piped or natural, is typically included to manage higher flows and convey runoff to a public storm drain, channel or natural outlet. The area of a rain garden is generally sized to equal 5% of the area being treated. They can be particularly effective at heavy metal removal; reductions of up to 95% of lead, copper and zinc, and 70-85% of total phosphorus and nitrogen have been noted (Davis & McCuen 2005, p. 241). Rain gardens are useful strategies for managing stormwater in areas adjacent to parking, such as within tree islands, along pedestrian zones, in center roadway medians, and in unused open space, including front yards.



Bioretention Swale: Water flows off of the street and is treated in this streetside bioretention swale.



storm drain system, either via a perforated pipe or via surface flow. Although stormwater planters can be designed without a bottom to allow infiltration, they are typically designed to focus on flow control and attenuation to the public storm drain system. They are particularly effective at handling low intensity storms.

In the right-of-way, stormwater planters are recommended adjacent to buildings, sidewalks and pedestrian plazas where flow control is a significant concern and space is at a premium. Planters can also be designed to serve a conveyance function in the right of way where there is insufficient width to provide sloped sides (i.e., a swale) or the grade would be too steep. Stormwater planters provide aesthetic benefits and, depending on plant selection and design, can provide water, food and nesting materials for birds.

Pervious Paving

Pervious paving technologies provide hard surfaces for walking and driving while allowing stormwater runoff to percolate into an underlying soil or reservoir base where it can infiltrate into native soil or be conveyed off-site via an overflow drainage system. Pervious paving is largely made up of the same components as conventional paving material, but includes more void space to allow runoff to percolate through the pavement section. Void spaces within these pavements trap oils, grease, and other roadway pollutants and create opportunities for micro-organisms to break them down. Additional benefits include reducing impervious surface area, which in turn, reduces stormwater flows off-site.

Pervious paving systems may be used in place of conventional impervious paving in many locations. They are typically used on low-traffic streets, such as residential streets and pedestrian corridors, and are especially appropriate for parking areas, driveways, alleys and sidewalks.



Pervious Concrete: A close-up view of the structure of pervious concrete.



Pervious Concrete: A porous concrete street.

Pervious Concrete

Porous cement concrete generally has a narrower distribution of coarse aggregate and contains less fines than standard concrete. The porous concrete layer is placed atop a 6" to 12" permeable base course that serves as a reservoir, assisting with flow through. This base course can be sized to provide detention, and provides strength for the travel lane. Proper installation of porous cement concrete requires the talents of experienced craftsmen.

Porous cement concrete can often be identified by the "popcorn" or "rice krispie" look of its surface. This surface finish can be mitigated by using smaller aggregate sizes to provide a smoother, more traditional finish. Aggregate sizing can range from as small as 1/4" all the way up to 1".

Porous Asphalt

Porous asphalt is a variation of the standard hot mix asphalt used as a road surface. Porous asphalt omits the fine sand and dust, creating void content of about 18-22% compared to the 2-3% void content of traditional asphalt mixes. This top course is installed as a 2-4" thick layer placed atop a course of coarse aggregate designed to rapidly filter and store water in addition to providing stability. Porous asphalt is slightly easier to install than porous concrete; however, product life tends to be shorter (about 10-12 years) in roadway applications.

In appearance, porous asphalt has a similar finish to standard asphalt. It is generally smoother than porous concrete, making it ideal for bicycle and pedestrian surfaces. Porous asphalt has been shown to reduce runoff by 60-98% (Legret and Colandini 1999) and can reduce total suspended solids in runoff and their associated pollutants by more than 80% (Barrett 2008). It can also increase road safety by reducing splash and spray, providing better visibility and traction, and reducing hydroplaning. Porous asphalt also reduces road noise.



Porous Asphalt: Water soaks into the wearing course of a porous asphalt installation.

Bioretention Planter: Polluted runoff from the street runs into these stormwater planters. If there is too much water, it overflows back onto the curb and continues down the gutter line.

Bioretention Planters

Bioretention planters are similar in design and function to rain gardens, but have a more defined shape and vertical sides, and may employ an impermeable bottom layer or enclosure. The planters are often constructed of concrete, making them well-suited for urban applications where water needs to be directed away from building foundations. Stormwater planters consist of a planter box made of sturdy material, amended soils, a gravel drainage layer, and plants. An overflow is incorporated to manage higher flows and convey runoff to the public

Permeable Pavers

Porous pavers are made for a wide variety of uses, from patios, paths and walkways, to driveways, parking areas and roadways. They come in many shapes, sizes and finishes, ranging from open grid systems with grass or gravel to interlocking porous blocks. Porous pavers tend to be easier and faster to install than porous concrete or porous asphalt, but require more long-term maintenance. They have been shown to reduce virtually all runoff and to substantially reduce runoff pollutant loads, particularly zinc and copper. (Dietz 2007).



Porous Pavers are installed in a residential alley setting.

Recycled Roadway Surface

The use of recycled materials is becoming increasingly commonplace in roadway reconstruction and resurfacing projects across the country. Using materials such as reclaimed asphalt pavement, recycled asphalt shingles, and ground tire rubber in the mixing of the asphalt aggregate can have both great environmental and economical impacts.

For example, the recent resurfacing of Michigan Avenue in Chicago consists of 45 percent recycled content. The project utilized asphalt shingles from about 130 houses, 2,200 recycled car tires and 24 truckloads of reclaimed pavement. It is estimated to be approximately 40 percent less expensive than non-recycled roadway resurfacing projects and has noise dampening benefits on account of the rubber.⁴

⁴ McMahon, Jeff. *Taking Recycling To The Street: Chicago Recycles Michigan Ave.* Forbes Magazine. <http://www.forbes.com/sites/jef-fmcmahon/2012/07/31/taking-recycling-to-the-street-chicago-recycles-michigan-avenue/>



*Euclid Avenue
Bus Rapid Transit Station*

Chapter 3 - Complete and Green Streets Typologies



Overview

As described in Chapter 1, Cleveland's Complete and Green Street Typologies classify the City's roadways into logical categories based on similar physical and contextual characteristics. In order to best accomplish this, streets are classified based on a two tier system.

Tier One classifies streets by their curb to curb width. Classification breaks were set based on the number of vehicular lanes a street currently has. The classifications in this tier are:

- **Very Large** - > 70' pavement width
- **Large** - 69'-48' pavement width
- **Medium** - 48'-30' Pavement Width
- **Small** - < 30' Pavement Width

The **Transit Spine Overlay** and **Access/Alleyways** categories don't fall under a specific tier one classification. The Transit Spine Overlay and the Bicycle Overlay are intended to be applied to different classifications as an overlay. In general, access streets and alleyways in Cleveland vary greatly in width, therefore a particular tier one classification is not appropriate for this typology category.

Tier Two classifies roadways based on context, function and connectivity. These classifications are as follows:

- **Commuter Street** - The current, primary function of these roadways is the efficient movement of motor vehicles. Sufficient accommodations should be made for pedestrians, bicyclists and transit users along these routes where they are expected so as not to deter or discourage use by non-motorized roadway users. Truck traffic should be a consideration.

- **Commercial Street** - These streets have a significant transportation connectivity function and serve as a destination for commercial activity. Roadway priorities should be balanced among motor vehicles, transit, bicyclists and pedestrians. Truck traffic should be a consideration.

- **Neighborhood Street** - These roadways have a significant transportation connectivity function serving residential areas. Roadway priorities should be balanced among motor vehicles, transit, bicyclists and pedestrians.

- **Industrial Street** - These roadways have a significant transportation connectivity function serving industrial areas. The accommodation of large trucks should be a design consideration. Surrounding land use is primarily industrial but may become increasingly business-oriented or commercial, especially as Cleveland land uses change in accordance with the Connecting Cleveland 2020 Citywide Plan. For this reason, pedestrian and bicycle traffic should be expected and provided for and these roadways should be designed with transitioning land use as a major contextual consideration.

- **Neighborhood Street** - These roadways have a local connectivity function serving residential areas. Roadway priorities should be given to pedestrians and bicyclists and providing good access to transit. Providing on-street parking should be a consideration.

- **Commercial Street/Pedestrian Shopping Street** - These roadways have a local connectivity function serving commercial areas. Roadway priorities should be given to pedestrians and bicyclists and providing

good access to transit. Providing on-street parking should be a consideration. Truck access should be a consideration.

- **Transit Spine Overlay** - These are roadways that have been identified as future express bus or Bus Rapid Transit corridors by the Cleveland Regional Transit Authority. However, Transit Spine Overlay treatments may be warranted on Medium to Very Large streets that serve a significant transit function and have excess vehicular capacity. Warrants for the Transit Spine Overlay typology will be discussed in the *Cleveland Complete and Green Streets Design Guide*. It is important to coordinate bicycle and pedestrian accommodations with transit design to ensure access for transit customers.

- **Priority Bikeway Overlay** - While all typologies include accommodations for bicyclists, the Priority Bikeway Overlay uses additional treatments that give roadway priority to bicycle users. These treatments are intended to improve safety, comfort and convenience for bicyclists and encourage them to utilize these routes as much as possible for trips. The Priority Bikeway Overlay is applied to corridors that are identified in the Cleveland Bikeway Master Plan. Additionally, the Priority Bikeway Overlay can be applied to roadways that meet the warrants described in the future *Cleveland Complete and Green Streets Design Guide*.

- **Alleyway/Access** - These roadways have a local access function serving commercial or industrial areas. Roadway priorities should be given to loading vehicles, trucks and possibly pedestrians and bicyclists where good non-motorized connections can be made.

A table of prototypical Cleveland streets that were used in developing the typologies can be found in **Appendix B**

Typology Examples

Typology Cutsheets

The following pages present information on the Complete and Green Streets Typologies developed for the City of Cleveland. These cutsheets depict **potential** improvement options for each of the typology types based on different transportation mode and green treatment priorities. Due to the large palette of different traffic calming and greening techniques and differences in street designs, it is impossible to show all the potential configurations for each typology.

These cutsheets were developed primarily as illustrative examples and should not take the place of the design and engineering process

Not all improvements presented in Chapter 2 are applicable across all typologies. **Figures 3.1, 3.2 and 3.3** on the following pages show which treatments can be applied to each of the Complete and Green Street Typologies. The Priority Bikeway Overlay classification is excluded from these figures since this overlay can be applied to any typology.

Typology Maps

Following the development of the typologies, Cleveland’s street network was classified based on the new typology categories. The classification methodology looked primarily at existing and future land-use and zoning along street corridors, street width, connectivity function (what land uses a street corridor connects and whether it facilitates local or regional connections) and current and future transit. Maps depicting the Complete and Green Streets Typologies applied to Cleveland’s street network can be seen following the typology cutsheets.

It is possible that some roadways can be classified according to multiple typologies. It is also possible that changing land uses over time will cause some typologies depicted in the map to change. Typologies shown on the maps are a starting point for roadway classification, but may not always be used for the selection of design elements.

The graphic to the right presents an overview of the roadway typologies shown in the cutsheets presented in the following section. The graphic shows the existing primary and secondary users of the corridor and how the application of the treatments proposed in the typology cutsheets will affect current user priorities.

Very Large, Commuter Street Proposed Users: Primary   Secondary   	Existing Users: Primary   Secondary   
Very Large, Commercial Connector Proposed Users: Primary    Secondary  	Existing Users: Primary   Secondary   
Very Large, Transit/Priority Bikeway Overlay Proposed Users: Primary     	Existing Users: Primary   Secondary   
Large, Commercial Connector Proposed Users: Primary    Secondary  	Existing Users: Primary   Secondary   
Large, Neighborhood Connector Proposed Users: Primary    	Existing Users: Primary   Secondary   
Large, Industrial Connector Proposed Users: Primary    Secondary  	Existing Users: Primary   Secondary   
Large, Transit/Priority Bikeway Overlay Proposed Users: Primary    Secondary 	Existing Users: Primary and Secondary Users Vary
Medium, Neighborhood Street Proposed Users: Primary    	Existing Users: Primary   Secondary   
Medium, Commercial Street Proposed Users: Primary    Secondary  	Existing Users: Primary   Secondary   
Medium, Industrial Street Proposed Users: Primary    Secondary   <small>Transit not typical</small>	Existing Users: Primary   Secondary  
Medium, Transit/Priority Bikeway Overlay Proposed Users: Primary    	Existing Users: Primary   Secondary   
Small, Neighborhood Street Proposed Users: Primary   Secondary   <small>Transit not typical</small>	Existing Users: Primary   Secondary 
Small, Commercial Street Proposed Users: Primary    Secondary  	Existing Users: Primary   Secondary  
Alleyway/Access Street Proposed Users: Primary   Secondary    <small>Transit not typical</small>	Existing Users: Primary   Secondary  

Figure 3.1 - Traffic Calming Appropriateness Per Complete Streets Typologies



Figure 3.2 - Intersection Improvement Appropriateness Per Complete Streets Typologies



Figure 3.3 - Green Treatment Appropriateness Per Complete Streets Typologies



Very Large, Commuter Street > 70' Pavement Width 💧 = green infrastructure strategies

Example Improved Characteristics

- 4-6 lanes with dedicated turn lanes
- Target speed: 35mph
- High-visibility crosswalks
- Pedestrian-scaled street lighting
- Median stormwater infiltration 💧
- ADA compliant curb ramps and sidewalks
- Accessible Pedestrian Signals
- Pedestrian crossing refuge
- Native and/or drought tolerant plantings 💧
- Bicycle parking

- Reduced impervious surfaces 💧
- Recycled roadway surface 💧
- Median street trees and planting 💧
- Street trees 💧

Option A (higher bus/bike priority)

- Curbside stormwater swales 💧
 - Shared bus/bike lane
- ## Option B
- Bicycle facilities on parallel street
 - Minimum 8' sidewalk or sidepath

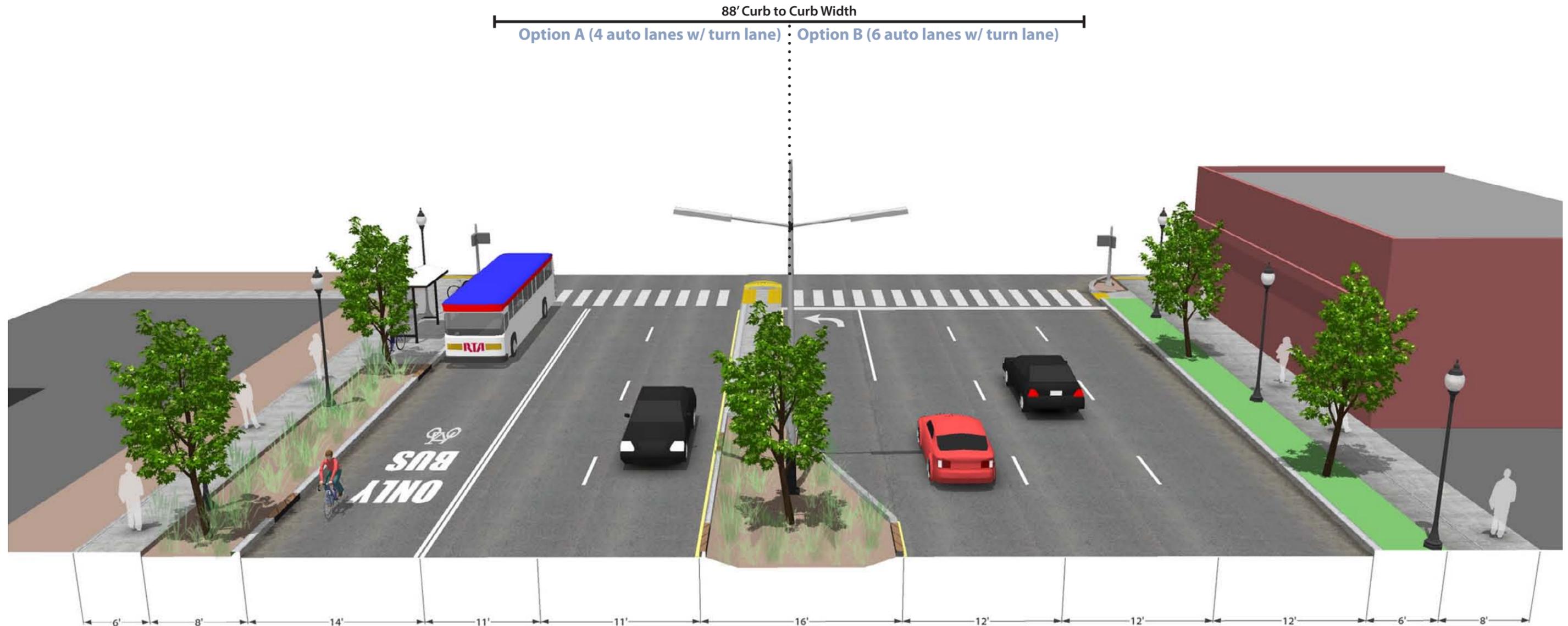
Example Existing Conditions

Curb to Curb Width: 88ft
 Right-of-Way: 120ft
 Land Use: Commercial/Residential
 Connectivity: High
 Lanes: 7
 Speed Limit: 35
 Transit: Bus
 Traffic Calming: None



Proposed Users: Primary **Secondary**

Existing Users: Primary **Secondary**



Very Large, Commercial Street > 70' Pavement Width

💧 = green infrastructure strategies

Example Improved Characteristics

- Lanes: 4-5, target speed: 30mph
- High-visibility crosswalks
- Pedestrian-scaled street lighting
- Street trees 💧
- ADA compliant curb ramps and sidewalks
- Accessible Pedestrian Signals
- Native and/or drought tolerant plantings 💧
- Bicycle parking (including bike corrals)
- Recycled roadway surface 💧
- Curbside bioretention planters

Option A (higher bike/stormwater priority)

- 4 lanes
- Standard or buffered bike lanes
- Permeable pavement
- Curbside continuous bioretention 💧
- Bulbouts with bioretention cells 💧

Option B

- 4 lanes with a planted median/turn lane
- Shared lane markings

Example Existing Conditions

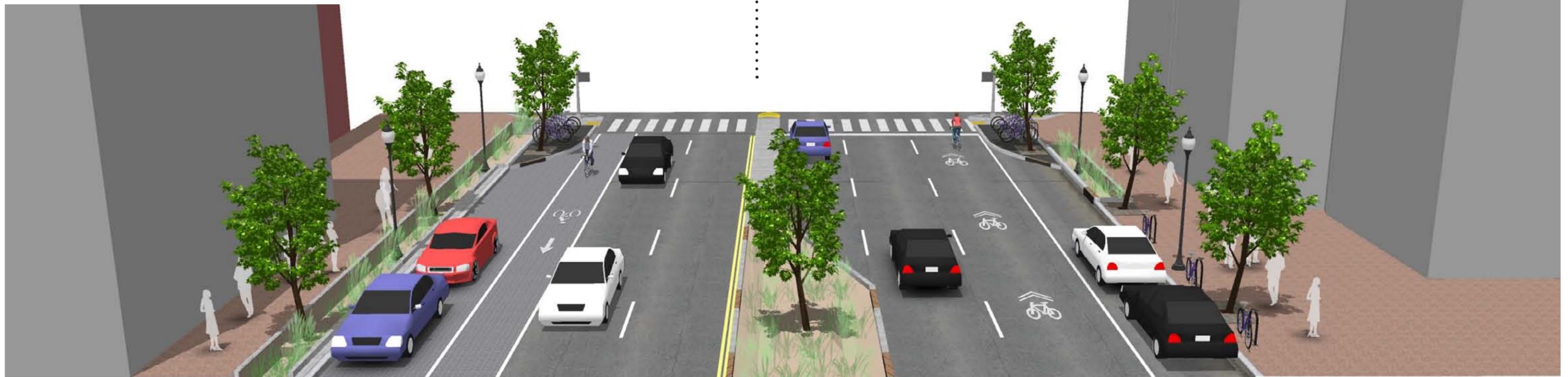
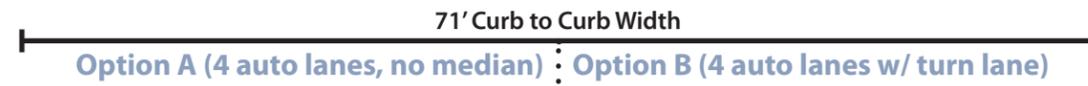
Curb to Curb Width: 71ft
 Right-of-Way: 100ft
 Land Use: Commercial
 Connectivity: Medium
 Lanes: 7
 Speed Limit: 35
 Transit: Bus
 Traffic Calming: None



Proposed Users: Primary 🚗🚲 Secondary 🚌🚐 Existing Users: Primary 🚗🚐 Secondary 🚶🚌🚲

Note: 9' parking lanes are shown here adjacent to 5' bike lanes. Other width configurations or designs (such as parking buffered bike lanes) may be preferred depending on roadway characteristics. The Complete and Green Street Design Guidelines will cover this topic in more detail.

Note: All turn conflicts along protected or buffered bike lanes must be eliminated by using signal protection, turn restrictions, or merging zones. Optional regulatory signage: RIGHT LANE MUST TURN RIGHT – EXCEPT BIKES may be added at intersections.



Shared lanes may include "Bikes May Use Full Lane" Signage (MUTCD R4-11)



Very Large, Transit/Priority Bikeway Overlay > 70' Pavement Width

💧 = green infrastructure strategies

Example Improved Characteristics

- 4 auto lanes with dedicated turn lanes
- Target speed: 35mph
- High-visibility crosswalks
- Pedestrian-scaled street lighting
- Median stormwater infiltration 💧
- ADA compliant curb ramps and sidewalks
- Accessible Pedestrian Signals
- Pedestrian crossing refuge
- Native and/or drought tolerant plantings 💧
- Bicycle parking

- Reduced impervious surfaces 💧
- Recycled roadway surface 💧
- Median stormwater swale 💧
- Street trees 💧

Option A (Transit Overlay)

- Curbside stormwater swales 💧
- Wide shared bike-bus lane (16' preferred)

Option B (Priority Bikeway Overlay)

- Protected or curb-separated bikeway

Example Existing Conditions

Curb to Curb Width: 88ft
 Right-of-Way: 120ft
 Land Use: Commercial/Residential
 Connectivity: High
 Lanes: 7
 Speed Limit: 35
 Transit: Bus
 Traffic Calming: None



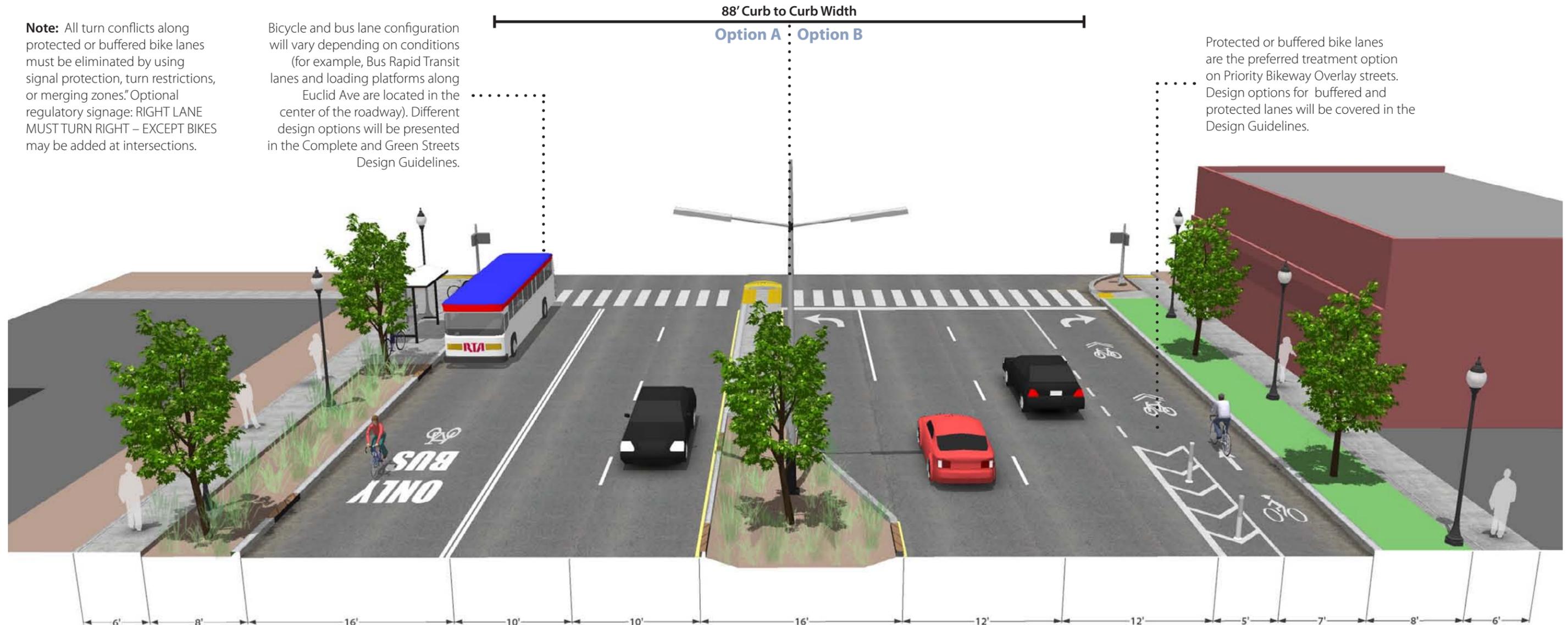
Proposed Users: **Primary** 🚗 🚚 **Secondary** 🚶 🚌 🚲

Existing Users: **Primary** 🚗 🚚 **Secondary** 🚶 🚌 🚲

Note: All turn conflicts along protected or buffered bike lanes must be eliminated by using signal protection, turn restrictions, or merging zones. Optional regulatory signage: RIGHT LANE MUST TURN RIGHT – EXCEPT BIKES may be added at intersections.

Bicycle and bus lane configuration will vary depending on conditions (for example, Bus Rapid Transit lanes and loading platforms along Euclid Ave are located in the center of the roadway). Different design options will be presented in the Complete and Green Streets Design Guidelines.

Protected or buffered bike lanes are the preferred treatment option on Priority Bikeway Overlay streets. Design options for buffered and protected lanes will be covered in the Design Guidelines.



Large, Commercial Street 69'-48' Pavement Width

💧 = green infrastructure strategies

Example Improved Characteristics

- 4 lanes with dedicated left turn lanes
- Target speed: 35mph
- High-visibility crosswalks
- Pedestrian-scaled street lighting
- ADA compliant curb ramps and sidewalks
- Accessible Pedestrian Signals
- Bicycle parking
- Recycled roadway surface
- Native and/or drought tolerant plantings
- Reduced impervious surfaces

Option A (higher bike priority)

- Street trees
- Buffered bike lanes
- Curbside bioretention cells

Option B (higher green infrastructure priority)

- Curbside stormwater swales
- On-street parking
- Bulb-outs with bioretention cells
- Shared lane markings

Example Existing Conditions

Curb to Curb Width: 69ft
 Right-of-Way: 96ft
 Land Use: Commercial/Residential
 Connectivity: High
 Lanes: 6
 Speed Limit: 35
 Transit: Bus
 Traffic Calming: None



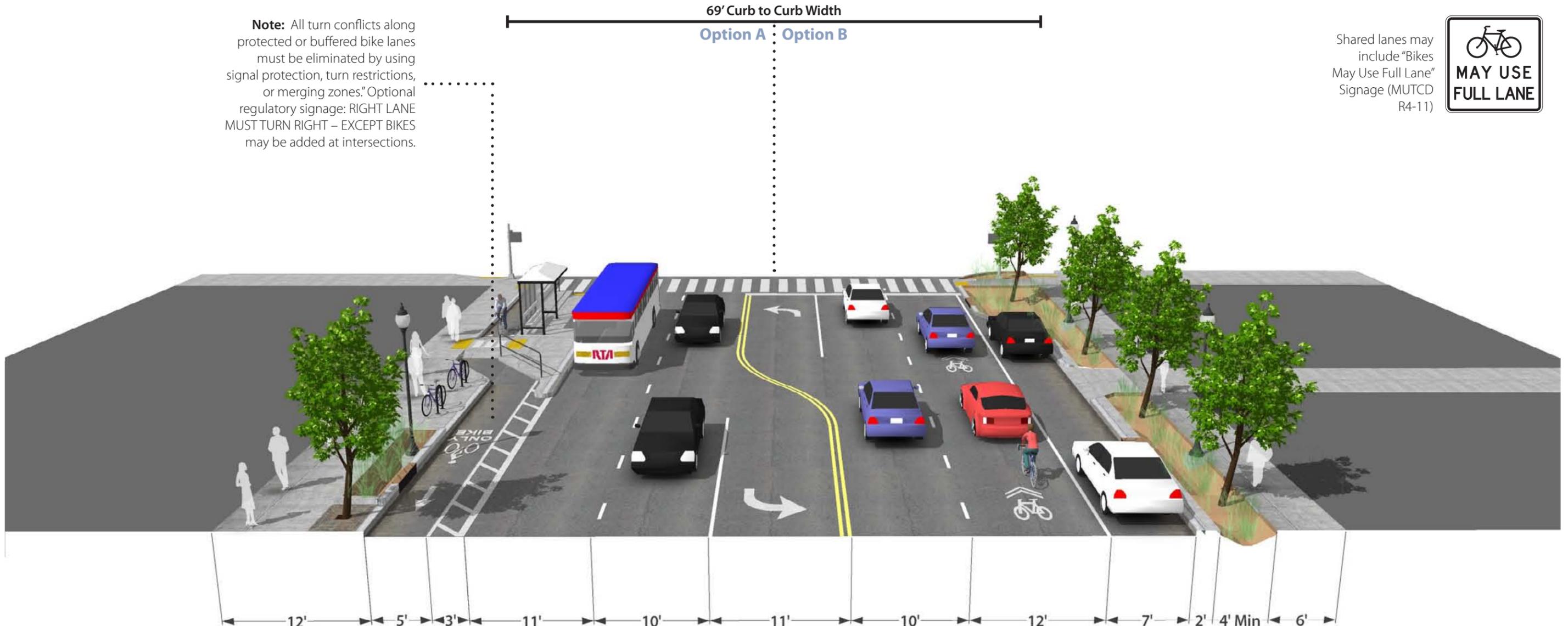
Proposed Users: Primary Secondary

Existing Users: Primary Secondary

Note: All turn conflicts along protected or buffered bike lanes must be eliminated by using signal protection, turn restrictions, or merging zones. Optional regulatory signage: RIGHT LANE MUST TURN RIGHT – EXCEPT BIKES may be added at intersections.

69' Curb to Curb Width
 Option A | Option B

Shared lanes may include "Bikes May Use Full Lane" Signage (MUTCD R4-11)



Large, Neighborhood Street 69'-49' Pavement Width 💧 = green infrastructure treatment

Example Improved Characteristics

- Lanes: 3-4 lanes
- Target speed: 25mph
- High-visibility crosswalks
- Pedestrian-scaled street lighting
- Accessible Pedestrian Signals
- ADA compliant curb ramps and sidewalks
- Recycled roadway surface
- Street trees 💧
- Native and/or drought tolerant plantings 💧
- Reduced impervious surfaces

Option A (higher bike priority)

- On-street parking
- Bike Lanes
- Planted median 💧
- Bulbouts with bioretention 💧
- Retain existing street trees 💧

Option B (higher stormwater priority)

- Shared lane markings
- Curbside bioretention cells/swales 💧

Example Existing Conditions

- Curb to Curb Width: 60ft
- Right-of-Way: 100ft
- Land Use: Residential
- Connectivity: High
- Lanes: 4
- Speed Limit: 25
- Transit: Bus
- Traffic Calming: None



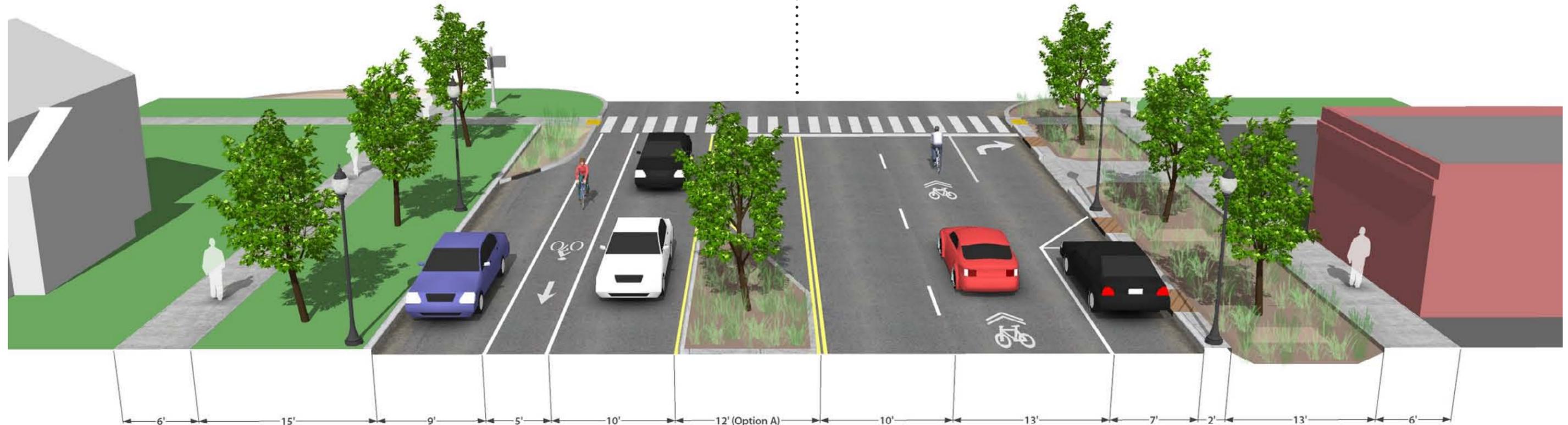
Proposed Users: **Primary**

Existing Users: **Primary** **Secondary**

Note: 9' parking lanes are shown here adjacent to 5' bike lanes. Other width configurations or designs (such as parking buffered bike lanes) may be preferred depending on roadway characteristics. The Complete and Green Street Design Guidelines will cover this topic in more detail.

60' Curb to Curb Width
 Option A (2 auto lanes w/turn lane) | Option B (4 auto lanes, no median)

Shared lanes may include "Bikes May Use Full Lane" Signage (MUTCD R4-11)



Large, Industrial Street 69'-48' Pavement Width 💧 = green infrastructure strategies

Example Improved Characteristics

- Lanes: 2 with center turn lane
- Target speed: 30mph
- High-visibility crosswalks
- Street lighting
- Accessible Pedestrian Signals
- ADA compliant curb ramps and sidewalks
- Curbside stormwater retention 💧
- Native and/or drought tolerant plantings 💧
- Recycled roadway surface 💧
- Street trees 💧

- Planted median (where feasible)
 - Reduced impervious surfaces
- ### Option A (higher bike priority)

- Bike lanes
- Planted median
- Truck compatible bulb-outs with bioretention 💧

Option B

- Pedestrian-scaled street lighting
- Shared lane markings

Example Existing Conditions

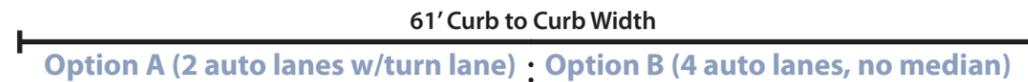
Curb to Curb Width: 61ft
 Right-of-Way: 85ft
 Land Use: Industrial/Office
 Connectivity: Medium
 Lanes: 4
 Speed Limit: 35
 Transit: Bus
 Traffic Calming: None



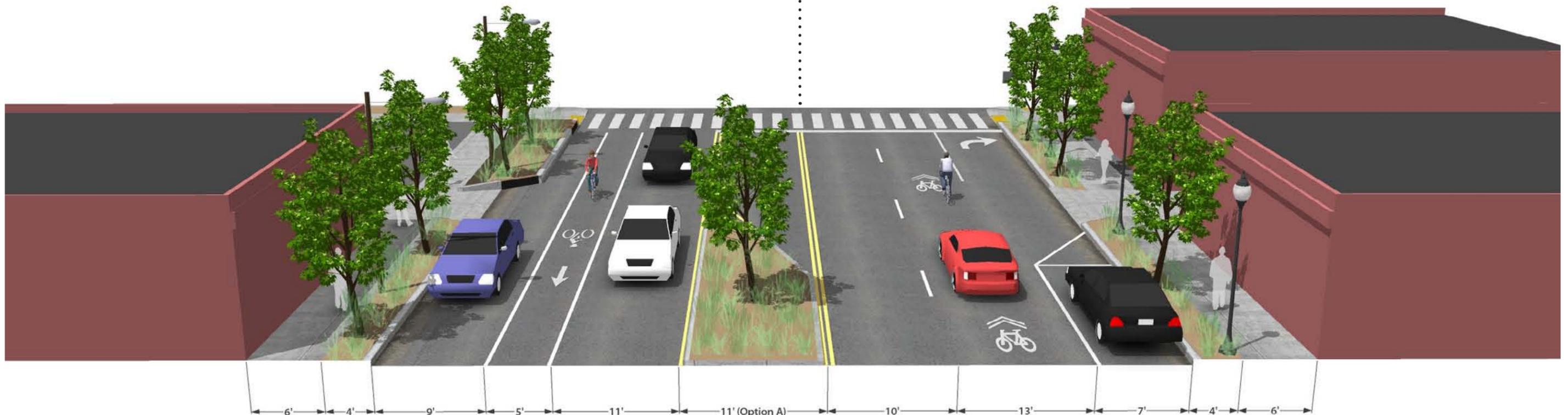
Proposed Users: **Primary** **Secondary**

Existing Users: **Primary** **Secondary**

Note: 9' parking lanes are shown here adjacent to 5' bike lanes. Other width configurations or designs (such as parking buffered bike lanes) may be preferred depending on roadway characteristics. The Complete and Green Street Design Guidelines will cover this topic in more detail.



Shared lanes may include "Bikes May Use Full Lane" Signage (MUTCD R4-11)



Large, Transit/Priority Bikeway Overlay 69'-49' Pavement Width

💧 = green infrastructure strategies

Example Improved Characteristics

- High-visibility crosswalks
- Pedestrian-scaled street lighting
- ADA compliant curb ramps and sidewalks
- Accessible Pedestrian Signals
- Native and/or drought tolerant plantings
- Bicycle parking
- Recycled roadway surface
- Curbside stormwater swales 💧
- Reduced impervious surfaces 💧
- Street trees 💧

- Median with pedestrian refuge (planted where feasible) 💧

Option A (Transit Overlay)

- Dedicated bus lane
- Advanced bus stops
- Protected or buffered bike lane

Option B (Priority Bikeway Overlay)

- Protected or buffered bike lane

Example Existing Conditions

Curb to Curb Width: 73ft
 Right-of-Way: 100ft
 Land Use: Commercial/Industrial
 Connectivity: High
 Lanes: 5
 Speed Limit: 35
 Transit: Bus
 Traffic Calming: None



Proposed Users: **Primary** 🚌🚶🚲 **Secondary** 🚗 Existing Users: **Primary and Secondary Users Vary**

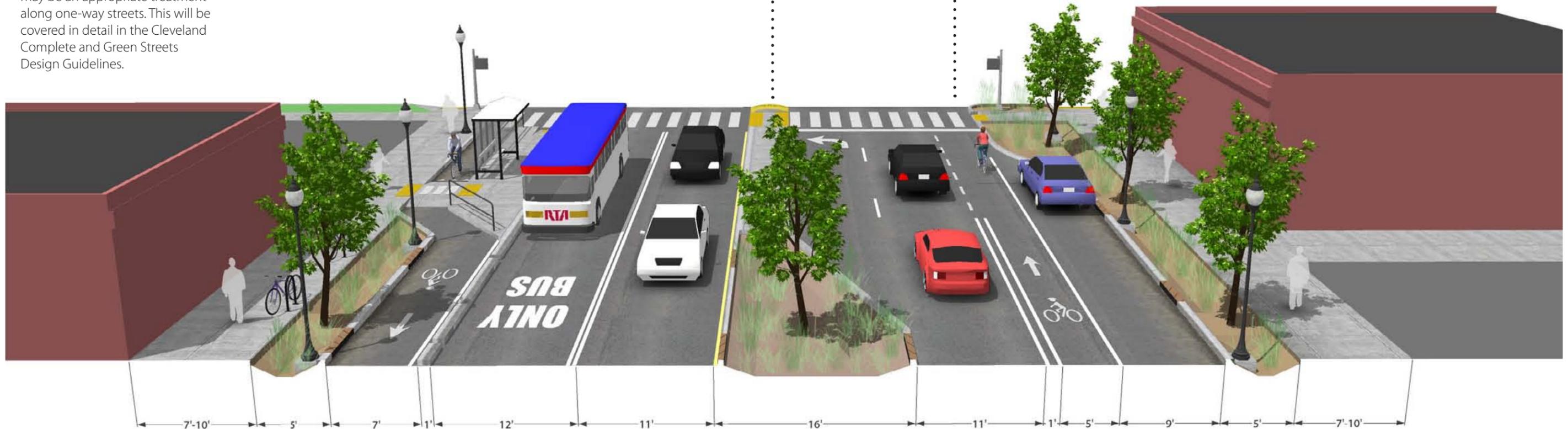
Note: All turn conflicts along protected or buffered bike lanes must be eliminated by using signal protection, turn restrictions, or merging zones. Optional regulatory signage: RIGHT LANE MUST TURN RIGHT – EXCEPT BIKES may be added at intersections.

Note: Contra-flow bicycle lanes may be an appropriate treatment along one-way streets. This will be covered in detail in the Cleveland Complete and Green Streets Design Guidelines.



Protected or buffered bike lanes are the preferred treatment option on Priority Bikeway Overlay streets. Appropriate design options for buffered and protected lanes will be covered in the Design Guidelines.

Note: 9' parking lanes are shown here adjacent to 6' bike lanes. Other width configurations or designs (such as parking buffered bike lanes) may be preferred depending on roadway characteristics. The Complete and Green Street Design Guidelines will cover this topic in more detail.



Medium, Neighborhood Street 48'-30' Pavement Width

💧 = green infrastructure strategies

Example Improved Characteristics

- Lanes: 2
- Target speed: 25mph
- High-visibility crosswalks
- Pedestrian-scaled street lighting
- Accessible Pedestrian Signals
- ADA compliant curb ramps and sidewalks
- Recycled roadway surface 💧
- Street trees 💧
- Native and/or drought tolerant plantings 💧
- Reduced impervious surfaces

Option A (higher bike priority)

- Permeable pavement
- Parking, one side of street
- Bike lanes

Option B

- Parking, both sides of street
- Shared lane markings
- Bulbouts with bioretention 💧
- Mid-block bioretention bulbouts (may include mid-block pedestrian crossings) 💧

Example Existing Conditions

Curb to Curb Width: 40ft
 Right-of-Way: 75ft
 Land Use: Residential
 Connectivity: Medium
 Lanes: 2
 Speed Limit: 35
 Transit: Bus
 Traffic Calming: None

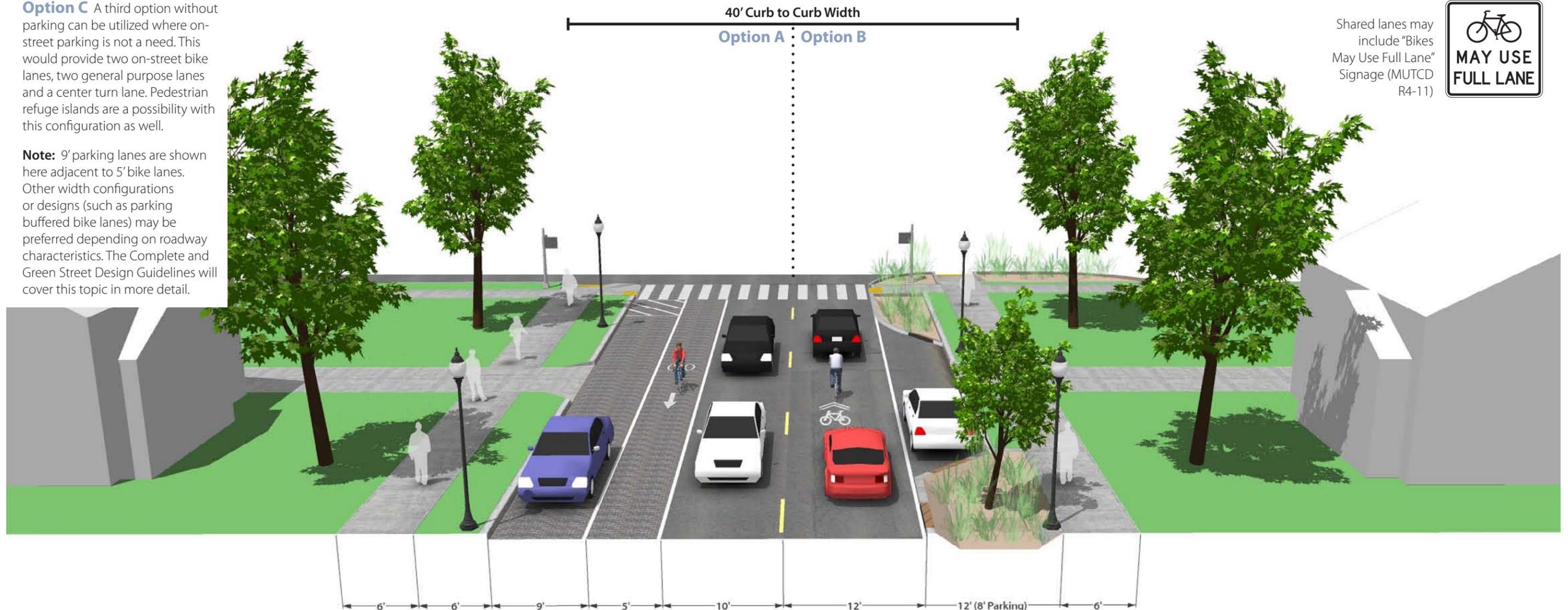


Proposed Users: Primary 🚗🚶🚲🚌

Existing Users: Primary 🚗🚌 Secondary 🚶🚲

Option C A third option without parking can be utilized where on-street parking is not a need. This would provide two on-street bike lanes, two general purpose lanes and a center turn lane. Pedestrian refuge islands are a possibility with this configuration as well.

Note: 9' parking lanes are shown here adjacent to 5' bike lanes. Other width configurations or designs (such as parking buffered bike lanes) may be preferred depending on roadway characteristics. The Complete and Green Street Design Guidelines will cover this topic in more detail.



Shared lanes may include "Bikes May Use Full Lane" Signage (MUTCD R4-11)



Medium, Commercial Street 48'-30' Pavement Width 💧 = green infrastructure strategies

Example Improved Characteristics

- Lanes: 2-3, Target speed: 25 mph
- High-visibility crosswalks
- Pedestrian-scaled street lighting
- ADA compliant curb ramps and sidewalks
- Accessible Pedestrian Signals
- Native and/or drought tolerant plantings
- Parking/loading lane
- Sidewalk furniture
- Street trees
- Bicycle parking (including bike corrals)

- Reduced impervious surfaces

Option A

- Curbside bioretention cells

Option B

- Shared lane markings
- Curbside continuous bioretention
- Bulb-outs with bioretention cells
- Permeable pavement

Example Existing Conditions

- Curb to Curb Width: 40ft
- Right-of-Way: 75ft
- Land Use: Residential
- Connectivity: Medium
- Lanes: 2
- Speed Limit: 35
- Transit: Bus
- Traffic Calming: None



Proposed Users: **Primary** **Secondary** Existing Users: **Primary** **Secondary**



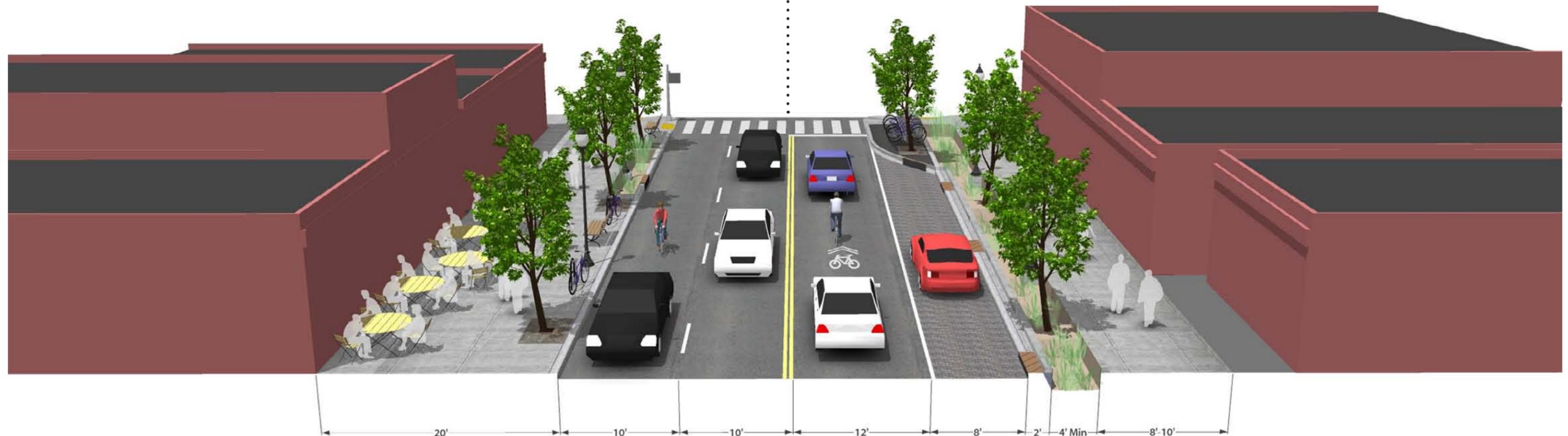
Option A will include "Bikes May Use Full Lane" Signage (MUTCD R4-11)

40' Curb to Curb Width
Option A | Option B



Shared lanes may include "Bikes May Use Full Lane" Signage (MUTCD R4-11)

Option C A third option without parking can be utilized where on-street parking is not a need. This would provide two on-street bike lanes, two general purpose lanes and a center turn lane. Pedestrian refuge islands are a possibility with this configuration as well.



Medium, Industrial Street 48'-30' Pavement Width 💧 = green infrastructure strategies

Example Improved Characteristics

- Lanes: 2
- Target speed: 25 mph
- High-visibility crosswalks
- Street lighting
- Accessible Pedestrian Signals
- ADA compliant curb ramps and sidewalks
- Bicycle parking (includes bike corrals)
- Native and/or drought tolerant plantings 💧
- Recycled roadway surface 💧
- Street trees

- Reduced impervious surfaces

Option A

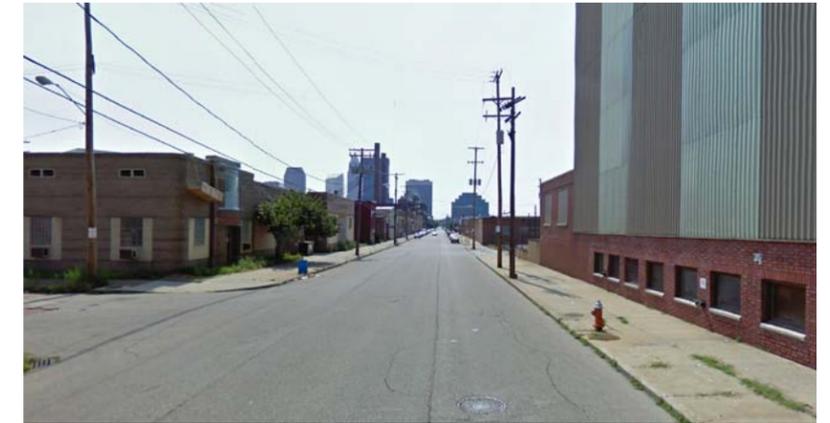
- Parking/loading both sides of street
- Shared lane markings

Option B (higher bike priority)

- Truck compatible bulb-outs with bioretention 💧
- Parking/loading one side of street
- Bike lanes
- Mid-block bioretention bulb-outs 💧

Example Existing Conditions

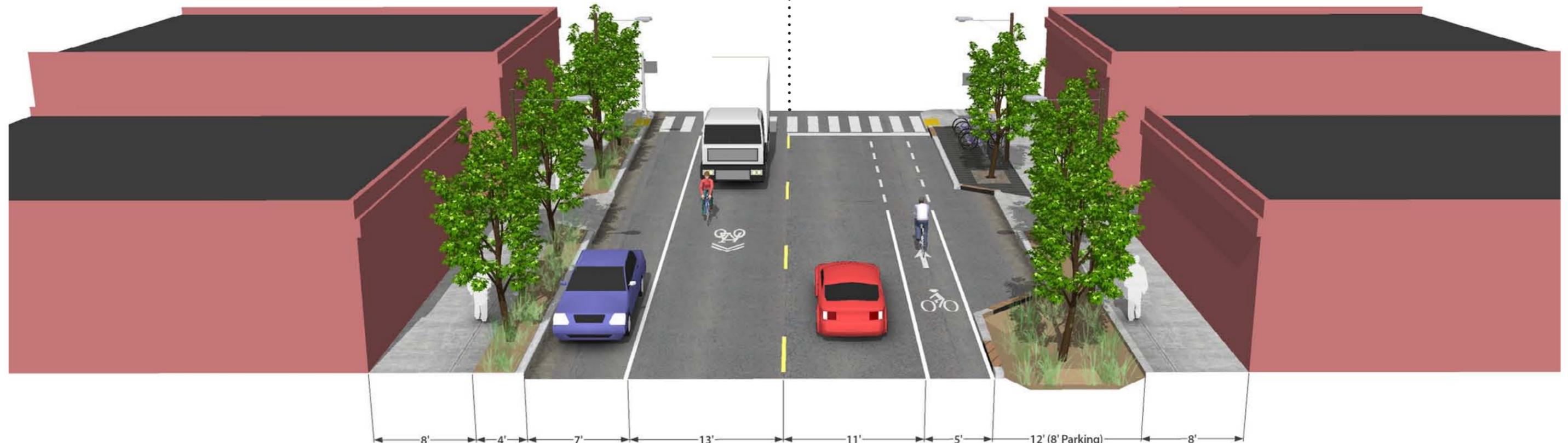
- Curb to Curb Width: 40ft
- Right-of-Way: 66ft
- Land Use: Industrial/Office
- Connectivity: Medium
- Lanes: 2
- Speed Limit: 35
- Transit: None
- Traffic Calming: None



Proposed Users: **Primary** **Secondary** Transit not typical Existing Users: **Primary** **Secondary**

Note: 8' parking lanes are shown here adjacent to 5' bike lanes. Other width configurations or designs (such as parking buffered bike lanes) may be preferred depending on roadway characteristics. The Complete and Green Street Design Guidelines will cover this topic in more detail.

40' Curb to Curb Width
 Option A (parking both sides) | Option B (parking one side)



Shared lanes may include "Bikes May Use Full Lane" Signage (MUTCD R4-11)



Medium, Transit/Priority Bikeway Overlay 48'-30' Pavement Width

💧 = green infrastructure strategies

Example Improved Characteristics

- Lanes: 2
- Target speed: 25mph
- High-visibility crosswalks
- Pedestrian-scaled street lighting
- Accessible Pedestrian Signals
- ADA compliant curb ramps and sidewalks
- Recycled roadway surface 💧
- Street trees 💧
- Native and/or drought tolerant plantings 💧
- Reduced impervious surfaces 💧

Option A (Transit Overlay)

- Dedicated bus pull-offs and waiting areas
- Parking, one side of street
- Bike lanes

Option B (Priority Bikeway Overlay)

- Bulb-outs with bioretention cells
- Mid-block bioretention bulbouts (may include mid-block pedestrian crossing)
- Parking, one side of street
- Bike lanes

Example Existing Conditions

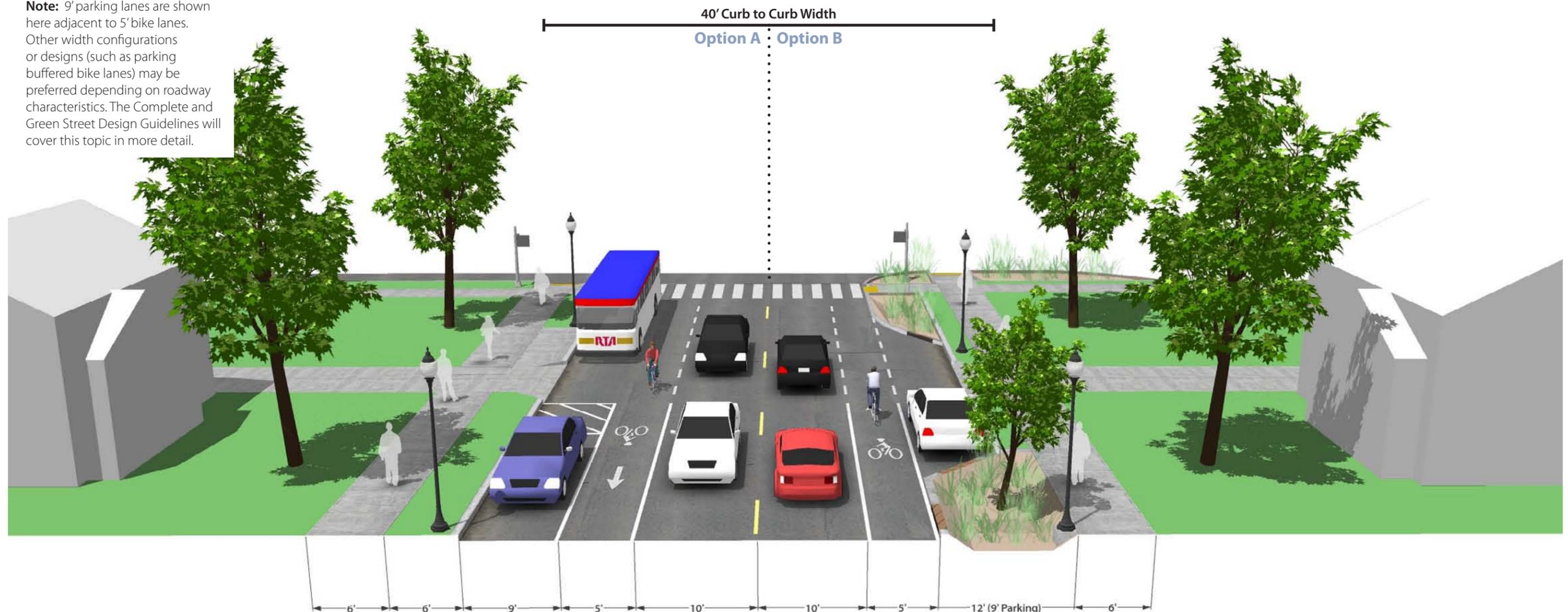
Curb to Curb Width: 40ft
 Right-of-Way: 75ft
 Land Use: Residential
 Connectivity: Medium
 Lanes: 2
 Speed Limit: 35
 Transit: Bus
 Traffic Calming: None



Proposed Users: **Primary** 🚗 🚶 🚲 🚌

Existing Users: **Primary** 🚗 🚘 **Secondary** 🚶 🚌 🚲

Note: 9' parking lanes are shown here adjacent to 5' bike lanes. Other width configurations or designs (such as parking buffered bike lanes) may be preferred depending on roadway characteristics. The Complete and Green Street Design Guidelines will cover this topic in more detail.



Small, Neighborhood Street < 30' Pavement Width 💧 = green infrastructure strategies

Example Improved Characteristics

- Lanes: 1-2
- Target speed: 20 mph
- High-visibility crosswalks
- Pedestrian-scaled street lighting
- Bulb-outs with bioretention cells 💧
- ADA compliant curb ramps and sidewalks
- Recycled roadway surface 💧
- Street trees 💧
- Native and/or drought tolerant plantings 💧

- Curbside bioretention cells 💧
- On street parking
- Intersection traffic calming treatments
- Reduced impervious surfaces 💧

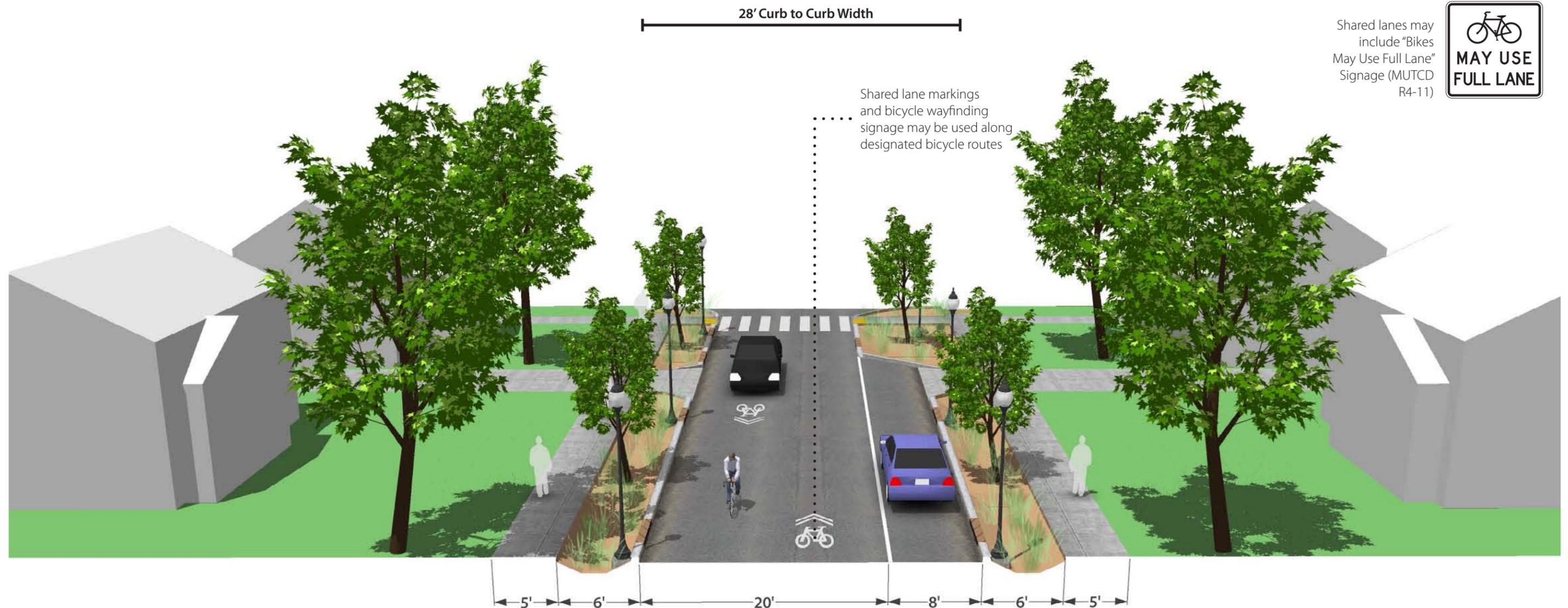
Example Existing Conditions

Curb to Curb Width: 28ft
 Right-of-Way: 48ft
 Land Use: Residential
 Connectivity: Medium
 Lanes: 2
 Speed Limit: 25
 Transit: None
 Traffic Calming: None



Transit not typical

Proposed Users: Primary Secondary **Existing Users:** Primary Secondary



Small, Commercial Street < 30' Pavement Width 💧 = green infrastructure strategies

Example Improved Characteristics

- Lanes: 1
- High-visibility crosswalks
- Pedestrian-scaled street lighting
- Bulb-outs with Bioretention cells 💧
- ADA compliant curb ramps and sidewalks
- Accessible Pedestrian Signals
- Permeable pavement 💧
- Reduced impervious surfaces 💧
- Native and/or drought tolerant plantings 💧

- Parking/loading lane
- Bicycle parking (including bike corrals)
- Sidewalk furniture
- Street trees 💧

Option A

- Curbside continuous bioretention 💧

Option B

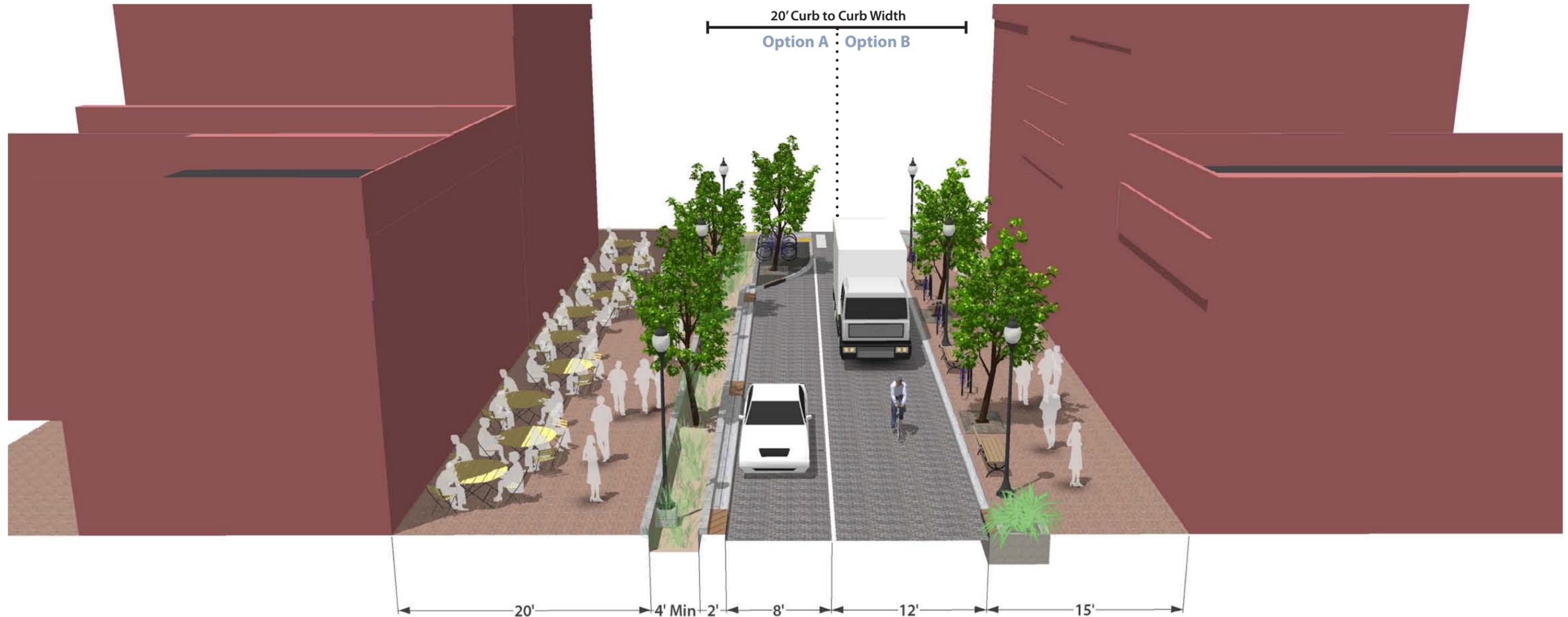
- *Filtterra* or similar stormwater treatment 💧

Example Existing Conditions

- Curb to Curb Width: 20ft
- Right-of-Way: 60ft
- Land Use: Commercial
- Connectivity: Low
- Lanes: 1
- Speed Limit: n/a
- Transit: None
- Traffic Calming: Several types



Proposed Users: **Primary** **Secondary** Existing Users: **Primary** **Secondary**



Alleyways/Access Pavement Width Varies 💧 = green infrastructure strategies

Example Improved Characteristics

- Lanes: 1
- Target speed: 20 mph
- High-visibility crosswalks
- Street lighting
- Accessible Pedestrian Signals
- ADA compliant curb ramps and sidewalks
- Permeable asphalt/concrete or pavers 💧
- Reduced impervious surfaces 💧

Option A (higher parking priority)

- One-way shared lane

- Parking/loading one side of street
- Add tree boxes in parking lane 💧

Option B (higher bike priority)

- No parking, loading zone only
- One-way motor vehicle traffic, two-way bike travel (contra-flow bike lane)

Option C (create linear park)

- Prohibit vehicular access
- Permeable grass pavers or natural surface 💧
- Add pedestrian-scaled lighting

Proposed Users: **Primary**   **Secondary**   

Example Existing Conditions

Curb to Curb Width: 20ft
 Right-of-Way: 40ft
 Land Use: Access
 Connectivity: Low
 Lanes: 1
 Speed Limit: 25
 Transit: None
 Traffic Calming: None



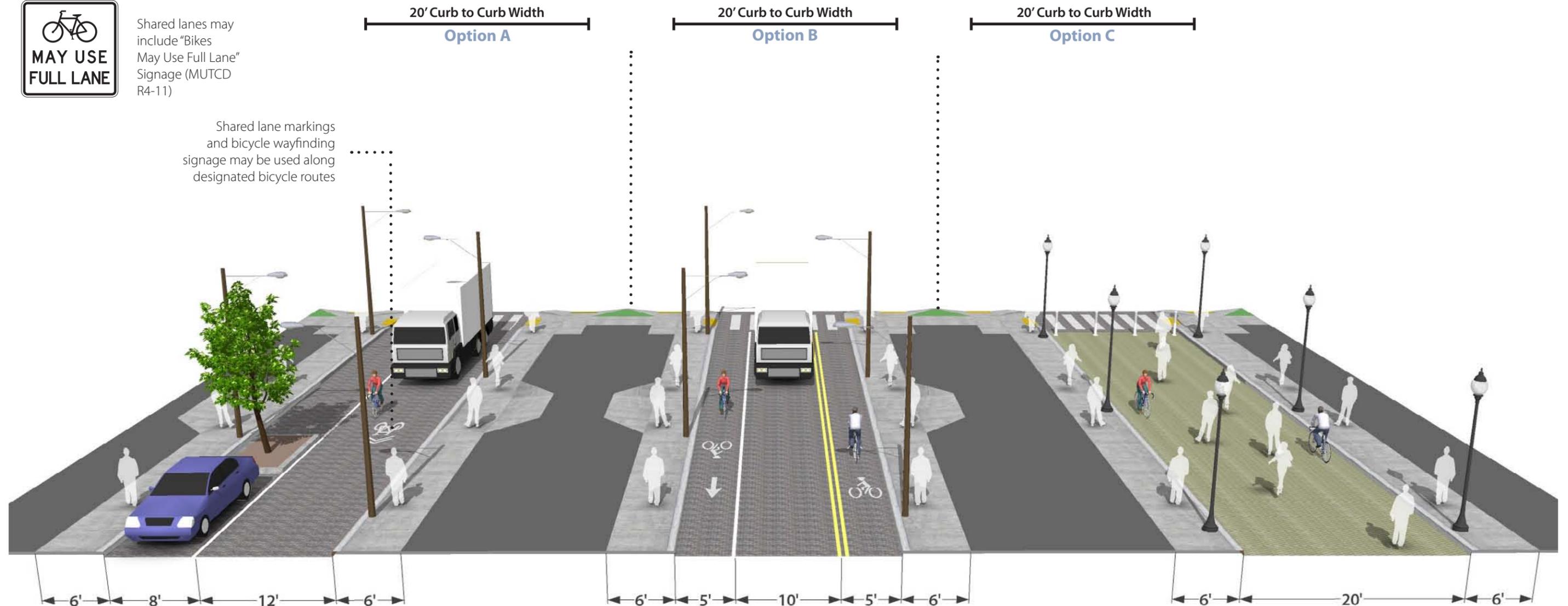
Transit not typical

Existing Users: **Primary**   **Secondary**  



Shared lanes may include "Bikes May Use Full Lane" Signage (MUTCD R4-11)

Shared lane markings and bicycle wayfinding signage may be used along designated bicycle routes

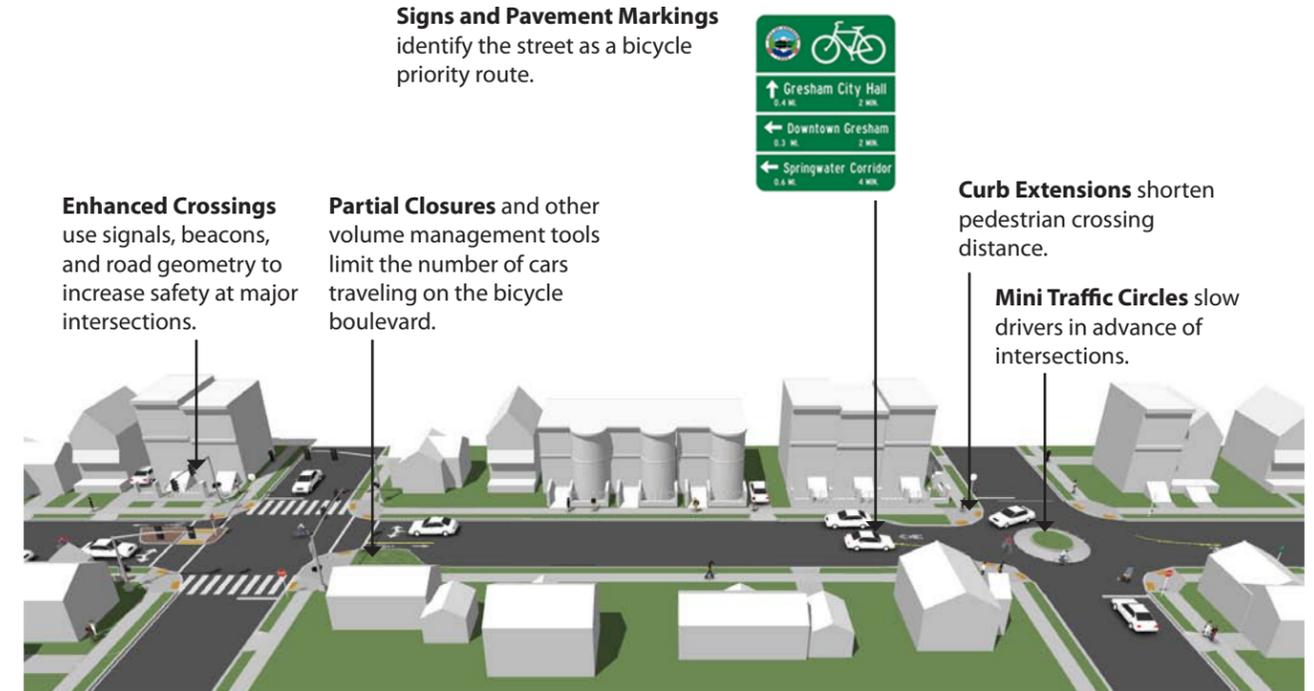


Priority Bikeway Overlay Potential Treatments

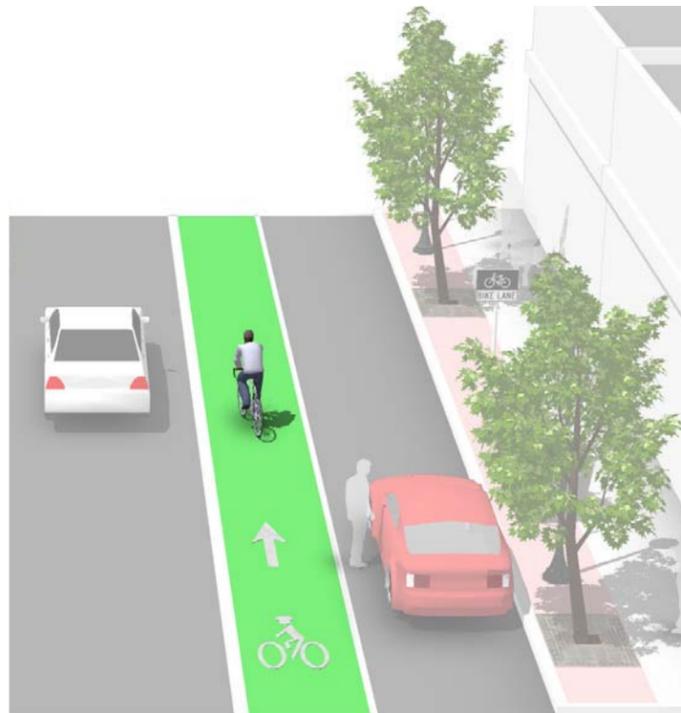
Priority Bikeway Overlay - While all typologies include considerations for bicyclists, the Priority Bikeway Overlay uses additional treatments that give roadway priority to bicycle users. These treatments are intended to improve safety, comfort and convenience for bicyclists and encourage them to utilize these routes as much as possible for trips. The Priority Bikeway Overlay may be applied to corridors that are identified in the Cleveland Bikeway Master Plan. Additionally, the Priority Bikeway Overlay may be applied to roadways that meet the warrants described in the future Cleveland Complete and Green Streets Design Guide.

The treatments on the following two pages highlight some of the design features that may be found along Cleveland Priority Bikeways. The Cleveland Complete and Green Streets Design Guide will provide detailed information on the treatments shown here as well as additional Priority Bikeway treatments such as buffered bicycle lanes, separated multi-use paths, mid-block crossings and cycle tracks.

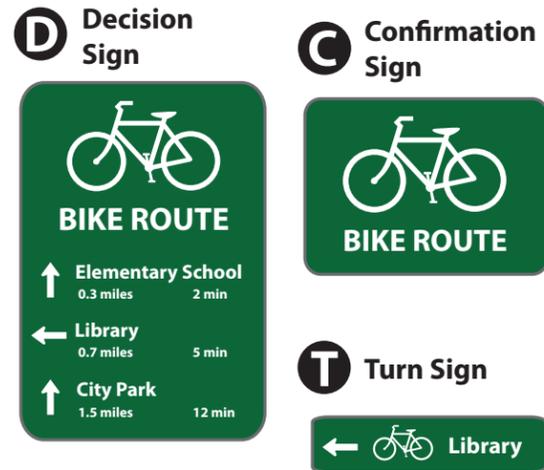
Neighborhood Greenways/Bicycle Boulevards



Colored Pavement for Bikeways and Conflict Areas

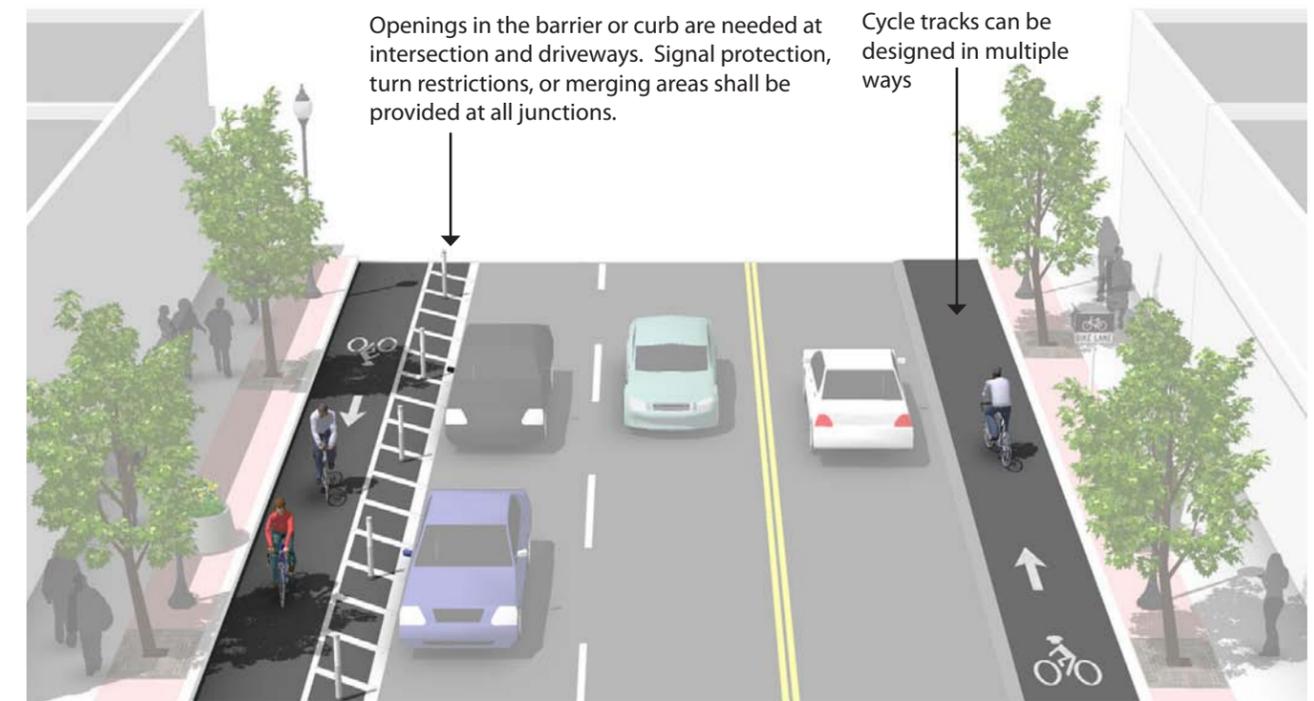


Bicycle Wayfinding Signage

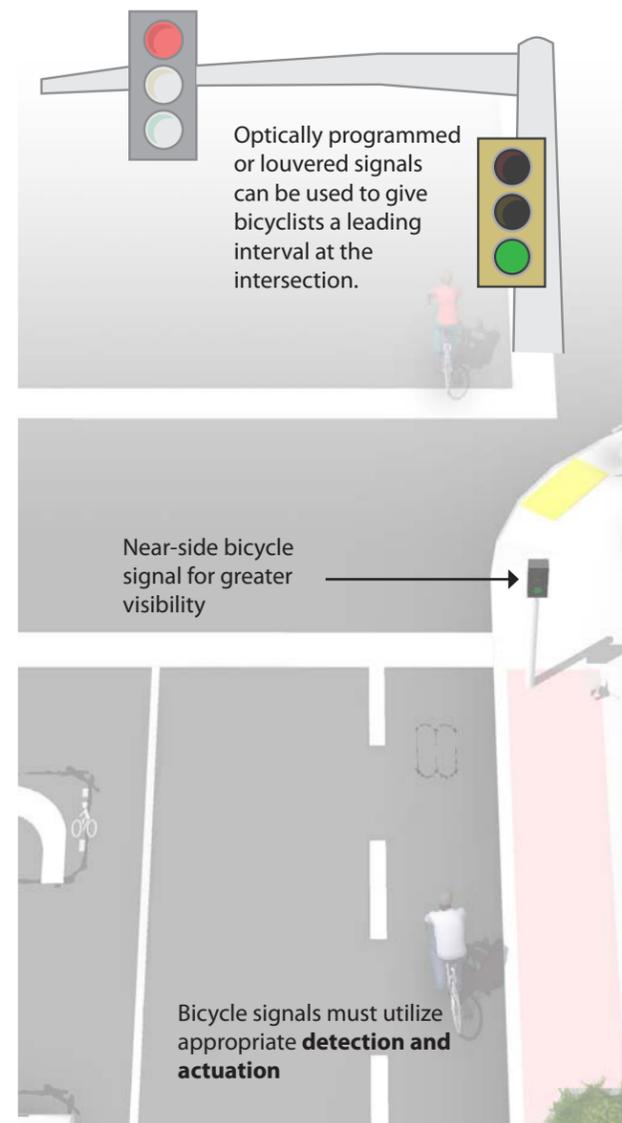
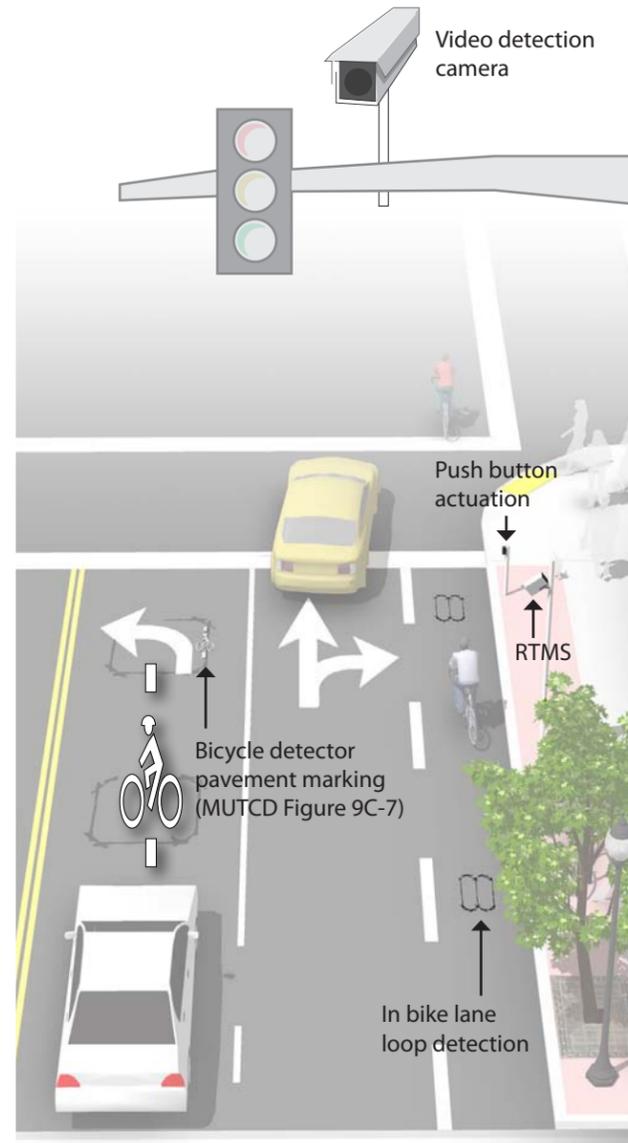


Protected or Separated Bikeways (also known as Cycletracks)

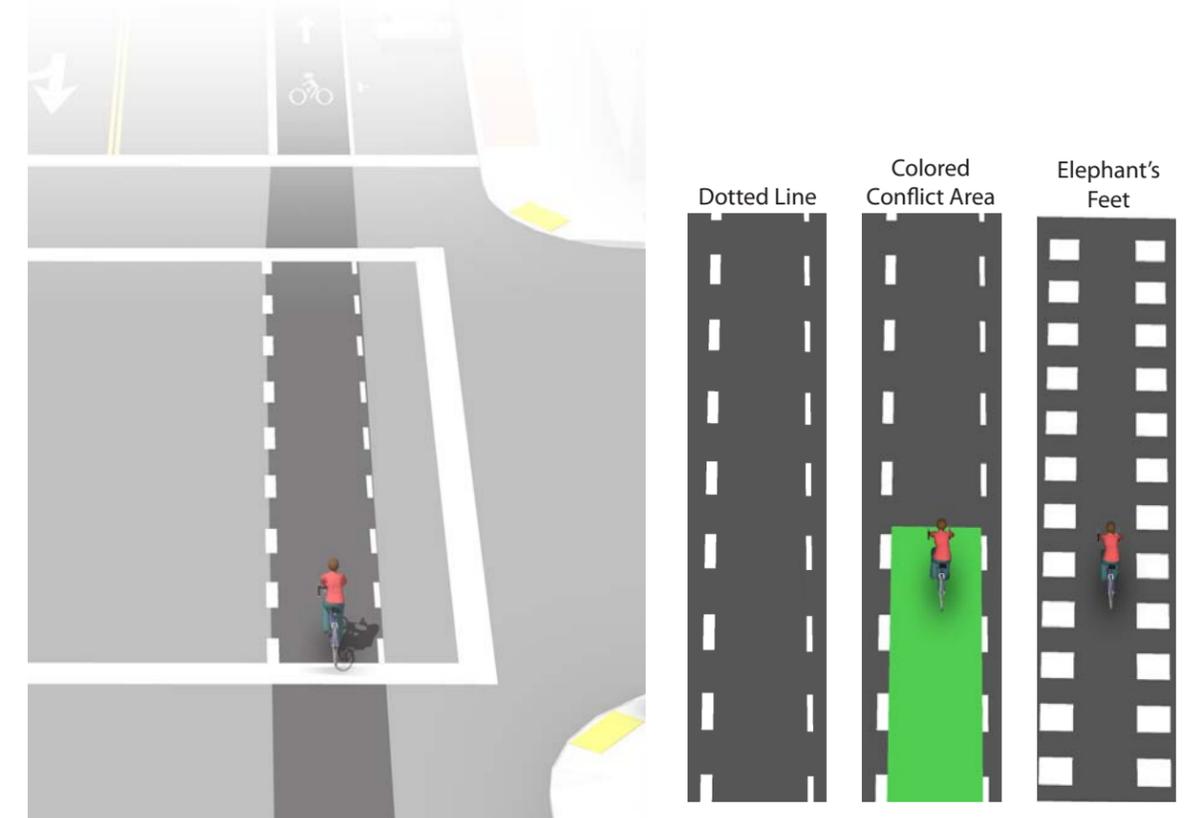
Note: This facility type is appropriate only when turning conflicts at intersections and driveways have been addressed with approved designs.



Bicycle Actuation, Detection and Signalization



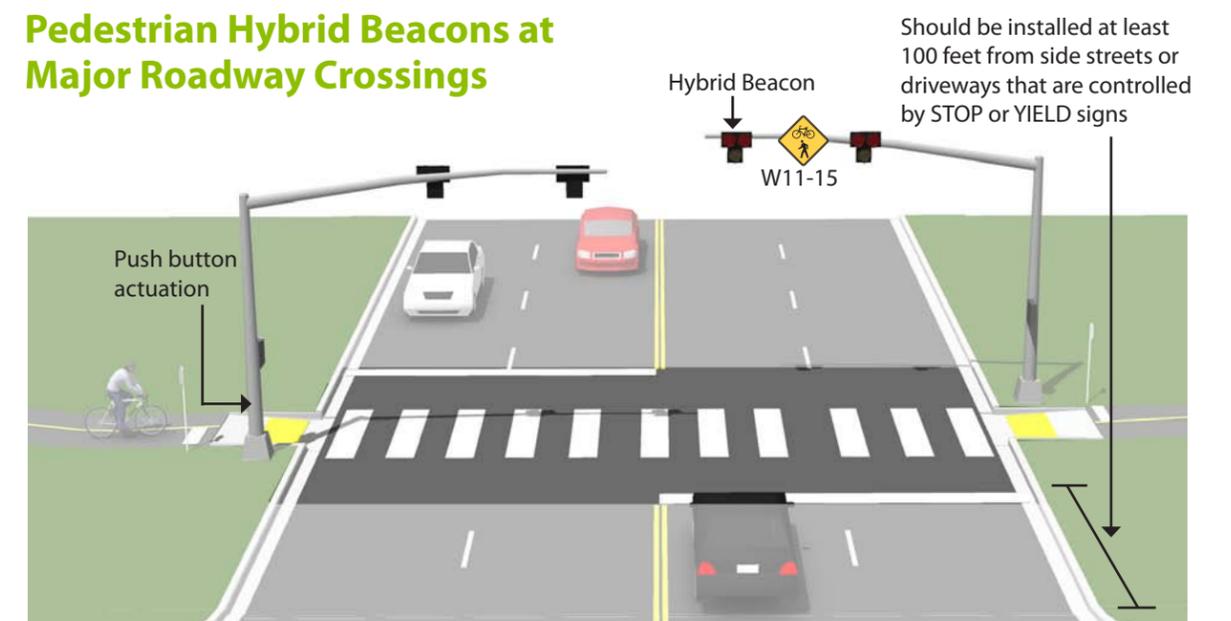
Bicycle Intersection Markings



Bicycle Corrals



Pedestrian Hybrid Beacons at Major Roadway Crossings



Cleveland Complete and Green Streets Typologies

Complete and Green Streets Typologies

- Limited Access,
- Atypical
- Very Large Streets, Commercial
- Very Large Streets, Commuter Street
- Very Large Streets, Industrial
- Large Streets, Commercial
- Large Streets, Industrial
- Large Streets, Neighborhood
- Medium Streets, Commercial
- Medium Streets, Industrial
- Medium Streets, Neighborhood
- Small Streets, Access+Alleys
- Small Streets, Commercial
- Small Streets, Neighborhood
- Access+Alleys
- Transit Spine Overlay
- Priority Bikeway Overlay

Streets Outside of City Limits

Transit Lines

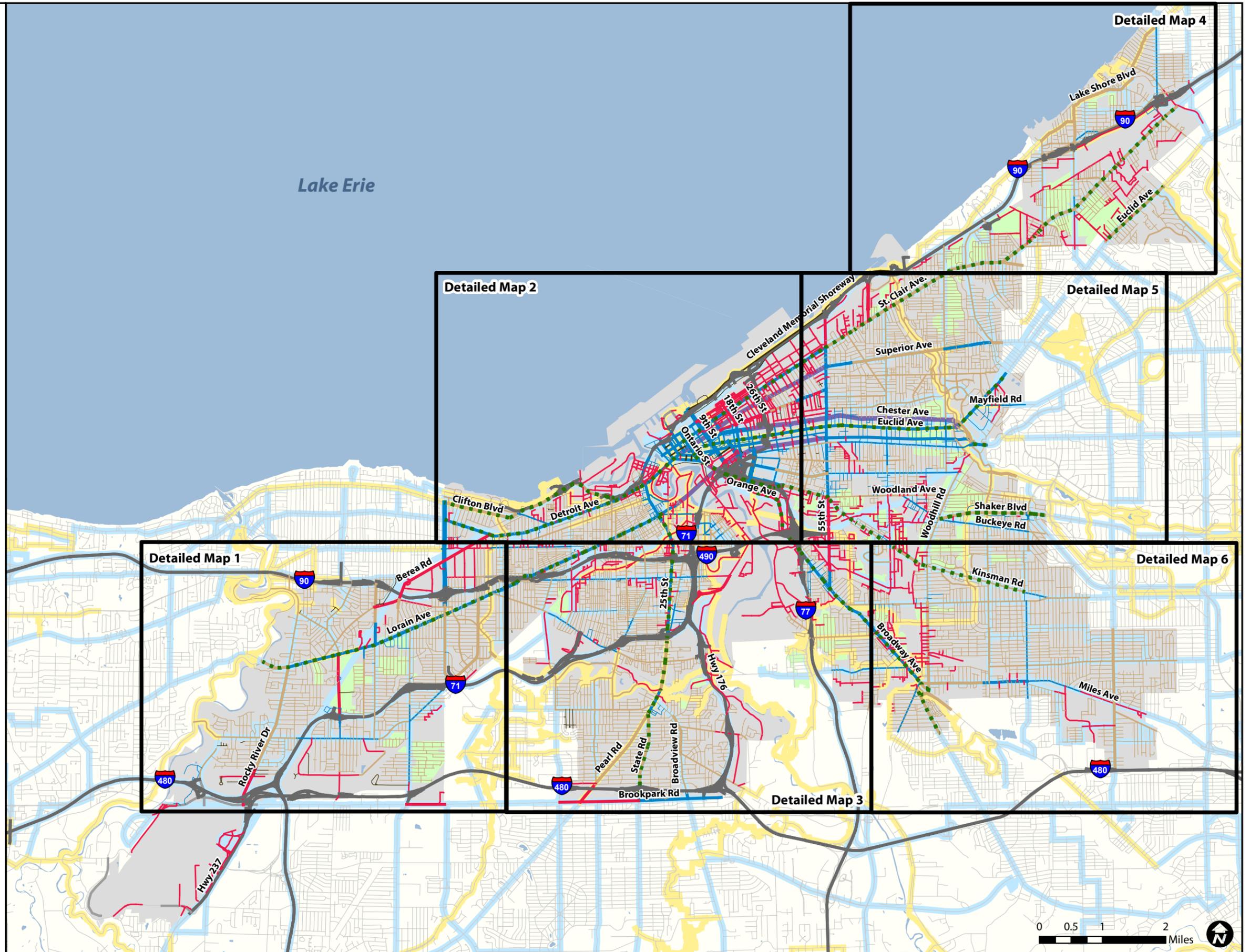
Candidate Green Infrastructure Areas

Water Bodies

Cleveland City Limits

**Overview Map
City of Cleveland, OH**

Sources: City of Cleveland, NOACA
 Date: 8/16/2013
 Authors: JC, SP
 Alta Planning + Design



Cleveland Complete and Green Streets Typologies

Complete and Green Streets Typologies

- Limited Access,
- Atypical
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- Very Large Streets, Commuter Street
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- Large Streets, Commercial
- Large Streets, Industrial
- Large Streets, Neighborhood
- Medium Streets, Commercial
- Medium Streets, Industrial
- Medium Streets, Neighborhood
- Small Streets, Access+Alleys
- Small Streets, Commercial
- Small Streets, Neighborhood
- Access+Alleys
- Transit Spine Overlay
- Priority Bikeway Overlay

Streets Outside of City Limits

Transit Lines



Candidate Green Infrastructure Areas



Water Bodies

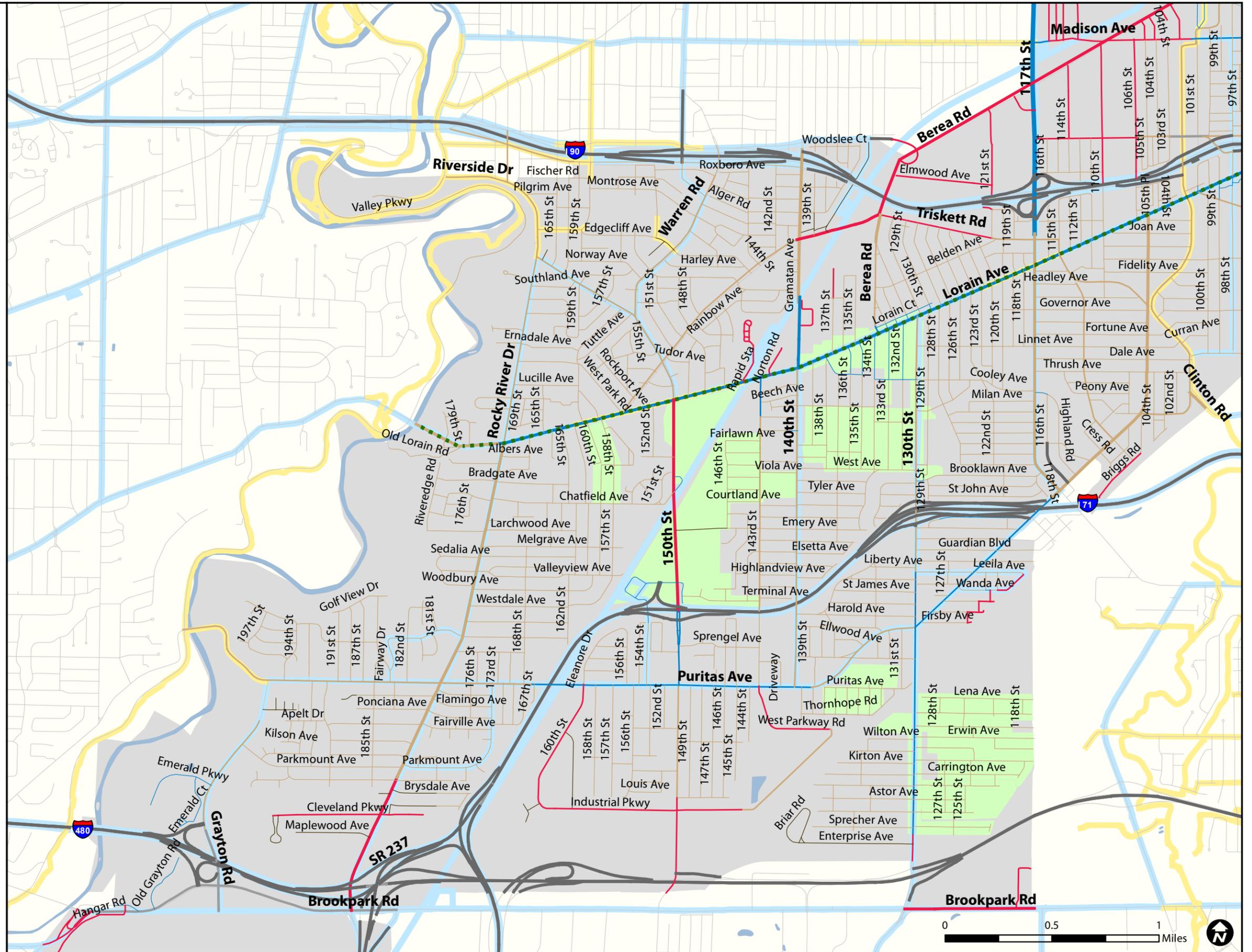


Cleveland City Limits



Detailed Map 1 City of Cleveland, OH

Sources: City of Cleveland, NOACA
 Date: 8/16/2013
 Authors: JC, SP
 Alta Planning + Design



Cleveland Complete and Green Streets Typologies

Complete and Green Streets Typologies

- Limited Access,
- Atypical
- Very Large Streets, Commercial
- Very Large Streets, Commuter Street
- Very Large Streets, Industrial
- Large Streets, Commercial
- Large Streets, Industrial
- Large Streets, Neighborhood
- Medium Streets, Commercial
- Medium Streets, Industrial
- Medium Streets, Neighborhood
- Small Streets, Access+Alleys
- Small Streets, Commercial
- Small Streets, Neighborhood
- Access+Alleys
- Transit Spine Overlay
- Priority Bikeway Overlay

Streets Outside of City Limits

Transit Lines

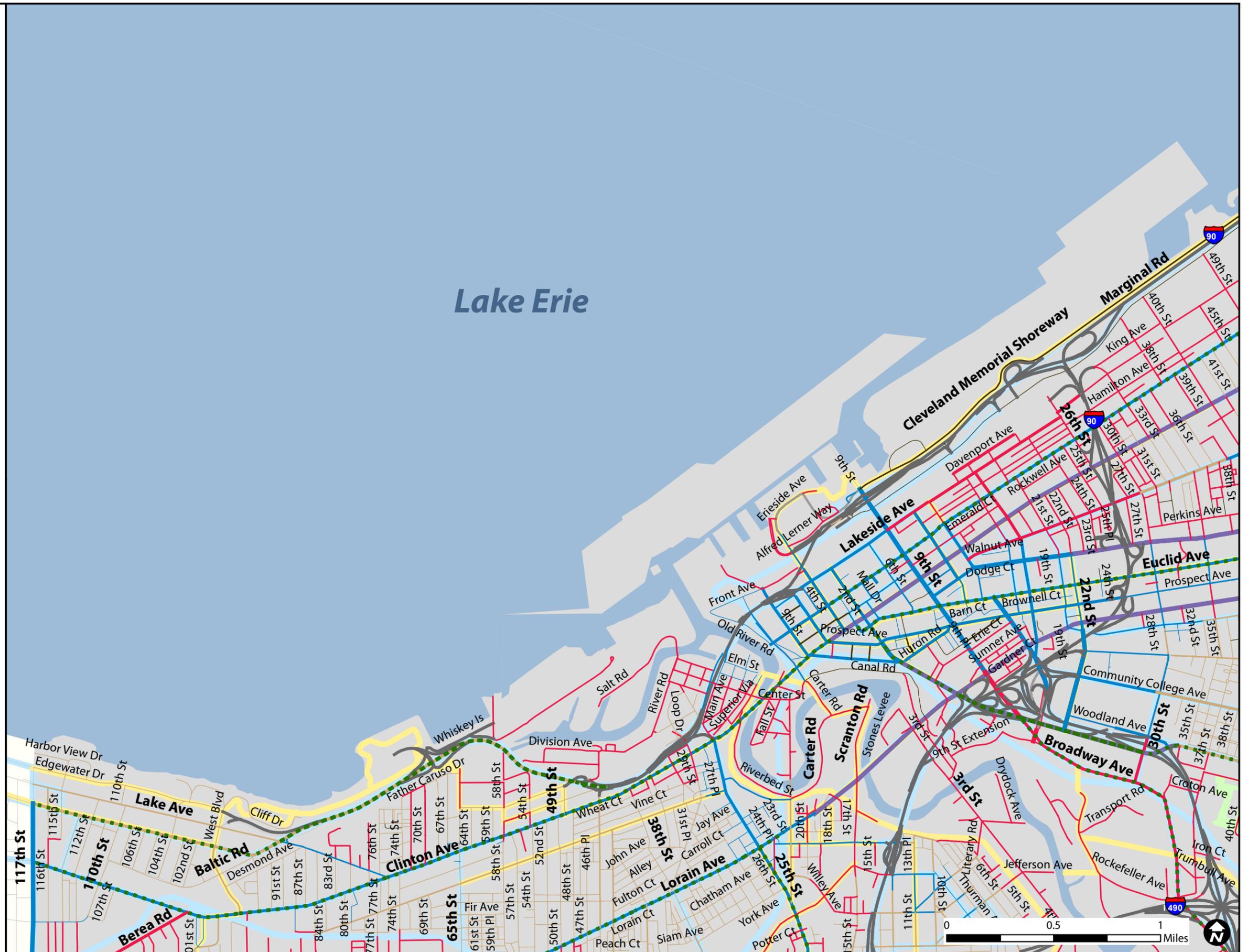
Candidate Green Infrastructure Areas

Water Bodies

Cleveland City Limits

**Detailed Map 2
City of Cleveland, OH**

Sources: City of Cleveland, NOACA
 Date: 8/16/2013
 Authors: JC, SP
 Alta Planning + Design



Cleveland Complete and Green Streets Typologies

Complete and Green Streets Typologies

- Limited Access,
 - Atypical
 - Very Large Streets, Commercial
 - Very Large Streets, Commuter Street
 - Very Large Streets, Industrial
 - Large Streets, Commercial
 - Large Streets, Industrial
 - Large Streets, Neighborhood
 - Medium Streets, Commercial
 - Medium Streets, Industrial
 - Medium Streets, Neighborhood
 - Small Streets, Access+Alleys
 - Small Streets, Commercial
 - Small Streets, Neighborhood
 - Access+Alleys
 - Transit Spine Overlay
 - Priority Bikeway Overlay
- Streets Outside of City Limits**
- Limited Access,
 - Atypical

Transit Lines

- Rapid Transit
- Local Transit

Candidate Green Infrastructure Areas

- Candidate Green Infrastructure Areas

Water Bodies

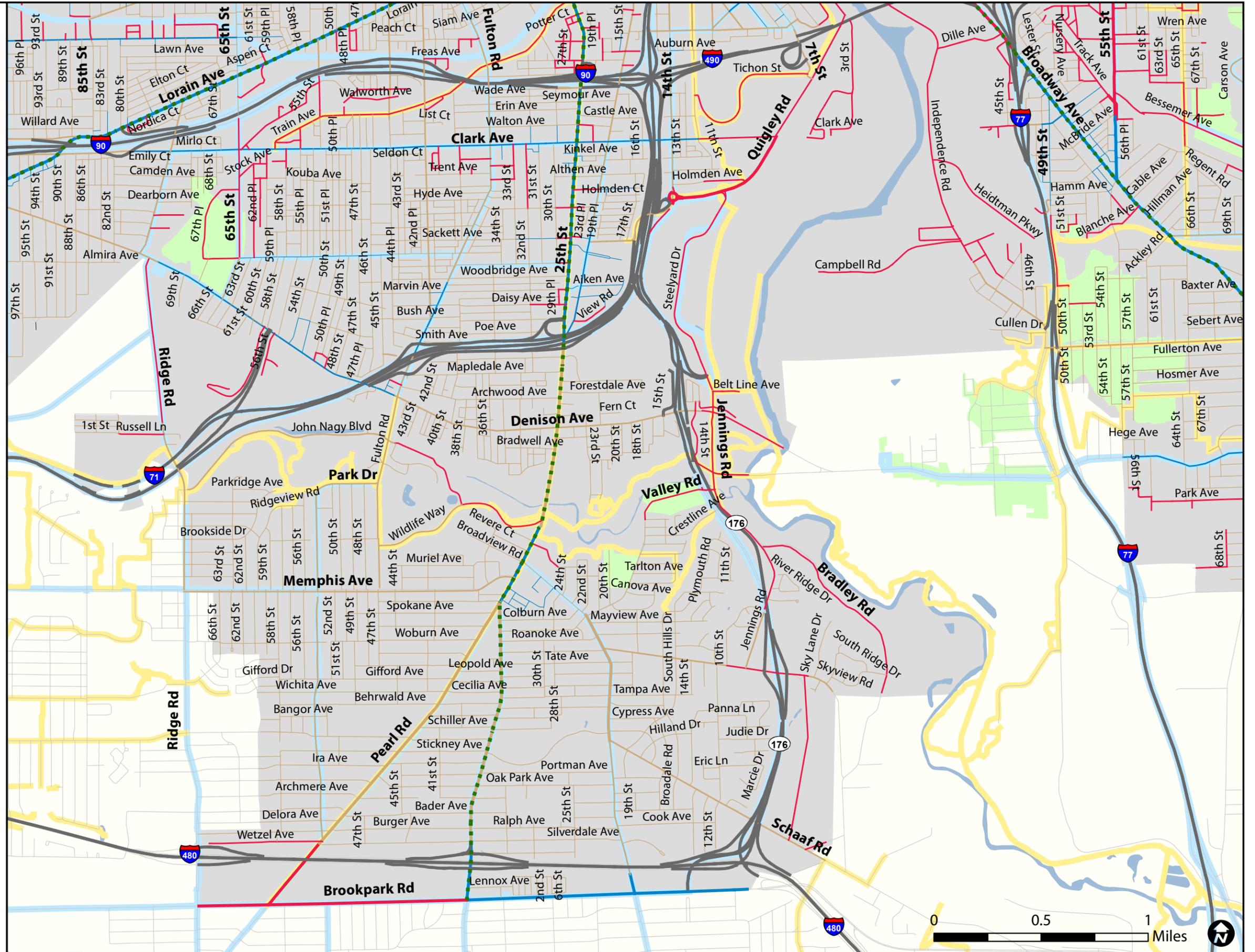
- Water Bodies

Cleveland City Limits

- Cleveland City Limits

Detailed Map 3 City of Cleveland, OH

Sources: City of Cleveland, NOACA
 Date: 8/16/2013
 Authors: JC, SP
 Alta Planning + Design



Cleveland Complete and Green Streets Typologies

Complete and Green Streets Typologies

- Limited Access,
- Atypical
- Very Large Streets, Commercial
- Very Large Streets, Commuter Street
- Very Large Streets, Industrial
- Large Streets, Commercial
- Large Streets, Industrial
- Large Streets, Neighborhood
- Medium Streets, Commercial
- Medium Streets, Industrial
- Medium Streets, Neighborhood
- Small Streets, Access+Alleys
- Small Streets, Commercial
- Small Streets, Neighborhood
- Access+Alleys
- Transit Spine Overlay
- Priority Bikeway Overlay

Streets Outside of City Limits

-

Transit Lines

-

Candidate Green Infrastructure Areas

-

Water Bodies

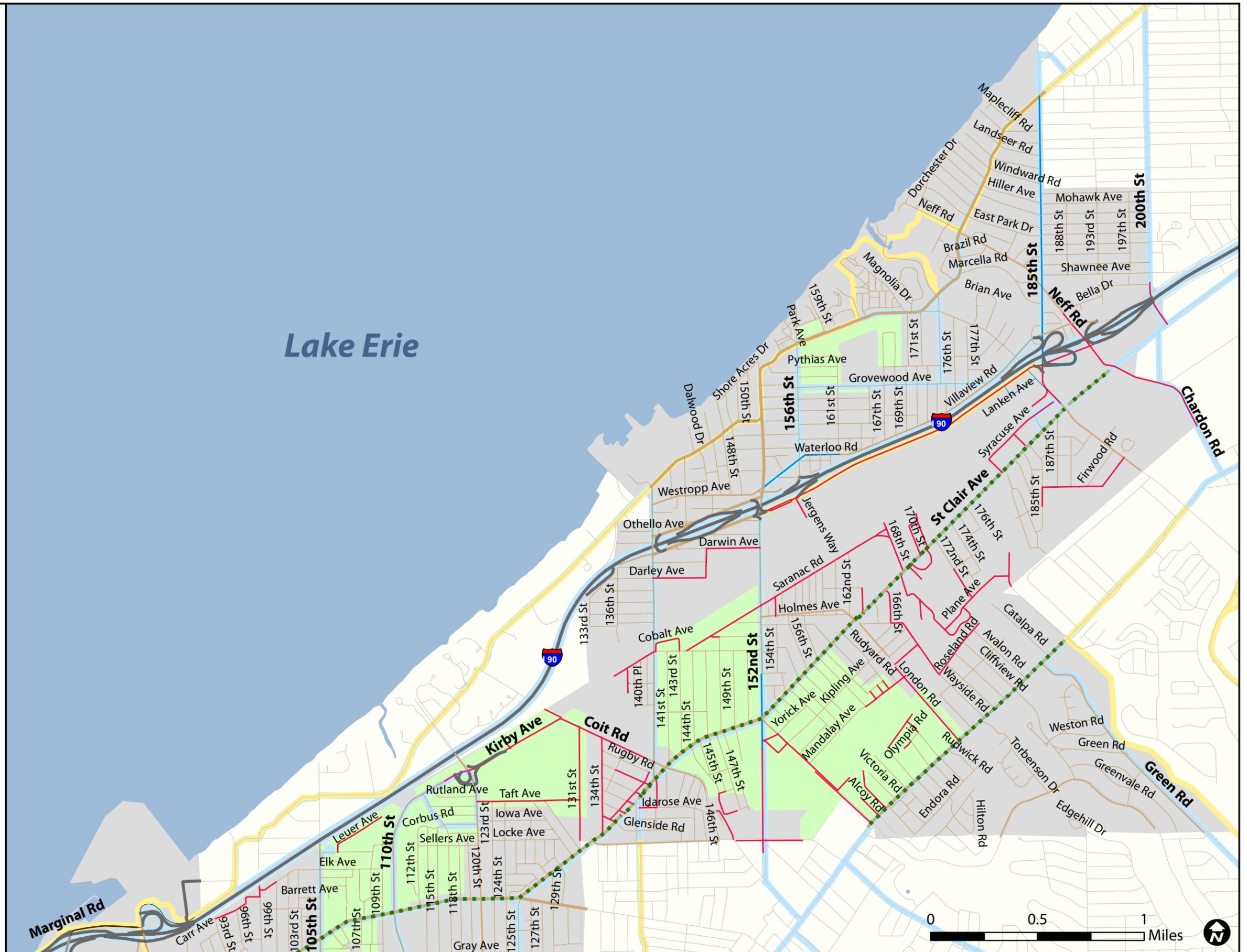
-

Cleveland City Limits

-

Detailed Map 4 City of Cleveland, OH

Sources: City of Cleveland, NOACA
 Date: 8/16/2013
 Authors: JC, SP
 Alta Planning + Design



Cleveland Complete and Green Streets Typologies

Complete and Green Streets Typologies

-  Limited Access,
-  Atypical
-  Very Large Streets, Commercial
-  Very Large Streets, Commuter Street
-  Very Large Streets, Industrial
-  Large Streets, Commercial
-  Large Streets, Industrial
-  Large Streets, Neighborhood
-  Medium Streets, Commercial
-  Medium Streets, Industrial
-  Medium Streets, Neighborhood
-  Small Streets, Access+Alleys
-  Small Streets, Commercial
-  Small Streets, Neighborhood
-  Access+Alleys
-  Transit Spine Overlay
-  Priority Bikeway Overlay

Streets Outside of City Limits

-  Street

Transit Lines

-  Transit Line

Candidate Green Infrastructure Areas

-  Candidate Green Infrastructure Area

Water Bodies

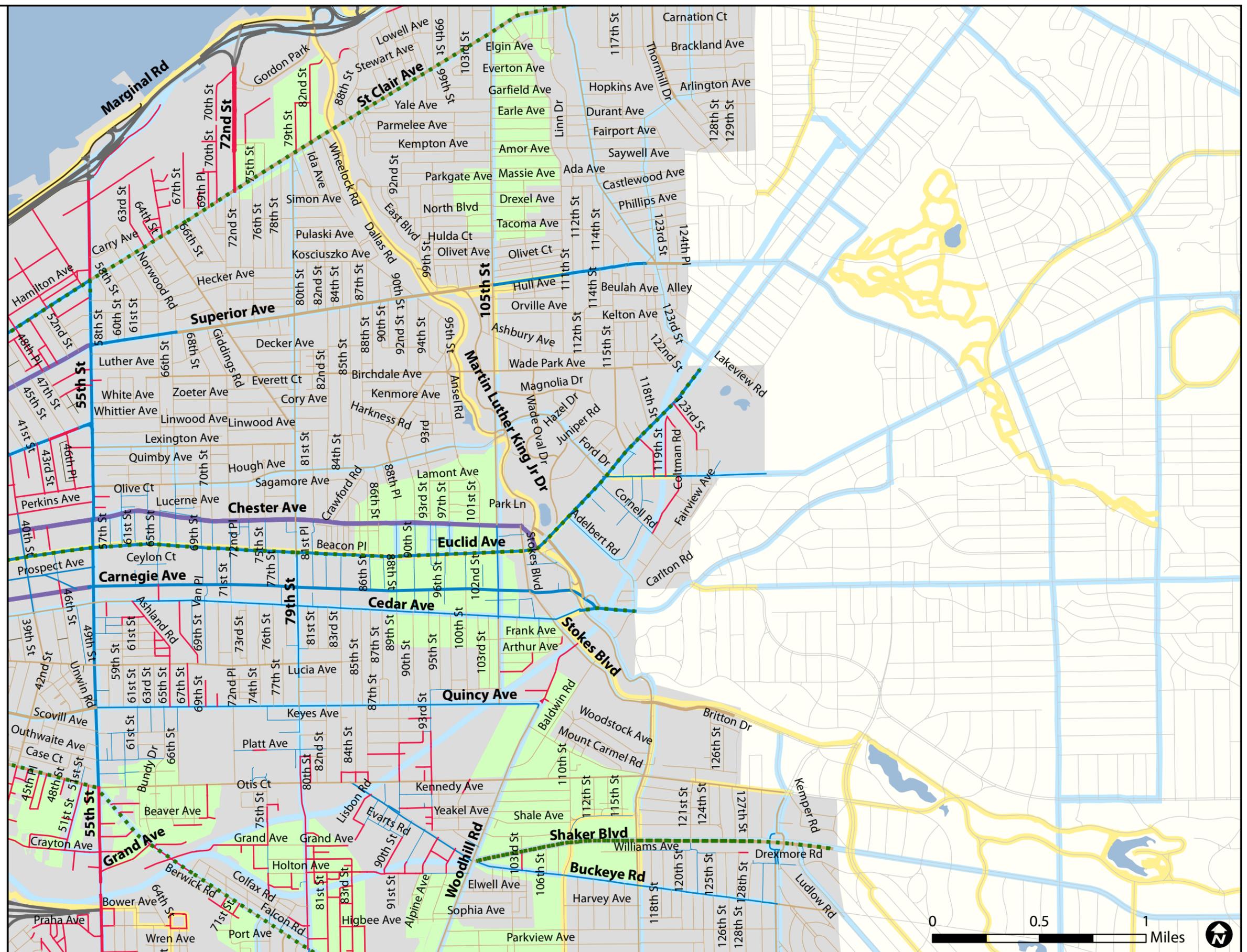
-  Water Body

Cleveland City Limits

-  Cleveland City Limits

Detailed Map 5 City of Cleveland, OH

Sources: City of Cleveland, NOACA
 Date: 8/16/2013
 Authors: JC, SP
 Alta Planning + Design



Cleveland Complete and Green Streets Typologies

Complete and Green Streets Typologies

- Limited Access,
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- Very Large Streets, Commercial
- Very Large Streets, Commuter Street
- Very Large Streets, Industrial
- Large Streets, Commercial
- Large Streets, Industrial
- Large Streets, Neighborhood
- Medium Streets, Commercial
- Medium Streets, Industrial
- Medium Streets, Neighborhood
- Small Streets, Access+Alleys
- Small Streets, Commercial
- Small Streets, Neighborhood
- Access+Alleys
- Transit Spine Overlay
- Priority Bikeway Overlay

Streets Outside of City Limits

Bus Lines

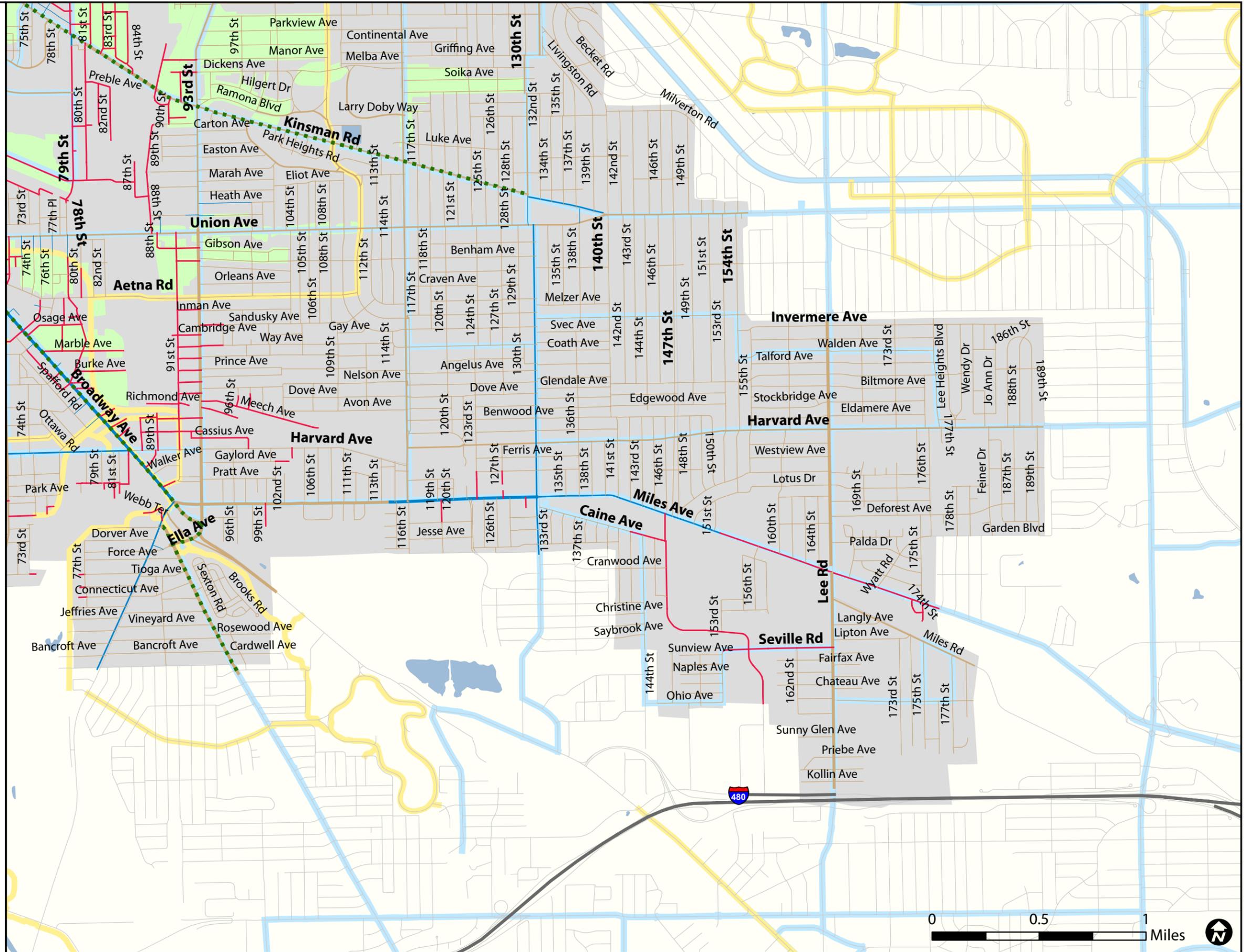
Candidate Green Infrastructure Areas

Water Bodies

Cleveland City Limits

Detailed Map 6 City of Cleveland, OH

Sources: City of Cleveland, NOACA
 Date: 8/16/2013
 Authors: JC, SP
 Alta Planning + Design





Euclid Avenue

Appendix A

Results of January Typology Workshop

1 Introduction

The City of Cleveland recognizes that diverse public and stakeholder participation and input is an important part in the development of its Complete and Green Streets Design Guidelines. Therefore, it was identified early on that a thoughtful public involvement approach should be conducted to better guide the definition of Cleveland's street typologies and the subsequent development of street design guidelines. Although the street typologies and design guidelines will ultimately be refined by the Alta team working in conjunction with the project task force, public and stakeholder involvement would provide valuable insight as to the types of streets that exist in Cleveland and their typical attributes.

The input and outreach process for this project also serves the secondary purpose to better educate the public and stakeholders on the presence of and the importance of the project. The importance of and need for complete and green streets in Cleveland is great. Complete and green streets can help bolster the economy; increase public safety, health and livability; and improve environmental health through stormwater remediation and the use of sustainable materials/construction.

2 Workshop Background

The primary purposes of this workshop were to:

- inform participants on the importance of complete streets in Cleveland,
- educate participants on the different strategies and techniques that can be used to "complete and green the streets,"
- build buy-in for the project from the various organizations represented,
- gather information and perspectives on the existing street types and conditions in Cleveland, and
- view what typical complete and green street techniques the participants preferred for Cleveland

Prior to the workshop, a list of invitees was developed that included at least one representative from Cleveland-related organizations viewed as having a direct and important stake in the project. These organizations included:

- The Cleveland Urban Design Collaborative
- LAND Studio
- The Northeast Ohio Regional Sewer District
- The Downtown Cleveland Alliance
- The GreenCityBlueLake Institute
- YMCA of Greater Cleveland
- The City of Cleveland Department of Aging
- The Northeast Ohio Areawide Coordinating Agency
- Cuyahoga County
- Ohio Department of Transportation
- The Greater Cleveland Regional Transit Authority
- Metroparks
- Cleveland City Council

A list of workshop attendees can be found in Attachment A. The workshop was held at the Sustainable Cleveland Center on January 23rd, 2013 from 12:00 to 4:00 PM. The workshop was broken up into three segments:

The first segment provided background information to participants on the need for complete and green streets, both in Cleveland and nationwide. This segment provided information supporting the need for complete streets and presented several comparisons of "incomplete," or heavily auto-oriented streets, and complete and green streets: those which consider the needs of all roadway users and consider environmental needs.

The second segment began by presenting information on the ways in which organizations and cities similar to Cleveland defined and classified their streets from a Complete Streets approach. This was done in order to inform participants on the various considerations that guide Complete Streets classification. Case studies included classifications from The National Association of City Transportation Officials (NACTO), Chicago IL, Charlotte NC, Brunswick ME,

Minneapolis MN, and New York City. Workshop participants were then asked to gather in pre-selected groups and given one hour to define current typologies for each type of street in Cleveland. Following the exercise, groups were asked to present their definitions and reasoning to the larger group. For each type of street in Cleveland, groups were asked to:

- create a name,
- include example streets in Cleveland,
- state the street's key purpose,
- identify transportation mode priority,
- define the typical speed,
- define acceptable auto congestion,
- define the importance of the street as a link and a place, and
- describe the street's context (surrounding land use).

The goal of this session was for the group to define existing street types in Cleveland, based on participant opinions of street conditions and context. Examples of both workshop worksheets are found in Attachment B and the compiled results of the two workshop segments can be found in Attachment C.

The third segment began by presenting the different techniques and strategies that can be used to make existing streets more complete and environmentally responsible. The presentation covered a thorough list of common traffic calming techniques for slowing or discouraging personal motor vehicle traffic. These techniques serve to make streets inviting and favorable for alternative forms of transportation such as walking bicycling and public transit, as well as more accommodating of uses other than transportation, such as play, street festivals and stormwater remediation. It was also explained that all traffic calming techniques are not appropriate on all types of roadways. For reference, a list of appropriate traffic calming techniques based on roadway type was presented and included in the worksheet. Participants were then asked to re-join their previous groups and decide upon the traffic calming and "greening" techniques they would like to see for each of their previously-

defined typologies. They were also asked to rank the techniques they selected from highest-desire to lowest. Examples of both workshop worksheets are found in Attachment B and the compiled results of the two workshop segments can be found in Attachment C.

3 Workshop Results

Following the workshop, the input from the groups was compiled, organized and analyzed in order to identify trends in the typology identification and determine overall preferences for traffic calming and greening techniques among workshop participants.

3.1 Typology

Results of the typology definition exercise were somewhat varied among the groups, but there is also some significant overlap in categorization. **Table 1** shows the typologies as created by the 5 workshop groups. In this table, the typologies are categorized by common attributes such as roadway size (determined from group-generated prototypical roadway examples), land use context and priority user in order to assist in identifying trends in the data. Detailed results from the Typology workshop can be found in Attachment C

Table 1. Summary of Workshop Typologies

Street Typology Name	Cleveland Example	Ped. Priority	Bike Priority	Transit Priority	Goods Priority	Auto priority	Typical Speed	Acceptable Congestion	Importance as a Link	Importance as a Place
Very Large Streets										
Spinal Route	Chester	Low	Low	Medium	Medium	High	35	Low	High	Low
Runway	Chester, Clifton, Carnegie, 150th	Low	Low	High	Medium	High	35-40	Low	High	Low
Parkways										
Large Streets										
Street District	W 25th Detroit	High	High	High	Low	High	25	High	Medium	High
Main Street	W 117, Prospect W. 25th, Cedar, E 79th	Low	Low	High	Medium	Medium	25-35	Medium	Medium	Medium
Commuter	Chester, Carnegie, Clifton	Medium	High	High	High	High	25-40	Medium	High	Medium
Commercial Ave.	Carnegie, Chester, Superior, Detroit	Low	Low	Med/High	High	High	35	Med-Low	High	Low
Transit Street	Euclid Ave, Clifton	High	High	High	Medium	Medium-Low	35	High-medium	High	Medium-Low
Medium Streets										
Neighborhood Connectors	W 130, W 150, Franklin, Riverside	High	High	High	Low	Medium	35	Medium	Medium	Medium
Neighborhood Connector/Center	Bridge, Madison, Buckeye	High	High	Medium	Medium	Medium	25	High	Medium	High
Neighborhood Connector	Broadway, Lorain, Pearl	Medium	High	High	High	high	25-35	Medium	High	Medium
Neighborhood Connector	Most numbered residential streets	High	High	Low	Low	Low	20	High	Medium	medium
Boulevard	(Shaker Blvd.)	Medium	Medium	High	Medium	High	45-50	Low	High	Medium
Neighborhood Connector	Franklin Blvd.	Medium	High	Medium	Low	High	35	medium	High	Medium
Small Residential Streets										
Neighborhood Streets	any residential street	High	High	Low	Low	Low	25	High	Low	High
Residential	Residential 2-lane residential	High	High	Low	Low	Medium	25 and less	High	Low	High
"Walk Your Car"	Market Street, N. End of E. 9th, Hessler	High	High	Medium	Medium	medium	15	Low	Low	High
Neighborhood Connector	Most numbered residential streets	High	High	Low	Low	Low	20	High	Medium	Medium

Street Typology Name	Cleveland Example	Ped. Priority	Bike Priority	Transit Priority	Goods Priority	Auto priority	Typical Speed	Acceptable Congestion	Importance as a Link	Importance as a Place
Neighborhood Residential Street	West Clinton	High	High	Low	Low	Medium	25	Medium	Low	Medium
Small Commercial Streets										
Street District	W 25th Detroit	High	High	High	Low	High	25	High	Medium	High
Sin Streets	E 4th, Coventry, Markey, W 25 @ Market	High	High	Low	Low	Low	0-20	High	Low	High
Main Street	W. 25th Street, Mayfield in Little Italy, Detroit by Garden Square	High	High	High	Medium	Medium	25	High	Medium	High
Main Street	Mayfield (little italy), w.65/Detroit, w.25/bridge	High	High	High	Medium	Medium	25	High	Medium	High
Activity Area Street	Market Ave.	High	High	High	Low	Low	15	High	Low	High
Pedestrian Only/Oriented Street										
Destination Street	Market, E 4th, Alleys	High	High	High	Low	Low	0	High	Low	High
Sin Streets	E 4th, Coventry, Markey, W 25 @ Market	High	High	Low	Low	Low	0-20	High	Low	High
"Festival Street"	E. 4th Street, Times Square	High	Medium	Low	Medium	Low	0	Low	Low	High
Polka Street - Pedestrian Way	East 4th/Sometimes Market Ave	High	Low	Low	Low	None	0	None	n/a	High
Pedestrian Street	E. 4th Street, Uptown	High	Medium	n/a	n/a	n/a	10	n/a	Low	High
Other										
Intersections	n/a	Medium	Medium	High	High	High	n/a	Low	High	Medium (Vary)
Alleys	Johnston Court, Franfort, Bolivar	Medium	Medium	Low	High	Low	0-10	High	Low	Low
Industrial Roadway	Bessemer	Low	Low	Low	High	High	35	medium	Medium	High

The main ways that groups categorized the streets were by transportation function, land use connectivity, surrounding land use and surrounding activity. Overall size of the street was not a major consideration among the groups. The graphic below displays the primary words that were used in the definition of typology names. The larger a word appears in the graphic, the more instances it occurs in the definitions. Common, non-descriptive nomenclature such as Street and Avenue was removed to emphasize the adjectives:



Other notable trends in the data are as follows:

- More typologies were defined for smaller, less auto-oriented streets than large auto-oriented streets.
- Motor vehicles received the highest priority on the largest defined roadways. In general, this priority declined as the size of the roadway decreased and its functions diversified. The opposite is true for bicyclists and pedestrians, except that these users were given medium to high priority in all but the largest roadway categories.
- The highest typical roadway speed for the typologies was 50 MPH and the lowest was 0 MPH. The vast majority of roadways were listed as 35 MPH or less.
- In response to the question: *What is the importance of a roadway to serve as a place?*, the vast majority of roadways were listed as having a medium or high importance.

3.2 Traffic Calming and Street “Greening” Preferences

Groups selected and ranked traffic calming and street “greening” preferences based on information presented in the PowerPoint presentation. These results are summarized in the following figures. These summaries were generated by averaging the selected, ranked treatments of all typologies in each typology category. The typology categories are identified in **Table 1** above. Treatments preceded by the word “Other” were those that were written in by individual groups. Detailed results from this exercise can be seen in Attachment C.

General observations about the data include:

- Street trees and High Visibility Crosswalks were popular traffic calming treatments for all typology categories.
- Street trees were the most popular street “greening” technique for all typology categories
- Many groups voluntarily added bicycle lanes or shared lane markings to the list even though the intent was that the Road Diet/Road Resizing treatment included the potential inclusion of bicycle lanes.

Figure 2. Traffic Calming and Greening Treatment Rankings for Very Large Streets

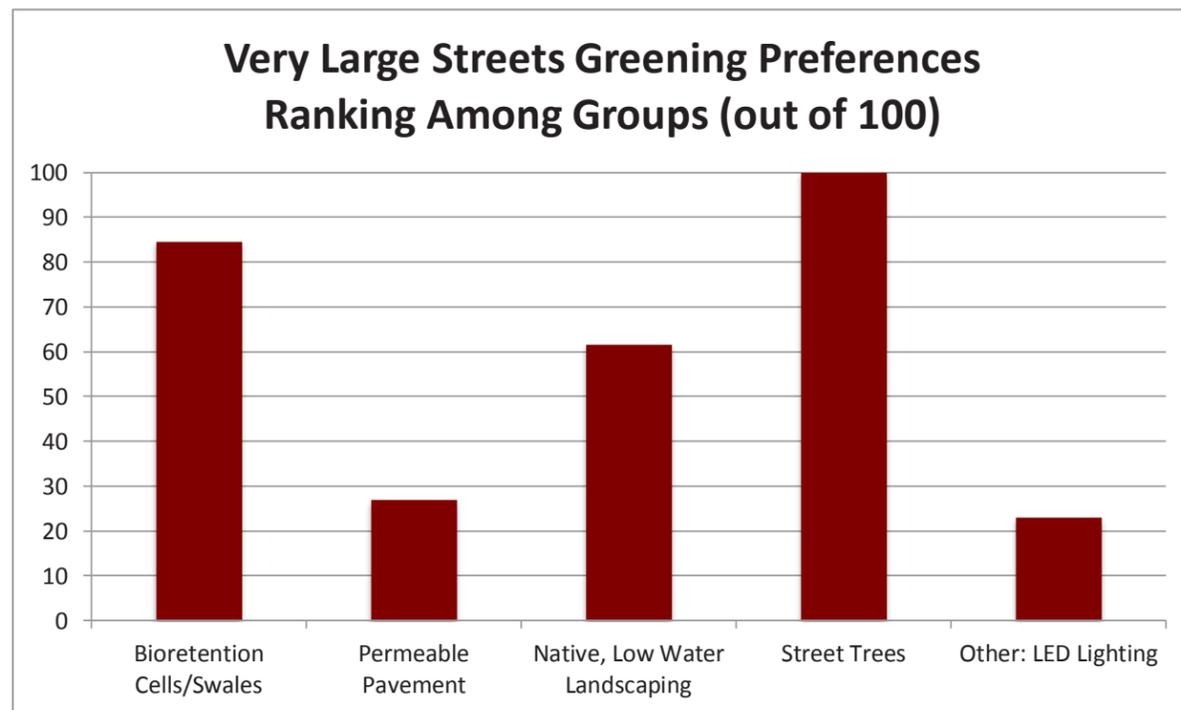
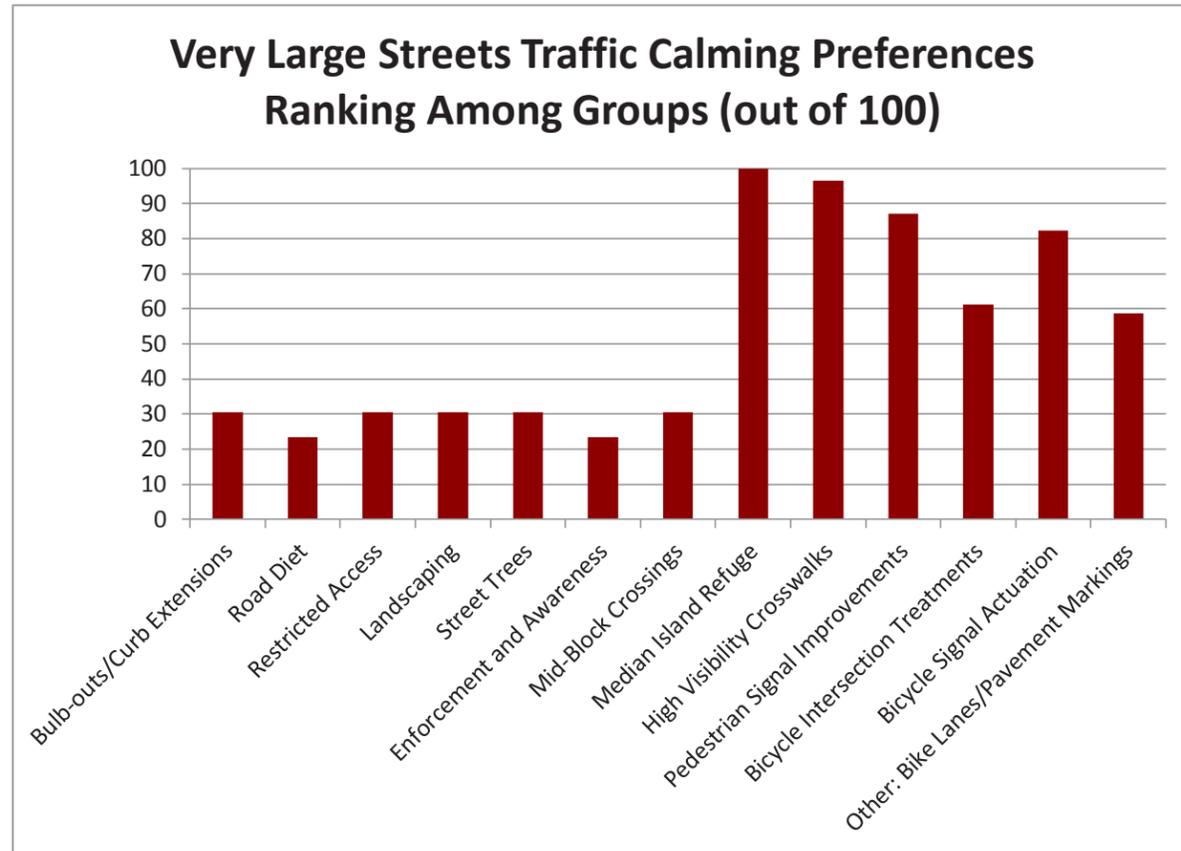


Figure 1. Traffic Calming and Greening Treatment Rankings for Large Streets

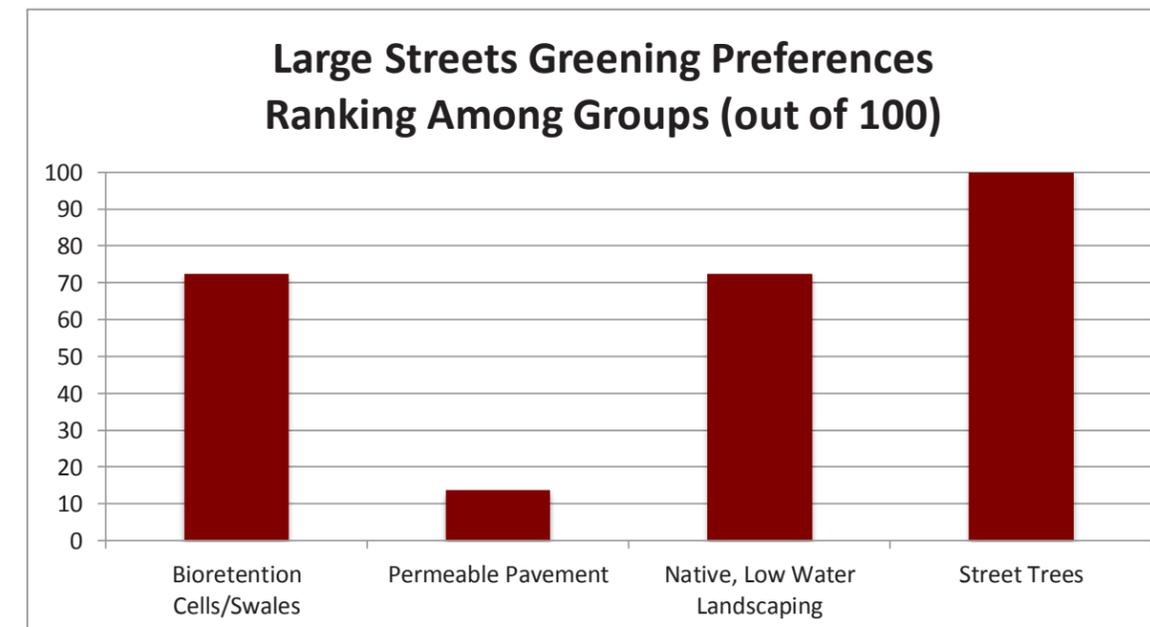
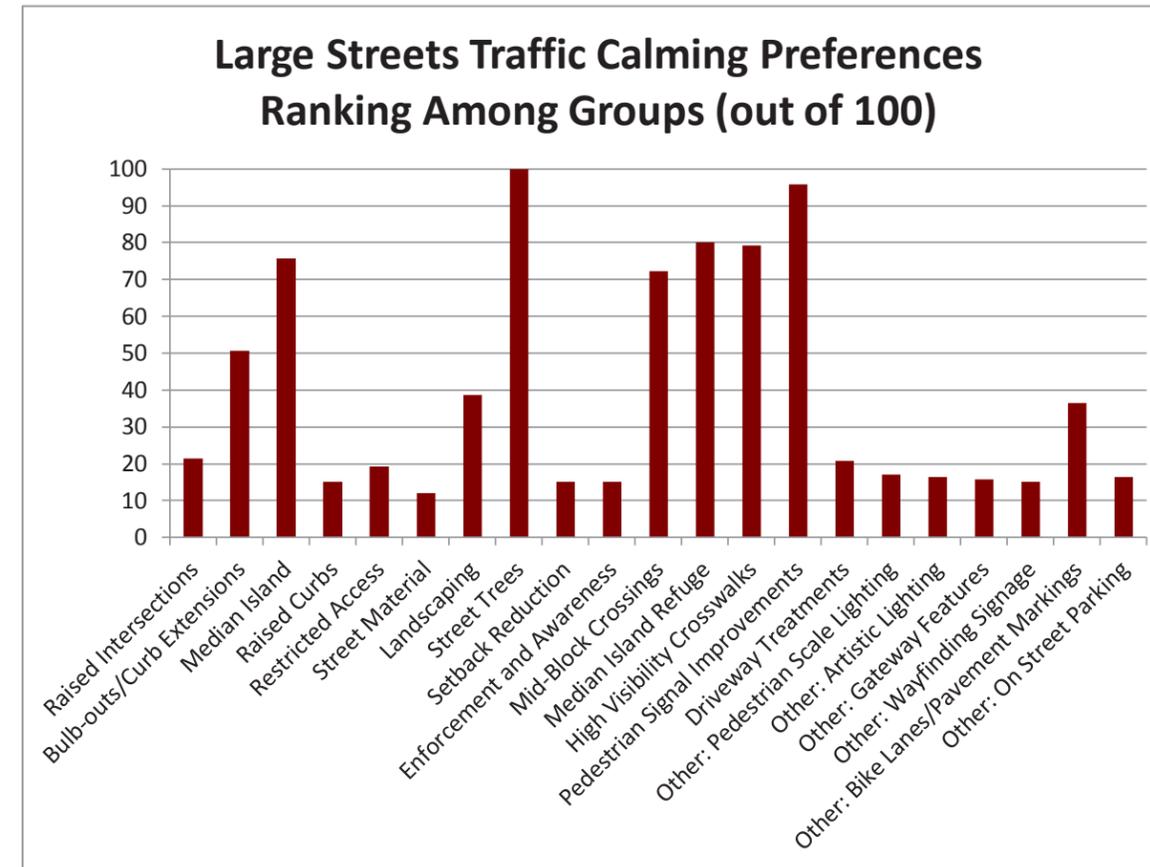


Figure 3. Traffic Calming and Greening Treatment Rankings for Medium Streets

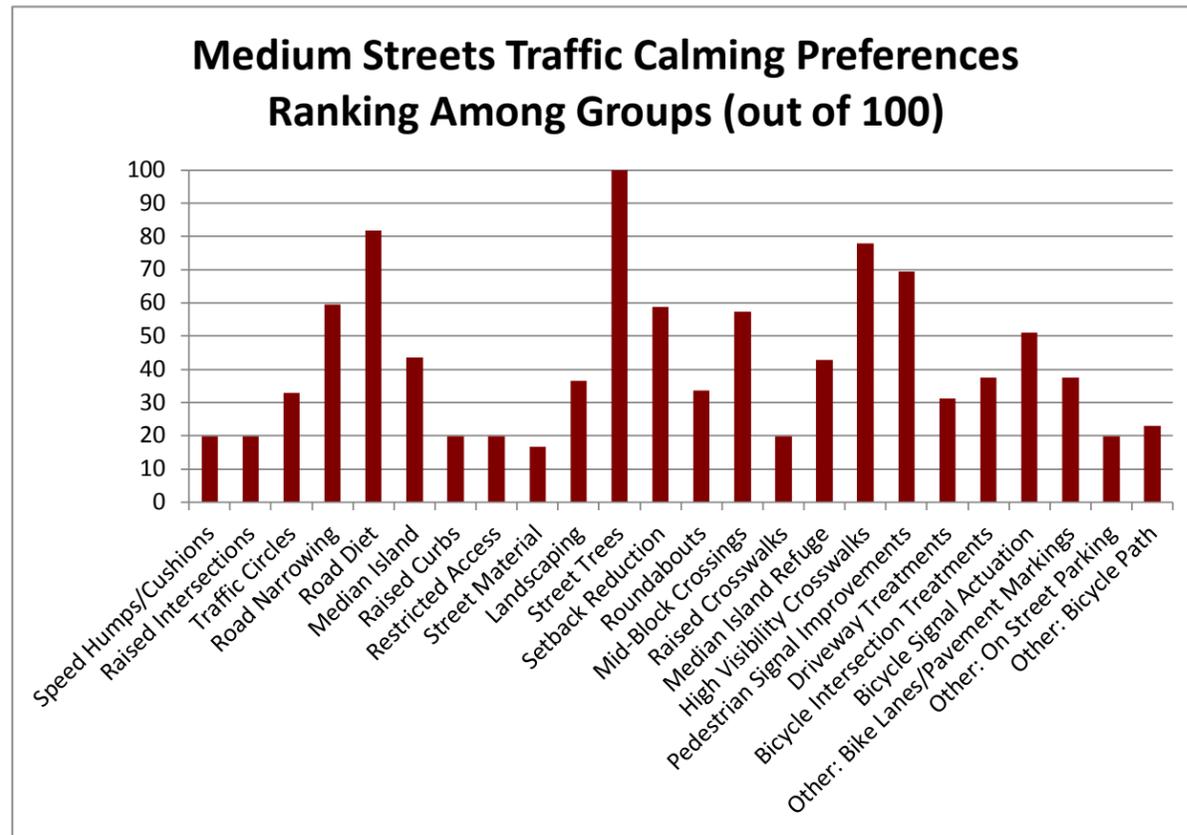
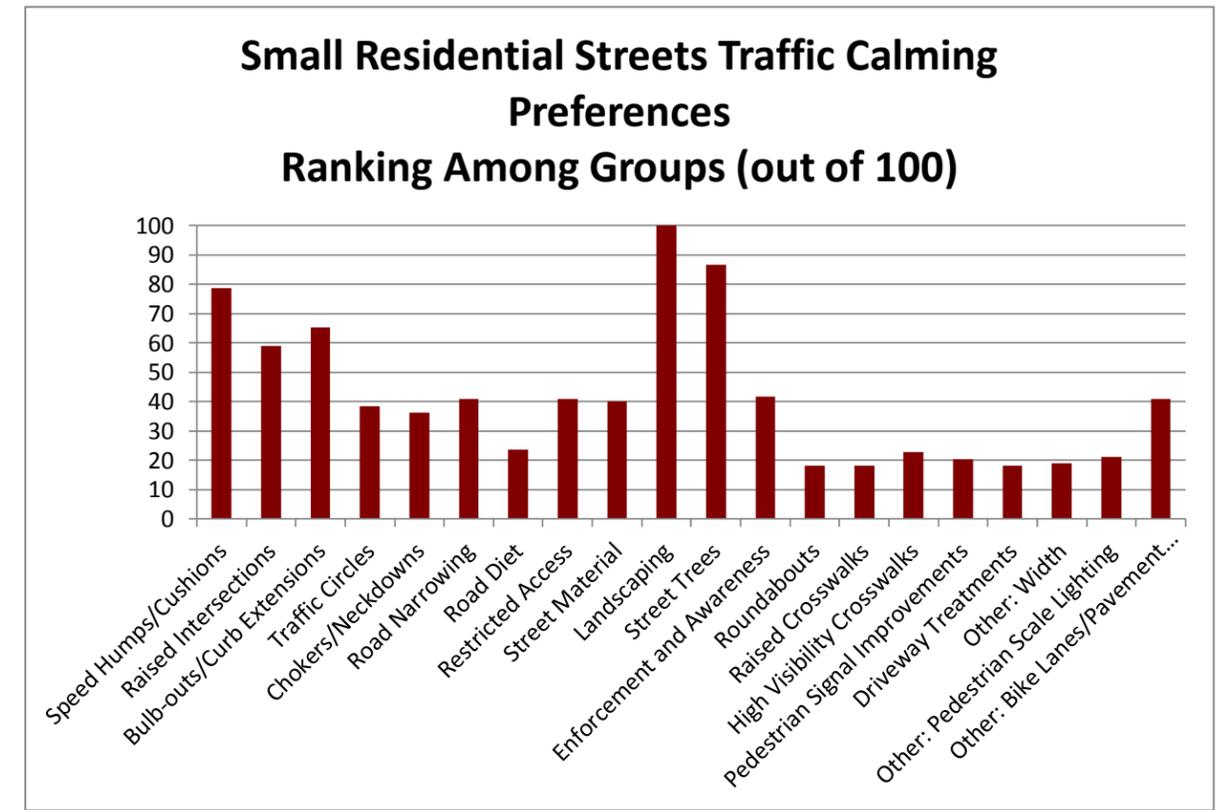
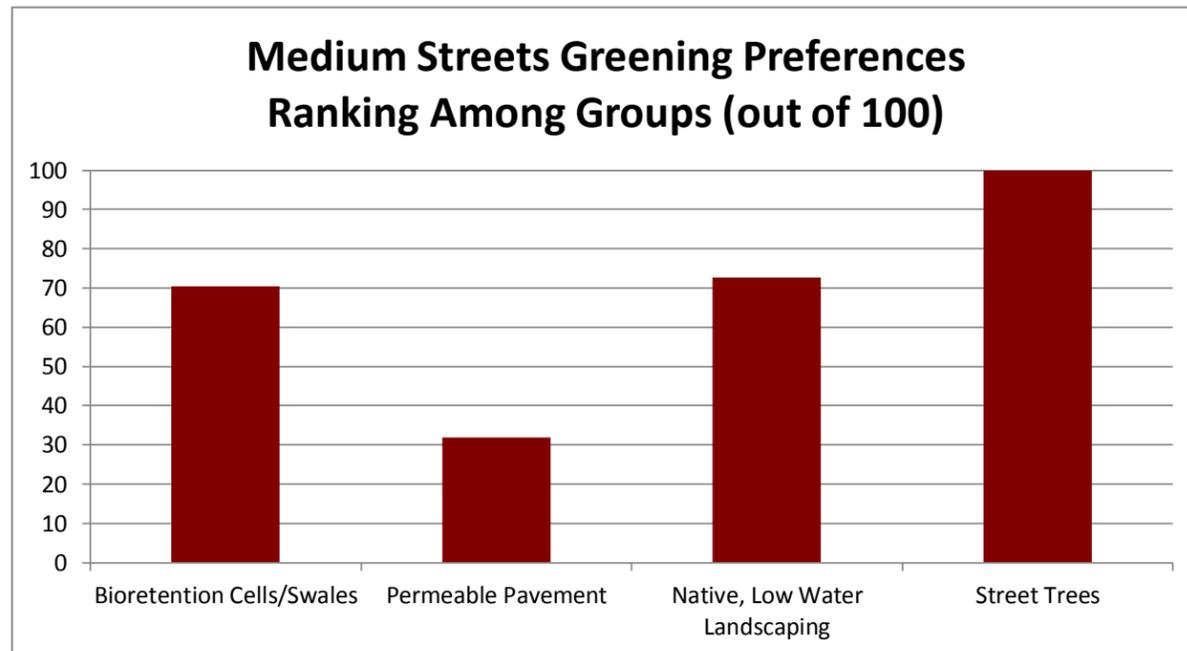


Figure 4. Traffic Calming and Greening Treatment Rankings for Small Residential Streets



Medium Streets Greening Preferences Ranking Among Groups (out of 100)



Small Residential Streets Greening Preferences Ranking Among Groups (out of 100)

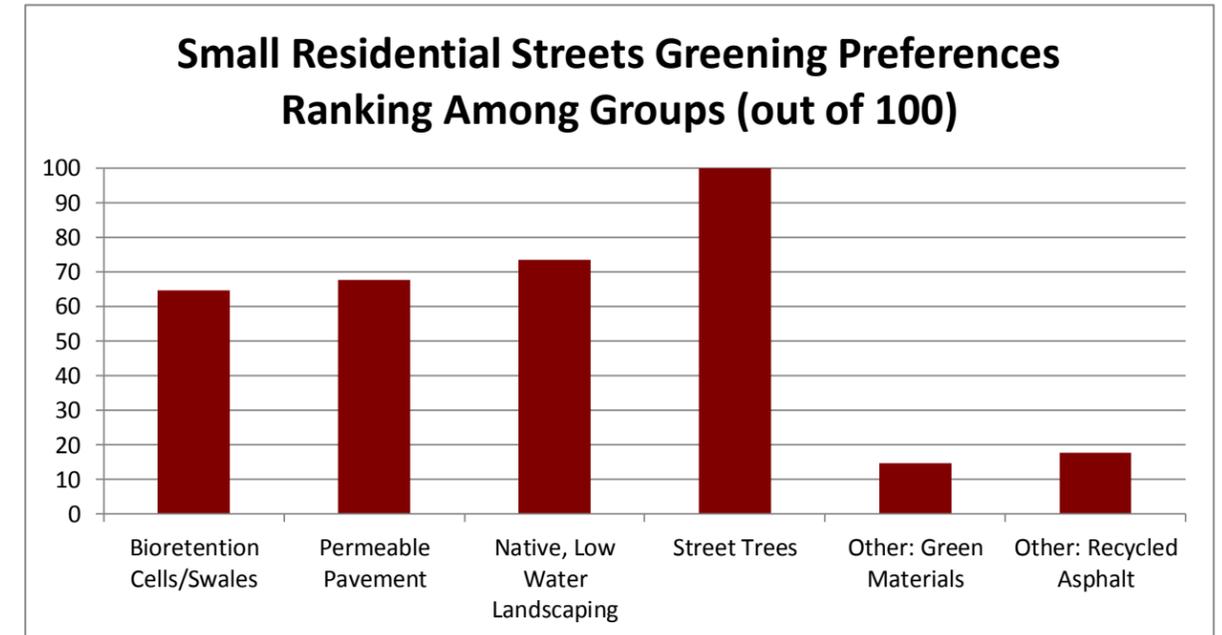


Figure 5. Traffic Calming and Greening Treatment Rankings for Small Commercial Streets

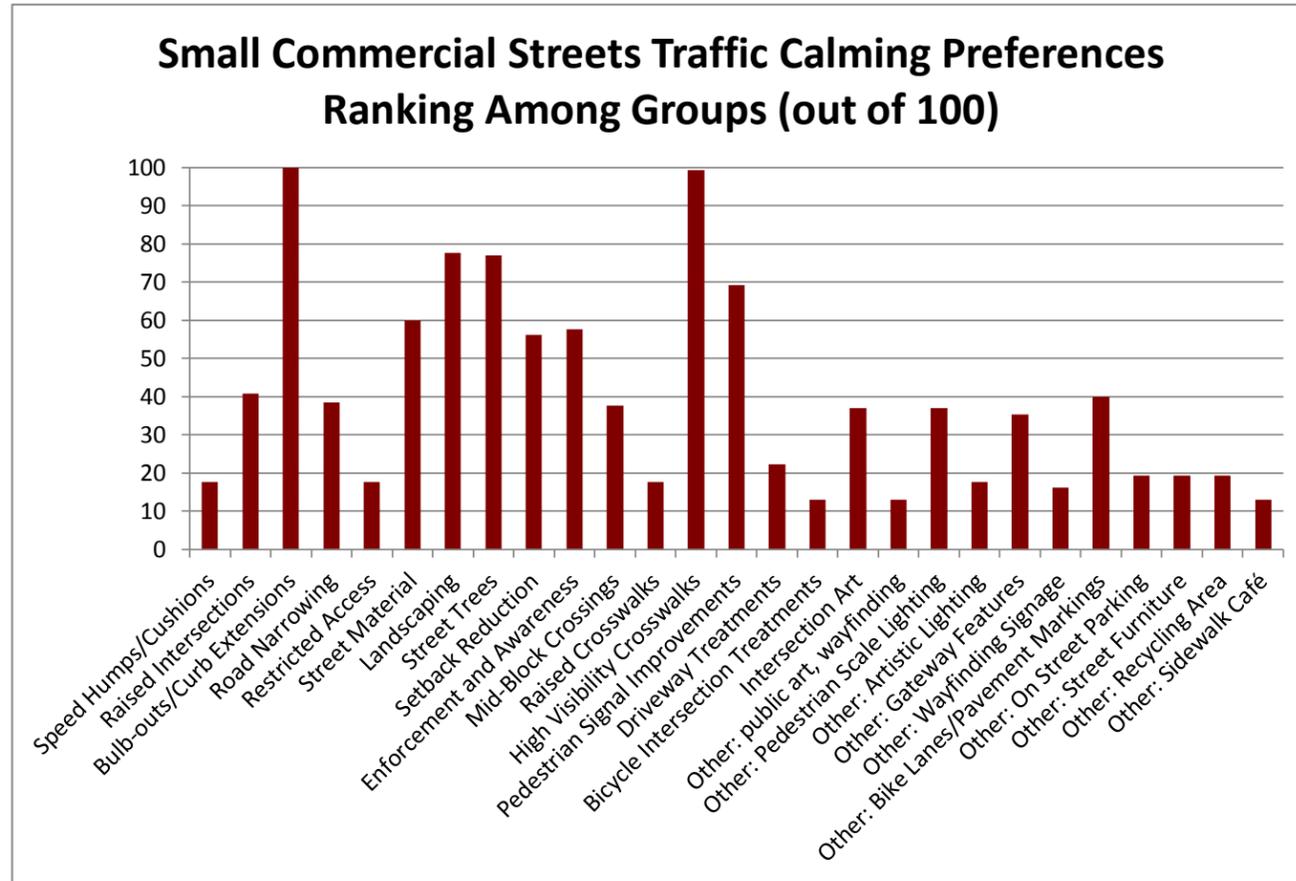
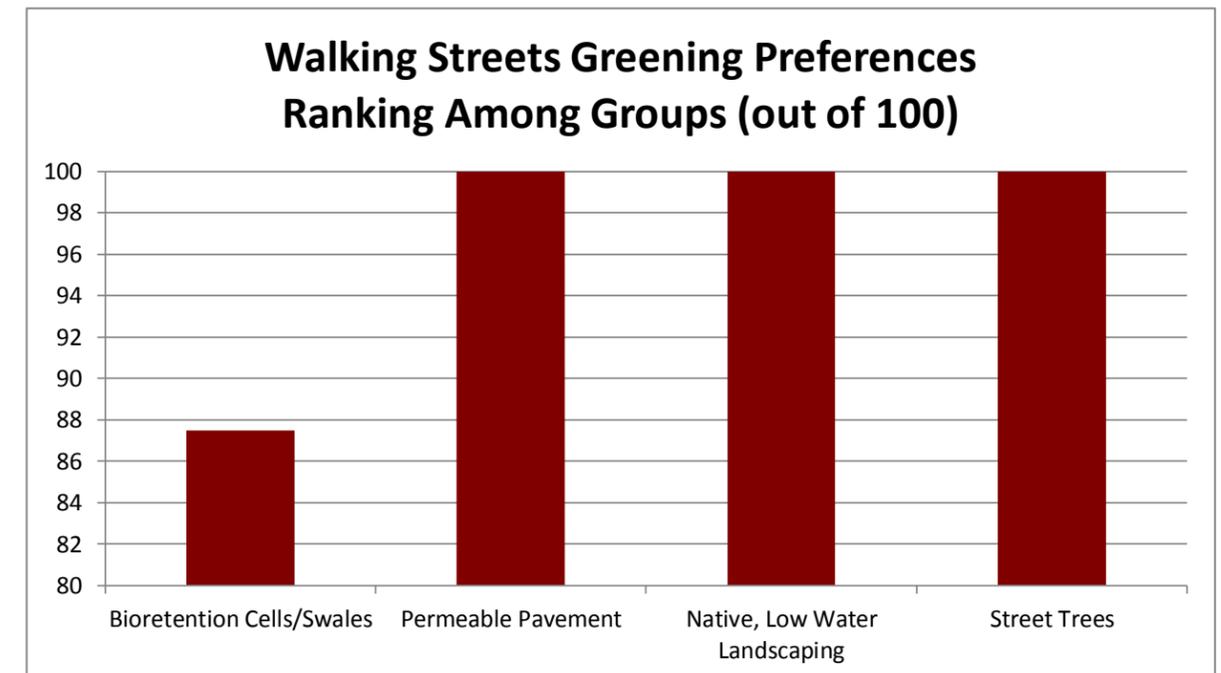
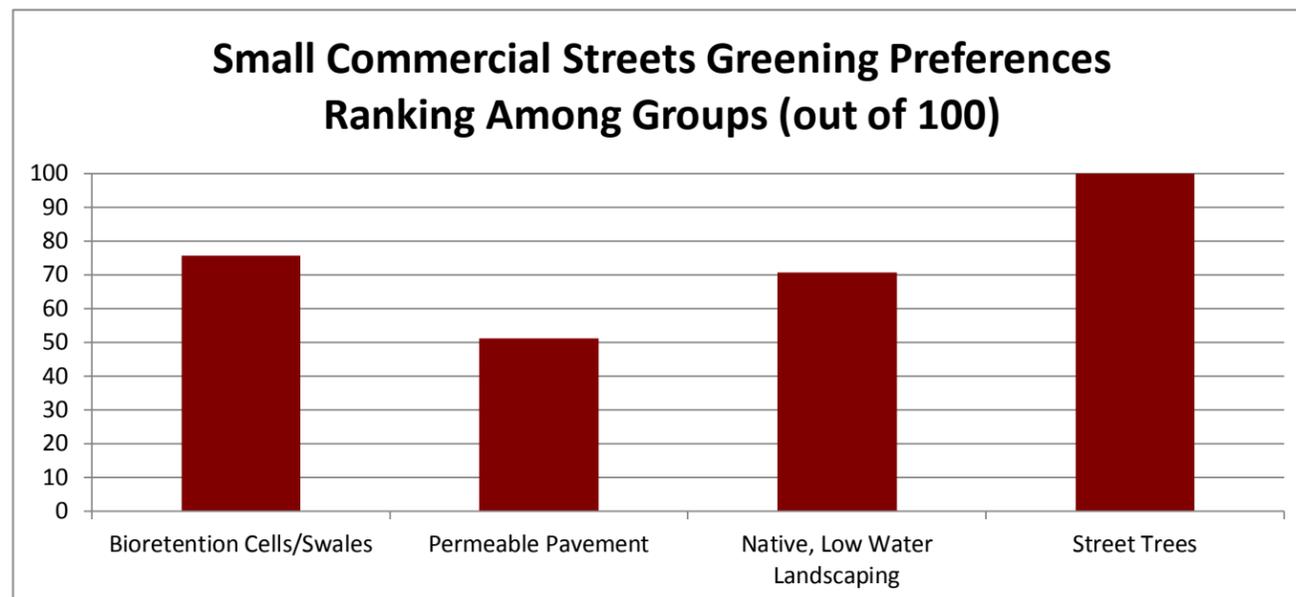
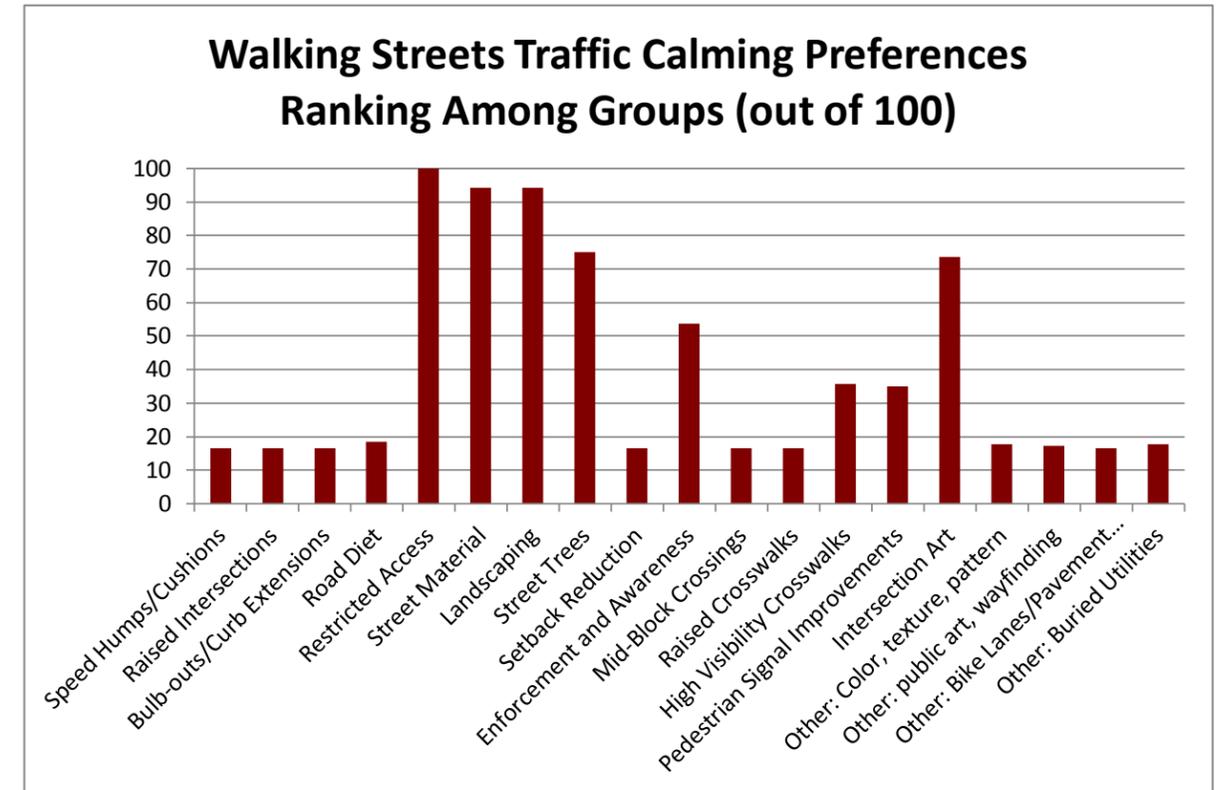


Figure 6. Traffic Calming and Greening Treatment Rankings for Walking Streets



4 Conclusion

The main ways that streets were categorized were by transportation function, land use connectivity, surrounding land use, and surrounding activity. Overall size of the street was not a major consideration among the groups. In general, more emphasis was placed on generating typologies for smaller streets with more localized functions such as those that serve neighborhoods.

The most popular traffic calming techniques across all categories were the addition of street trees and High Visibility Crosswalks. The addition of street trees was listed as the most popular street “greening” technique as well. The inclusion of bicycle lanes or roadway markings as a traffic calming technique was a popular treatment that was added by the groups to the consultant-generated list of treatments.

In general, participants expressed that the workshop was informative and helpful. They were attentive through the presentations, seen actively taking notes, and most were actively involved in the group breakout sessions. Overall it seemed to be well received based on the informal comments following the workshop. The comment was made by some that they would have liked to see representation from the City Engineering Department at the workshop.

The results include worthy ideas and show some notable trends that will be taken into consideration in the definition of Cleveland’s street typologies and design guidelines. Defining the street typologies and the design guidelines will be led by the Task Force and the Alta team.

5 Attachment A: Workshop Attendance

- Craig Williams
- Jack Cebe
- Anna Swanberg
- Barb Clint
- Chris Bongorno
- Emily Guiliani
- Gayle Lewin
- Heather Boden
- Jacob Van Sickle
- Jenita McGowan
- Marc Von Allmen
- Maribeth Feke
- Marty Cader
- Matt Gray
- Matt Hils
- Matt Zone
- Nancy Lyon Stadler
- Perrin Verzi
- Ray Odom
- Richard Sicha
- Ryan Mackin
- Valerie Webb
- Victoria McCauley
- Wendy Albin Sattin
- Randy Lane
- Marc Lefkowitz
- Ethan Cameron

6 Attachment B: Worksheet Examples

1/23/2013 Cleveland Complete and Green Streets Workshop

Street Typology Name (include street example in parenthesis)		
Traffic Calming/Street Resizing/Intersection Improvement Technique (prioritize with 1 being the highest)		
<ul style="list-style-type: none"> — Speed Humps/Cushions — Raised Intersections — Chicanes — Bulb-outs/Curb Extensions — Traffic Circles — Chokers/Neckdowns — Road Narrowing — Road Diet — Median Island — Raised Curbs — Restricted Access 	<ul style="list-style-type: none"> — Street Material — Landscaping — Street Trees — Setback Reduction — Enforcement and Awareness — Roundabouts — Mid-Block Crossings — Raised Crosswalks — Median Island Refuge — High Visibility Crosswalks — Pedestrian Signal Improvements 	<ul style="list-style-type: none"> — Driveway Treatments — Bicycle Intersection Treatments — Bicycle Signal Actuation — Intersection Art
Street Greening Technique (prioritize with 1 being the highest)		
<ul style="list-style-type: none"> — Bioretention Cells/Swales — Permeable Pavement — Native, Low Water Landscaping 	<ul style="list-style-type: none"> — Street Trees 	<ul style="list-style-type: none"> — — —

Traffic Calming Type Applicability (source MassDOT)

	Arterials	Major Collectors	Minor Collectors	Local Roads
Street Narrowing				
Narrow Lanes		Δ	■	■
Raised Curb	■	■	■	■
Street Furniture	■	■	■	■
Street Trees	■	■	■	■
Street Lighting	■	■	■	■
Spot Narrowing	Δ	■	■	■
Medians and Crossing Islands	■	■	■	■
Curb Extensions	■	■	■	■
Road Diets	Δ	Δ	■	■
Building Steps	■	■	■	■
Horizontal Deflection				
Chicanes			■	■
Crossing Islands/Short Medians	■	■	■	■
Mid-Block Traffic Circles			Δ	■
Roundabouts	■	■	■	■
Lane Shifts		Δ	Δ	■
Profile Alterations				
Speed Humps		Δ	Δ	■
Raised Crosswalk		Δ	■	■
Raised Intersections		Δ	■	■
Textured Pavement	■	■	■	■
Traffic Management	Δ	Δ	Δ	Δ

■ Other used for new design or research programs in traffic calming settings.
 Δ May be suitable

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Street Typology Name (include street example in parenthesis)							
Key Purpose	Mode Priority	Typical Speed	Acceptable Auto Congestion	Importance of Street to Function as a		Context	Other Considerations
				Link	Place		
	Ped H M L Bike H M L Transit H M L Goods H M L Auto H M L		H M L	H M L	H M L		

Typology Name Examples:

NACTO Typologies:
 Very Large Streets
 Large Streets
 Medium Streets
 Small Street
 Very Small Streets
 Alleys and Passageways
 Pedestrians Streets
 Shared Streets/Home Zones
 Transit Streets
 Intersections

Chicago Typologies:
 Thoroughfare
 City Connector
 Neighborhood Connector
 Lane
 Alley
 Pedestrian Way

Minneapolis Typologies:
 Commuter Street
 Commerce Street
 Activity Area Street
 Community Connector
 Neighborhood Connector
 Industrial Connector

Charlotte Typologies:
 Main Streets
 Avenues
 Boulevards
 Parkways
 Local Streets

Brunswick Typologies:
 Highway
 Commercial Arterial
 Drive
 Destination Street
 Commercial Avenue
 Residential Avenue
 Slow-Flow Street
 Shared Use Path

7 Attachment C: Complete Workshop Results

Table 1: Typology Results by Group

Group	Street Typology Name	Cleveland Example	Key purpose	Ped Priority	Bike Priority	Transit Priority	Goods Priority	Auto priority	Typical Speed	Acceptable Congestion	Importance as a link	Importance as a place	Context	Other
1	Spinal Route	Chester	Through Movement w/ some commercial access	Low	Low	Medium	Medium	High	35	Low	High	Low	Light Industrial, Commercial, Institutional	
1	Neighborhood Connectors	W 130, W 150, Franklin, Riverside	Small scale spinal connecting neighborhoods	High	High	High	Low	Medium	35	Medium	Medium	Medium	Varies Based on Surrounding Land Uses	Biking Connectors, Access to Business
1	Street District	W 25th Detroit	Nodes of interest, Entertainment, Cultural Institutions	High	High	High	Low	High	25	High	Medium	high	Nodes of interest, Entertainment, Cultural Institutions	historic, cultural, aesthetics
1	Neighborhood Streets	any residential street	provide access for residents living on the street: recreational, local business, local connections, daily activity	High	High	Low	Low	Low	25	High	Low	High	Residential, light commercial, shared space	KIDS, fire truck, safety services
1	Destination	Market, E	Serves as a place,	High	High	High	Low	Low	0	High	Low	High	Serves as a place,	bike/ped linkages,

Group	Street Typology Name	Cleveland Example	Key purpose	Ped Priority	Bike Priority	Transit Priority	Goods Priority	Auto priority	Typical Speed	Acceptable Congestion	Importance as a link	Importance as a place	Context	Other
	Street	4th, Alleys	partying, churches, schools										partying, churches, schools	historic, cultural aesthetics
2	Runway	Chester, Clifton, Carnegie, 150th	Move Cars	Low	Low	High	Medium	High	35-40	Low	High	Low	Connection to highways and Employment Areas - Vary	Continuous Sidewalks, Ramps
2	Intersections	n/a	Connect Streets, Crossings	Medium	Medium	High	High	High		Low	High	Medium (Vary)	Vary	Turning Lane, Crosswalk, Crossing Time
2	Alleys	Johnston Court, Franfort, Bolivar	Deliverables, Ped Shortcuts, Trash Pickup	Medium	Medium	Low	High	Low	0-10	High	Low	Low	Highly Urban, Scary	Function, Mix w/trucks, delivery/travel
2	Sin Streets	E 4th, Coventry, Markey, W 25 @ Market	Entertainment	High	High	Low	Low	Low	0-20	High	Low	High	Fun, Stay Long, Safe	Parking, Crosswalks, Fun, Atmosphere
2	Neighborhood Connector/Center	Bridge, Madison, Buckeye	Local Traffic, Movement, Social Connection	High	High	Medium	Medium	Medium	25	High	Medium	High	Local Business, Gathering	Social Interaction

Group	Street Typology Name	Cleveland Example	Key purpose	Ped Priority	Bike Priority	Transit Priority	Goods Priority	Auto priority	Typical Speed	Acceptable Congestion	Importance as a link	Importance as a place	Context	Other
2	Main Street	W 117, Prospect W. 25th, Cedar, E 79th	Commerce Through-put	Low	Low	High	Medium	Medium	25-35	Medium	Medium	Medium	Mixed-Use	Higher Density, Connection to Runways
2	Residential	Residential 2-lane residential	Home Destination	High	High	Low	Low	Medium	25 and less	High	Low	High	Housing Low-Med Density	Social, parks, Biking, Pedestrian
3	Commuter	Chester, Carnegie, Clifton	Commuting	Medium	High	High	high	high	25-40	Medium	High	Medium	Mixed but Move industrial	no longer small neighborhood scale, no stop signs, needs designate bike facility
3	Neighborhood Connector	Broadway, Lorain, Pearl	Moving to and Thru, Errands or commute	Medium	High	High	High	high	25-35	Medium	High	Medium	Mixed use, light industrial, medium density	No Semi's, landscaping and pedestrian oriented at key nodes

Group	Street Typology Name	Cleveland Example	Key purpose	Ped Priority	Bike Priority	Transit Priority	Goods Priority	Auto priority	Typical Speed	Acceptable Congestion	Importance as a link	Importance as a place	Context	Other
3	Main Street	W. 25th Street, Mayfield in Little Italy, Detroit by Garden Square	Traditional, Commercial Districts, Commuter Route	High	High	High	medium	Medium	25	High	Medium	High	Mixed-use, neighborhood services, schools, churches, institutions	Design amenities, Bike lanes, Ped crosszones, on-street parking
3	"Walk Your Car"	Market Street, N. End of E. 9th, Hessler	Could be residential Destination	High	High	Medium	Medium	medium	15	Low	Low	High	Residential, Entertainment District, Commercial retail	Would lend itself to bike boulevard in residential
3	"Festival Street"	E. 4th Street, Times Square	Community gathering, small business, destination "place", vibrant flexible	High	Medium	Low	Medium	Low	0	Low	Low	High	Entertainment, Commercial/residential small bus.	lighting, security, landscape, move business encroachment on ROW
4	Commercial Ave.	Carnegie, Chester, Superior, Detroit	moving vehicles, goods, connecting areas	Low	Low	Med/High	High	High	35	Med-Low	High	Low	Consider neighborhoods, it passes through especially in intersections.	Express busses, street trees, highway/free way pedestrian crossings

Group	Street Typology Name	Cleveland Example	Key purpose	Ped Priority	Bike Priority	Transit Priority	Goods Priority	Auto priority	Typical Speed	Acceptable Congestion	Importance as a link	Importance as a place	Context	Other
4	Transit Street	Euclid Ave, Clifton	Transit Connectivity, Pedestrian and Cycle Accessibility, mode options + access to transit	High	High	High	medium	Medium-Low	35	High-medium	High	Medium-Low	TOD as place making	Transit Hubs and how they connect, wayfinding, transit waiting environment , lighting
4	Main Street	Mayfield (little italy), w.65/Detroit, w.25/bridge	shopping/retail/dining pedestrian oriented, destination	High	High	High	Medium	Medium	25	High	Medium	High	Mixed-use district, dense urban scale	separated bicycle facilities, bike parking, transit and waiting environments, sidewalks and café seating, signage and lighting

Group	Street Typology Name	Cleveland Example	Key purpose	Ped Priority	Bike Priority	Transit Priority	Goods Priority	Auto priority	Typical Speed	Acceptable Congestion	Importance as a link	Importance as a place	Context	Other
4	Neighborhood Ave	Franklin Ave, Wade park Ave.	More of a link, but to be safe and calm	High	High	Medium	Low	Medium	25-3035	Medium	High	Low	Primarily Residential, but more through traffic	Consult Bikeway master plan for Bike Consideration. Street trees, tree lawns, bulb-outs
4	Neighborhood Connector	Most numbered residential streets	Very Local circulator, safe spaces for family, social interactions	High	High	Low	Low	Low	20	High	Medium	medium	Mostly residential, some small retail on corners	on street parking, traffic calming, street trees
4	Polka Street - Pedestrian Way	East 4th/Sometimes Market Ave	Place making, some commerce	High	Low	Low	Low	None	0	None	n/a	High	A destination, active, ground floor retail, plaza, recreation	Accommodate cyclists if street widths allows safety.
4	Parkways													
5	Boulevard	(Shaker Blvd.)		Medium	Medium	high	Medium	High	45-50	Low	High	Medium	Median-Landscaped	
5	Industrial Roadway	Bessemer	Heavy Industrial Use Trucks	Low	Low	Low	High	High	35	medium	Medium	High	Industry	Roadway Built For Trucks
5	Commuter Street	Chester, Clifton, Carnegie	Moving all Motorized Vehicles	Low	Low	High	High	High	35	Low	High	Low	Multiple Lanes, Wide Cartway, Roadway Lighting	Good Traffic Flow

Group	Street Typology Name	Cleveland Example	Key purpose	Ped Priority	Bike Priority	Transit Priority	Goods Priority	Auto priority	Typical Speed	Acceptable Congestion	Importance as a link	Importance as a place	Context	Other
5	Fun Street/Commercial Street	Lorain, Detroit Ave	Connections and Destination	medium	Medium	High	Medium	High	35	Medium	High	Medium	Mixed-use, commercial nodes, transit routes	bike lanes/sharrows, land-use
5	Neighborhood Connector	Franklin Blvd.	Neighborhood Connections	medium	High	Medium	Low	High	35	medium	High	Medium	On-street parking, responsible striping or roadway	sharrows/bike lanes
5	Neighborhood Residential Street	West Clinton	Get Home	High	High	Low	Low	Medium	25	Medium	Low	Medium	No Stiping, on-street parking, tree lawns, sidewalks	none
5	Activity Area Street	Market Ave.	Pedestrian Movement priority and destination	High	High	High	Low	Low	15	High	Low	High	Mixed-use retail, entertainment/activity	zoning, land-use, pro.zoning
5	Pedestrian Street	E. 4th Street, Uptown	Destination Place	High	Medium	n/a	n/a	n/a	10	n/a	Low	High	Retail, residential, mixed-use	zoning and land-use. Pedestrian Retail Overlay

Table 2: Traffic Calming and “Greening” Results by Group

Traffic Calming Technique	Group 1					Group 2						
	Spinal Route	Neighborhood Connectors	Street District	Neighborhood Streets	Destination Street	Intersections	Alleys	Sin Streets	Residential	Neighborhood Connector/Center	Main Street	Runway
Speed Humps/Cushions	0	0	0	6	0	0	0	8	8	0	0	0
Raised Intersections	0	0	1	0	0	0	0	8	8	0	0	0
Chicanes	0	0	0	0	0	0	0	0	8	0	0	0
Bulb-outs/Curb Extensions	0	0	4	5	0	0	0	8	0	9	0	0
Traffic Circles	0	7	0	0	0	0	0	0	8	0	0	0
Chokers/Neckdowns	0	0	0	0	0	0	0	0	8	0	0	0
Road Narrowing	0	1	0	0	0	0	0	0	8	9	0	0
Road Diet	0	2	0	0	0	0	0	0	0	9	1	0
Median Island	1	3	0	0	0	0	0	0	0	0	2	2
Raised Curbs	0	0	0	0	0	0	0	0	0	0	0	0
Restricted Access	0	0	0	2	1	0	4	8	8	0	0	0
Street Material	0	0	0	0	4	0	0	8	0	9	0	0
Landscaping	0	0	0	4	3	5	0	8	8	9	0	0
Street Trees	0	0	0	3	0	5	0	8	8	9	2	0
Setback Reduction	0	0	0	0	0	0	0	8	0	9	0	0
Enforcement and Awareness	0	0	0	1	0	0	0	8	0	0	0	0
Roundabouts	0	6	0	0	0	0	0	0	8	0	0	0
Mid-Block Crossings	0	0	5	0	0	0	0	8	0	9	5	0
Raised Crosswalks	0	0	0	0	0	0	0	8	8	0	0	0
Median Island Refuge	2	0	0	0	0	0	0	0	0	0	3	1
High Visibility Crosswalks	3	0	3	0	0	0	0	8	0	9	0	3
Pedestrian Signal Improvements	4	0	6	0	5	5	0	8	0	9	4	4
Driveway Treatments	0	0	2	0	0	0	0	0	8	9	0	0
Bicycle Intersection Treatments	5	4	0	0	0	5	0	0	0	9	0	5

Traffic Calming Technique	Group 1					Group 2						
	Spinal Route	Neighborhood Connectors	Street District	Neighborhood Streets	Destination Street	Intersections	Alleys	Sin Streets	Residential	Neighborhood Connector/Center	Main Street	Runway
Bicycle Signal Actuation	6	5	0	0	0	5	0	0	0	9	0	6
Intersection Art	0	0	0	0	2	5	0	8	0	0	0	0
Other: Width	0	0	0	7	0	0	0	0	0	0	0	0
Other: Color, texture, pattern	0	0	0	0	6	0	0	0	0	0	0	0
Other: public art, wayfinding	0	0	0	0	7	0	0	0	0	0	0	0
Other: Pedestrian Scale Lighting	0	0	7	0	0	5	4	0	0	0	0	0
Other: Artistic Lighting	0	0	8	0	0	0	0	0	0	0	0	0
Other: Gateway Features	0	0	9	0	0	0	0	0	0	0	0	0
Other: Wayfinding Signage	0	0	10	0	0	0	0	0	0	0	0	0
Other: Bike Lanes/Pavement Markings	7	0	0	0	0	0	0	8	8	9	6	0
Other: Crosswalks	0	0	0	0	0	5	0	0	0	0	0	0
Other: Buried Utilities	0	0	0	0	0	5	0	0	0	0	0	0
Other: Awareness Signage	0	0	0	0	0	0	4	0	0	0	0	0
Other: On Street Parking	0	0	0	0	0	0	0	0	0	0	0	0
Other: Street Furniture	0	0	0	0	0	0	0	0	0	0	0	0
Other: Recycling Area	0	0	0	0	0	0	0	0	0	0	0	0
Other: Sidewalk Café	0	0	0	0	0	0	0	0	0	0	0	0
Other: Bicycle Path	0	0	0	0	0	0	0	0	0	0	0	0
Greening												
Bioretention Cells/Swales	2	1	3	4	0	0	3	0	1	0	1	1
Permeable Pavement	0	0	2	3	0	4	2	1	2	1	1	0
Native, Low Water Landscaping	3	0	1	0	0	5	0	0	3	2	2	2
Street Trees	4	0	4	5	0	0	1	0	4	3	3	3
Other: Green Materials	0	0	0	1	0	0	0	0	0	0	0	0

Traffic Calming Technique	Group 1					Group 2						
	Spinal Route	Neighborhood Connectors	Street District	Neighborhood Streets	Destination Street	Intersections	Alleys	Sin Streets	Residential	Neighborhood Connector/Center	Main Street	Runway
Other: Recycled Asphalt	0	0	0	2	0	0	0	0	0	0	0	0
Other: Green Wall	0	0	0	0	0	3	0	0	0	0	0	0
Other: Grey Water Reuse	0	0	0	0	0	2	0	0	0	0	0	0
Other: Fountains	0	0	0	0	0	1	0	0	0	0	0	0
Other: LED Lighting	1	0	0	0	0	0	0	0	0	0	0	0

Traffic Calming Technique	Group 3					Group 4						
	Commuter	Neighborhood Connector	Main Street/Transit Street	Walk Your Car	Festival Streets	Neighborhood Connector	Neighborhood Ave	Polka Street	Parkways	Main Street	Commercial Ave.	Transit Street
Speed Humps/Cushions	0	0	0	0	0	5	0	0	0	0	0	0
Raised Intersections	0	0	0	5	0	5	5	0	0	0	0	0
Chicanes	0	0	0	7	0	5	0	0	0	0	0	0
Bulb-outs/Curb Extensions	0	0	1	0	0	2	12	0	5	6	8	10
Traffic Circles	0	0	0	0	0	5	12	0	0	0	0	0
Chokers/Neckdowns	0	0	0	0	0	8	0	0	0	0	0	0
Road Narrowing	0	0	0	2	0	0	5	0	0	6	0	0
Road Diet	0	1	0	1	0	0	0	0	11	0	8	0
Median Island	0	0	0	0	0	0	0	0	11	0	4	10
Raised Curbs	0	0	0	0	0	0	5	0	0	0	0	10
Restricted Access	0	0	0	0	1	0	0	4	5	0	0	4
Street Material	0	0	0	3	4	8	0	4	0	6	0	14
Landscaping	0	0	7	6	3	5	5	4	5	6	4	4
Street Trees	4	5	4	0	5	2	5	4	5	6	4	4
Setback Reduction	0	2	0	0	0	0	0	0	0	6	0	10
Enforcement and Awareness	0	0	7	8	2	0	0	8	11	0	0	10
Roundabouts	0	0	0	0	0	0	12	0	0	0	0	0
Mid-Block Crossings	0	4	0	0	0	0	0	0	5	0	0	10
Raised Crosswalks	0	0	0	0	0	0	5	0	0	0	0	0
Median Island Refuge	1	3	0	0	0	0	0	0	5	0	4	4
High Visibility Crosswalks	2	6	3	0	0	0	5	4	5	6	4	4
Pedestrian Signal Improvements	3	7	0	0	0	0	12	0	11	14	4	4
Driveway Treatments	0	0	0	0	0	0	12	0	0	0	0	0
Bicycle Intersection Treatments	0	0	0	0	0	0	0	0	0	14	0	0

Traffic Calming Technique	Group 3					Group 4						
	Commuter	Neighborhood Connector	Main Street/Transit Street	Walk Your Car	Festival Streets	Neighborhood Connector	Neighborhood Ave	Polka Street	Parkways	Main Street	Commercial Ave.	Transit Street
Bicycle Signal Actuation	0	0	0	0	0	0	12	0	11	0	0	0
Intersection Art	0	0	0	0	7	0	0	4	0	6	0	0
Other: Width	0	0	0	0	0	0	0	0	0	0	0	0
Other: Color, texture, pattern	0	0	0	0	0	0	0	0	0	0	0	0
Other: public art, wayfinding	0	0	0	0	0	0	0	0	0	14	0	0
Other: Pedestrian Scale Lighting	0	0	7	4	0	0	0	0	0	0	0	0
Other: Artistic Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Other: Gateway Features	0	0	7	0	0	0	0	0	0	0	0	0
Other: Wayfinding Signage	0	0	0	0	0	0	0	0	0	0	0	0
Other: Bike Lanes/Pavement Markings	5	4	2	0	0	2	0	0	5	0	0	0
Other: Crosswalks	0	0	0	0	0	0	0	0	0	0	0	0
Other: Buried Utilities	0	0	0	0	6	0	0	0	0	0	0	0
Other: Awareness Signage	0	0	0	0	0	0	0	0	0	0	0	0
Other: On Street Parking	0	0	0	0	0	0	5	0	0	6	8	0
Other: Street Furniture	0	0	0	0	0	0	0	0	0	6	0	0
Other: Recycling Area	0	0	0	0	0	0	0	0	0	6	0	0
Other: Sidewalk Café	0	0	0	0	0	0	0	0	0	14	0	0
Other: Bicycle Path	0	0	0	0	0	0	0	0	0	0	0	0
Greening												
Bioretention Cells/Swales	0	0	0	0	0	0	0	0	0	0	0	0
Permeable Pavement	1	0	0	2	2	2	1	1	0	1	1	1
Native, Low Water Landscaping	0	0	0	0	0	4	2	1	1	1	0	0
Street Trees	0	1	1	0	3	3	2	2	1	2	1	1
Other: Green Materials	2	2	2	1	1	1	0	2	1	2	1	1

Traffic Calming Technique	Group 3					Group 4						
	Commuter	Neighborhood Connector	Main Street/Transit Street	Walk Your Car	Festival Streets	Neighborhood Connector	Neighborhood Ave	Polka Street	Parkways	Main Street	Commercial Ave.	Transit Street
Other: Recycled Asphalt	0	0	0	0	0	0	0	0	0	0	0	0
Other: Green Wall	0	0	0	0	0	0	0	0	1	0	0	0
Other: Grey Water Reuse	0	0	0	0	0	0	0	0	0	0	0	0
Other: Fountains	0	0	0	0	0	0	0	0	0	0	0	0
Other: LED Lighting	0	0	0	0	0	0	0	0	0	0	0	0

Traffic Calming Technique	Group 5							
	Pedestrian Street	Activity Area Street	Neighborhood Residential Street	Neighborhood Connector	Fun/Commercial St	Commuter Street	Boulevard	Industrial Roadway
Speed Humps/Cushions	0	0	5	5	0	0	0	0
Raised Intersections	0	0	0	0	0	0	0	0
Chicanes	0	0	0	0	0	0	0	0
Bulb-outs/Curb Extensions	0	6	3	5	0	0	0	0
Traffic Circles	0	0	0	0	0	0	0	0
Chokers/Neckdowns	0	0	0	0	0	0	0	0
Road Narrowing	0	6	0	0	5	0	0	0
Road Diet	5	0	0	5	0	0	0	0
Median Island	0	0	0	0	0	2	2	0
Raised Curbs	0	0	0	0	0	0	0	0
Restricted Access	1	0	0	5	0	0	0	0
Street Material	3	1	0	0	0	0	0	0
Landscaping	5	2	5	0	4	0	0	0
Street Trees	2	6	1	1	7	1	4	0
Setback Reduction	0	6	0	5	0	0	0	0
Enforcement and Awareness	0	3	0	0	0	0	0	0
Roundabouts	0	0	0	0	0	0	0	0
Mid-Block Crossings	0	0	0	0	0	3	5	0
Raised Crosswalks	0	0	0	0	0	0	0	0
Median Island Refuge	0	0	0	0	0	0	3	0
High Visibility Crosswalks	0	6	2	2	2	0	0	0
Pedestrian Signal Improvements	0	6	5	5	3	0	0	0
Driveway Treatments	0	0	0	0	0	0	0	0
Bicycle Intersection Treatments	0	0	0	0	0	0	0	0

Traffic Calming Technique	Group 5							
	Pedestrian Street	Activity Area Street	Neighborhood Residential Street	Neighborhood Connector	Fun/Commercial St	Commuter Street	Boulevard	Industrial Roadway
Bicycle Signal Actuation	0	0	0	0	0	0	0	0
Intersection Art	0	0	0	0	7	0	0	0
Other: Width	0	0	0	0	0	0	0	0
Other: Color, texture, pattern	0	0	0	0	0	0	0	0
Other: public art, wayfinding	0	0	0	0	0	0	0	0
Other: Pedestrian Scale Lighting	0	0	0	0	0	0	0	0
Other: Artistic Lighting	0	0	0	0	0	0	0	0
Other: Gateway Features	0	0	0	0	0	0	0	0
Other: Wayfinding Signage	0	0	0	0	0	0	0	0
Other: Bike Lanes/Pavement Markings	0	0	0	0	1	0	0	0
Other: Crosswalks	0	0	0	0	0	0	0	0
Other: Buried Utilities	0	0	0	0	0	0	0	0
Other: Awareness Signage	0	0	0	0	0	0	0	0
Other: On Street Parking	0	0	0	0	0	0	0	0
Other: Street Furniture	0	0	0	0	0	0	0	0
Other: Recycling Area	0	0	0	0	0	0	0	0
Other: Sidewalk Café	0	0	0	0	0	0	0	0
Other: Bicycle Path	0	0	0	0	0	0	1	0
Greening								
Bioretention Cells/Swales	0	0	0	0	0	0	0	0
Permeable Pavement	1	0	0	0	0	0	1	2
Native, Low Water Landscaping	0	2	1	0	0	0	0	0
Street Trees	2	0	1	0	1	1	0	0
Other: Green Materials	2	1	1	1	2	2	2	1

Group 5								
Traffic Calming Technique	Pedestrian Street	Activity Area Street	Neighborhood Residential Street	Neighborhood Connector	Fun/Commercial St	Commuter Street	Boulevard	Industrial Roadway
Other: Recycled Asphalt	0	0	0	0	0	0	0	0
Other: Green Wall	0	0	0	0	0	0	0	0
Other: Grey Water Reuse	0	0	0	0	0	0	0	0
Other: Fountains	0	0	0	0	0	0	0	0
Other: LED Lighting	0	0	0	0	0	0	0	0

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Appendix B

Roadways Used to Generate Cleveland Typologies

This table shows Complete and Green Streets roadway typologies for the City of Cleveland. Typologies were generated based on peer examples of Complete Streets typologies, the consideration of multiple roadway characteristics and input received during the Cleveland Complete and Green Streets roadway typology workshop. The streets listed in the table were identified by workshop participants as archetypal Cleveland roadways.

Roadways are organized into two major categories:

1. Streets are primarily classified according to pavement width. The reason this categorization method was chosen is because the curb-to-curb width of the street will often be the major restricting characteristic in determining what Complete Streets retrofits can be made to a corridor. On occasion, it may be determined that curb width reduction or expansion may be the best solution for achieving the complete street goals of a roadway. However, a complete re-engineering of the roadway can be costly and time consuming. It is likely that the majority of Complete Street retrofits will take place within the corridor's existing pavement width and right-of-way. The pavement width categories were determined by grouping roadways by common number of motor vehicle lanes. Very Large Streets typically have six or more lanes, Large Streets typically have four to five lanes, Medium Streets have two to three lanes and Small Streets have two or less.
2. Within the primary roadway categories, streets were classified based on primary roadway function. These categories were derived from feedback received during the Cleveland Complete and Green Streets roadway typology workshop. Roadway function may be transportation mode, connectivity or land-use based (or a combination of multiple characteristics).

Roadway Name	Typical Pavement Width (ft)	ROW (ft)	Connectivity Function	Land Use (Primary/ Secondary)	Motor Vehicle Lanes	Parking	Speed Limit	ADT	Truck ADT	Transit	Notes
Very Large Streets > 70 ft. Pavement Width											
Commuter Street											
Clifton Blvd.	74	125	High/Regional	Residential	7	No	35	15330	190	Bus	
Carnegie Ave. (west of E 55 th)	72	100	Medium/Crosstown Connection	Commercial	7	No	35	unk.	unk.	None	
Chester Ave. (E 55 th to E 105 th)	70	120	High/Crosstown Connection	Commercial /Residential	6 (separated)	No	35	25540	1410	Bus (near downtown)	
Commercial Street											
Superior Ave. (west of E 55 th)	76	128	High/Crosstown Collection	Commercial /Residential	6	No	35	10756	665	BRT	
E 9 th St ¹	71-56	100	Medium	Commercial	6-2	Yes	35	unk.	unk.	Bus	Near-term Capital Improvement Project: E 9 Resurfacing

¹ 9th St. through downtown Cleveland is a unique roadway example in that it is a very wide, high capacity roadway that also serves as an important pedestrian corridor. It drops down to 2 lanes at the lakefront where it becomes a pedestrian-oriented parking zone.

Roadway Name	Typical Pavement Width (ft)	ROW (ft)	Connectivity Function	Land Use (Primary/ Secondary)	Motor Vehicle Lanes	Parking	Speed Limit	ADT	Truck ADT	Transit	Notes
Large Streets 69-48 ft. Pavement Width											
Commercial Street											
Carnegie Ave. (east of E 55th)	56	100	Medium/Crosstown Connection	Commercial	5	No	35	unk.	unk.	None	
Prospect Ave.	54	80	Medium/Feeder	Commercial	4	Yes	35	unk	unk	Bus	
Detroit Ave.	48	66	High/Crosstown Collection	Commercial /Residential	4-2	Yes	35	9897	342	Bus	
Broadway Ave.	48	60-70	High/Regional	Commercial /Residential	4	No	35	unk.	unk.	Bus	
Lorain Ave.	48	66	High/Regional	Commercial/Residential	4	Yes	35	unk.	unk.	Bus	
W 25th St. (Lorain Ave. to Detroit Ave.)	65	100	High/Feeder	Commercial /Residential	6	Yes	25	unk.	unk.	Bus	Parking in outside lane
Neighborhood Street											
W 117th St (south of Hwy 90)	59	80	High/Crosstown Collection	Residential/Commercial	5	No	35	unk.	unk.	Bus	
Pearl Rd. (Between I 71 and I 480)	56-44	100-66	High/Regional	Residential/Commercial	5-2	No	25	10122	394	Bus	
Cedar Ave.²	44	66	High/Crosstown Collection	Commercial /Residential	4	No	35	6942	unk.	Bus	
Industrial Street											
W 150th St. (North of Puritas)	60	75	Medium/Feeder	Commercial	5	No	35	unk	unk	None	

² While less than 48 feet, Cedar Ave. more closely fits the Medium Streets designation due to having 4 lanes and a high level of connectivity.

Roadway Name	Typical Pavement Width (ft)	ROW (ft)	Connectivity Function	Land Use (Primary/Secondary)	Motor Vehicle Lanes	Parking	Speed Limit	ADT	Truck ADT	Transit	Notes
St. Clair Ave. (Between 13th St. and Hwy 90)	60	100	High/Regional	Industrial/Commercial	4	Yes	35	unk.	unk.	Bus	
Payne Ave (Between 13th St. and Hwy 90)	58	85	Medium	Industrial/Commercial	4	Yes	35	unk.	unk.	Bus	
Ridge Rd. (north of Hwy 71)	52	85	High/Regional	Industrial/Commercial	4	No	35	unk.	unk.	Bus	
18th St. (north of Payne Ave.)	48	70	Medium	Industrial/Commercial	2	Yes	35	unk.	unk.	None	
Broadway Ave. (Between Hwy 77 and Hwy 90)	48	90	High/Regional	Industrial	4	No	35	6510	400	Bus	
Medium Streets 48-30 ft. Pavement Width											
Neighborhood Street											
Madison Ave.	40	66	Medium/Feeder	Residential/Commercial	2	Yes	35	8177	unk.	Bus (Western)	
Schaaf Rd. (Van Epps Rd. to Broadview Rd.)	40	75	Medium	Residential	2	Yes	35	unk.	unk.	None	
W 130th St. (north of Leeila Ave.)	40	60	Medium/Feeder	Residential	2	No	35	unk.	unk.	Bus (southern segments)	
West Blvd	40	130	Medium	Residential	2	Yes	35	unk.	unk.	Bus	(Interesting example small roadway, huge ROW)
Riverside Dr.	38	55-66	High/Feeder	Residential.	2	No	35	6750	120	Bus (some segments)	

Roadway Name	Typical Pavement Width (ft)	ROW (ft)	Connectivity Function	Land Use (Primary/ Secondary)	Motor Vehicle Lanes	Parking	Speed Limit	ADT	Truck ADT	Transit	Notes
Bridge Ave.	35	66	Medium/Feeder	Residential	2	Yes	25	unk.	unk.	None	
Franklin Blvd.	31	66	Medium/Feeder	Residential	2	Yes	35	unk.	unk.	None	
E 79th St.	30	50-60	High/Crosstown Collection	Residential	2 (4 in segments)	Yes	35	unk.	unk.	Bus	
Commercial Street/Pedestrian Shopping Street											
Wade Park Ave	40	68	Medium	Residential	2	Yes	25	unk.	unk.	Bus	Near-term Civic Improvement Project
E 185 th (North Extents to S Watreloo Rd)	40	58	Medium/Feeder	Commercial	2	Yes	25	unk.	unk.	Bus	
Mayfield Rd. (in Little Italy)	32	60	High/Regional	Commercial	2	Yes	35	15730	400	Bus	
Industrial Street											
Bessemer Ave.	40	72	Medium	Industrial/Access	2	No	25	unk.	unk.	Bus	
Lakeside Ave (east of 13 th St.)	40	66	Low	Industrial/Commercial	2	Yes	35	unk.	unk.	None	
Independence Rd.	40	61	Medium	Industrial/Residential	2	No	25	unk.	unk.	None	
Ivanhoe (Euclid to E 152)	40	58	Medium	Commercial/Industrial	4	No	35	unk.	unk.	None	Near-term Civic Improvement Project: New Curbs, sidewalks and street surface
Scranton Rd. (north of Train Ave.)	36	61	Medium	Industrial/Residential	2	Yes	25	unk.	unk.	None	
Train Ave.	30	61	Medium	Industrial/Residential	2	No	35	unk.	unk.	None	

Roadway Name	Typical Pavement Width (ft)	ROW (ft)	Connectivity Function	Land Use (Primary/ Secondary)	Motor Vehicle Lanes	Parking	Speed Limit	ADT	Truck ADT	Transit	Notes
Small Streets < 30 ft. Pavement Width											
Neighborhood Street											
E 75th	28	60	Low	Residential	1	Yes	25	unk.	unk.	None	
E 64th St.	28	44	Low	Residential	1	Yes	25	unk.	unk.	None	1 lane 2 way traffic
Lawnview Ave.	26	50	Low	Residential	1	Yes	25	unk.	unk.	None	1 lane 2 way traffic
E 65th St.	26	48	Medium	Residential	1	Yes	25	unk.	unk.	None (Bus in some segments)	1 lane 2 way traffic
E 74th St	26	40	Medium	Residential	1	Yes	25	unk.	unk.	None	
W 61st St.	22	55	Low	Residential	1	Yes	25	unk.	unk.	None	
Numbered Residential Streets	22-20	50-30	Low	Residential	2	Typically	25	unk.	unk.	None	one way
Hessler Rd.	20	36	Low	Residential	1	Yes	25	unk.	unk.	None	
Ellen Ave	20	30	Low	Residential	1	Yes	25	unk.	unk.	None	
Commercial Street/Pedestrian Shopping Street											
Market Ave.	28	66	Low	Commercial	1	Yes	n/a	unk.	unk.	None	One lane, one way, cobblestone
E 4th St.	20	40	Low	Commercial	1/none	Loading	none	unk.	unk.	None	
Variable Width Typologies/Overlays											
Alleyways/Access Streets											
Bolivar Rd.	35	66	Low	Access	2	Yes	25	unk.	unk.	None	Access/Alley
Frankfort Ave.	20	40	Low	Commercial /Access	1	Loading	25	unk.	unk.	None	Alley/Access

Roadway Name	Typical Pavement Width (ft)	ROW (ft)	Connectivity Function	Land Use (Primary/ Secondary)	Motor Vehicle Lanes	Parking	Speed Limit	ADT	Truck ADT	Transit	Notes
Johnson Ct.	20	33	Low	Access	1	Yes	25	unk.	unk.	None	Alley/Access
<p>Transit Spine Overlay - These are roadways that have been identified as future express bus or Bus Rapid Transit corridors by the Cleveland Regional Transit Authority. However, Transit Spine Overlay treatments may be warranted on Medium to Very Large streets that serve a significant transit function and have excess vehicular capacity. Warrants for the Transit Spine Overlay typology will be discussed in the Cleveland Complete and Green Streets Design Guide. Roadway priorities should be given to transit users, pedestrians and bicyclists.</p>											
Broadway Ave. (Between Hwy 77 and Hwy 90)	48	90	High/Regional	Industrial	4	No	35	6510	400	Bus	
Detroit Ave.	48	66	High/Crosstown Collection	Commercial /Residential	4-2	Yes	35	9897	342	Bus	
<p>Priority Bikeway Overlay - While all typologies include accommodations for bicyclists, the Priority Bikeway Overlay uses additional treatments that give roadway priority to bicycle users. These treatments are intended to improve safety, comfort and convenience for bicyclists and encourage them to utilize these routes as much as possible for trips. The Priority Bikeway Overlay is applied to corridors that are identified in the Cleveland Bikeway Master Plan. Additionally, the Priority Bikeway Overlay will be applied to roadways that meet the warrants described in the future Cleveland Complete and Green Streets Design Guide.</p>											
Pearl Rd. (Between I 71 and I 480)	56-44	100-66	High/Regional	Residential/Commercial	5-2	No	25	10122	394	Bus	
Clifton Blvd.	74	125	High/Regional	Residential	7	No	35	15330	190	Bus	