Complete Streets

DESIGN Guidelines

metropolitan planning organization

PALM BEACH MPO

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WARNING
ONE WAY

Summary of Primary Topics

Street Typology

Complete Streets are developed from a philosophy that streets have many different roles, functions, and characteristics depending on their context. Focus is placed on the type of trips served including pedestrian, bicyclist, transit, and motor vehicle trips. The design objectives for a particular street are revealed from a greater understanding and analysis of the different roles of the street. Based on an analysis specific to Palm Beach County roads and streets, a street typology consisting of five categories was developed. The table below shows the relationship between traditional functional classifications and the street typologies for these guidelines.

- Limited Access Facilities – LA
- Major Corridors – MC
- Main Connectors – CN
- Community Connectors – CC
- Neighborhood Streets - NS

	Major Corridors	Main Connectors	Community Connectors	Neighborhood Streets
Principal Arterial				
Minor Arterial				
Collector				
Local				

Land Use Typology

Land uses are categorized more broadly than the traditional zoning designations. Streets can thus respond to changes in the building form and function, elements which transcend whether a particular building is an office or apartment building. These land use typologies focus on building and parking orientation, in addition to the potential uses, as the orientation can affect the types of trips a building supports.

- Urban Core – UC
- Urban General – UG
- Suburban – SB
- Rural Town – RT
- Rural – RU
- Natural - NA

Flexibility in Design

FHWA and USDOT have embraced flexibility in design, the concept that designers should be provided with the ability to use professional judgment in applying guidelines rather than applying a purely prescriptive design approach. Consistent with that philosophy, FHWA issued a revision in the Federal Register to 23 CFR 625 on May 5, 2016. The revision reduced the number of controlling design criteria on roadways with design speeds under 50 mph from thirteen to two – design loading structural capacity and design speed. There are now ten controlling design criteria for high-speed roadways (design speeds of 50 mph or greater). The practical effect of this change is enhancing the practitioner's ability to exercise flexibility in roadway design based on engineering judgment and local context.

According to Toward More Flexible Design (FHWA-HRT-16-003), Hilton and Goodman (2016) note that the changes to the controlling criteria issued in 23 CFR 625 are a significant step in supporting FHWA's partners and stakeholders as they work to implement projects that result in better and more sustainable outcomes, such as improved connectivity and mobility for people of all ages and abilities, enhanced safety, and increased equity. The changes to the controlling criteria also demonstrate how much the focus of the Federal-aid highway program has evolved since its creation. Today, FHWA focuses on the safety of all users of the transportation system and on connecting people to work, schools, and other important destinations in ways that meet the needs of all modes and are sensitive to community character, livability, and quality of life.

Several street design elements fall within flexibility in design guidance provided by FHWA and FDOT. Flexibility is provided through ranges in design values to encourage facilities that are sensitive to local context and incorporate the needs of pedestrians, bicyclists, and motorists.

- Bicycle facility type
- Marked crosswalks
- Design speed
- Through travel lane width
- Turn lane width
- Curb return radii

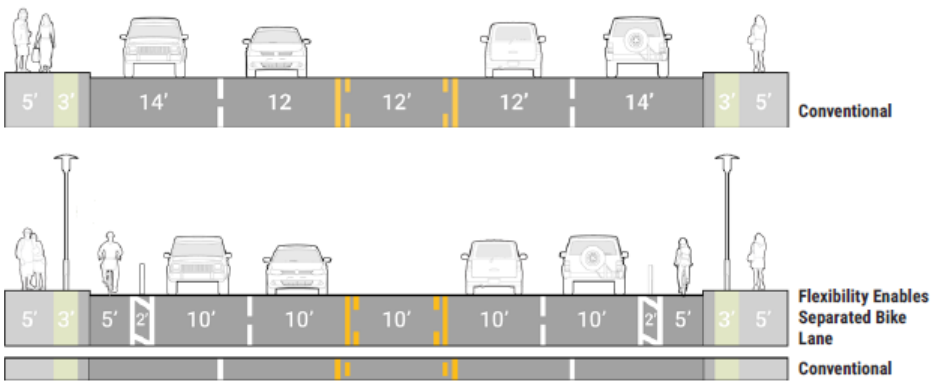
Sidewalk Zones

The Pedestrian Realm/Streetside can be divided into four zones, which serve different but complementary purposes. Unfortunately, some streets only have the Pedestrian Zone, which typically leads to an uncomfortable walking environment with no separation from traffic and many obstructions in the sidewalk. Although the boundaries between the four Pedestrian Realm zones can sometimes be blurred, the design of each zone is unique and must be treated with detailed attention to make the whole work together as an integrated system. The four zones are: **Frontage Zone**, **Pedestrian Zone**, **Furnishing Zone**, and **Curb Zone**.

Pedestrian Realm Zones

Lane Width

Lane width is a key component in distributing available space on Palm Beach County's streets; width also governs vehicle speed and has an effect on the safety of all users. The highway standard of 12 foot lanes typically does not provide the flexibility needed for Complete Streets, where vehicle speed must be balanced with safety and access for transit, bicyclists, and pedestrians. By reducing lane widths to more context-appropriate widths (10-11 feet), right-of-way space can be made available for the addition of bicycle lanes and wider sidewalks. See the FHWA graphic below for an illustration of lane width reductions which create space without reducing lane capacity for vehicles.



Source: FHWA Achieving Multimodal Networks, Applying Design Flexibility & Reducing Conflicts

Separated Bicycle Lanes

Complete Streets should provide safe, comfortable bicycle facilities to facilitate bicycle travel. Separated bicycle lanes offer a signficant upgrade in safety and comfort over traditional bicycle lanes. Separated bicycle lanes provide physical separation - parked vehicles, curbs, flex posts - between the travel lanes and the sidewalk to create a safe space for bicyclists. Also known as cycle tracks or protected bicycle lanes, these facilities can eliminate conflicts between loading and parking vehicles and bicyclists.

2-way, separated bicycle lane in Seattle, WA.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Introduction


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Chapter 1. Introduction

Purpose

The Palm Beach Metropolitan Planning Organization (MPO) has established these Complete Streets Design Guidelines to provide guidance to local practitioners on how to plan and design Complete Streets elements into all types of transportation and land development projects. The Complete Streets principles included herein promote the concept of "proactive design" recognizing that the way we design our streets has a significant impact on the way people use the street. Design principles of a street can guide users through physical and environmental cues; manage vehicle speeds; encourage safe walking, bicycling, and public transit use; and embrace the unique place characteristics that surround the street (often referred to as context-sensitive design).

There is a clearly recognized public need for well-designed multimodal roadway facilities. Approaching this effort from a comprehensive countywide level aims to ensure that safe, accessible streets are provided across Palm Beach County. This guide connects with the Florida Department of Transportation's (FDOT) Complete Streets Implementation Plan: Multimodal Development and Delivery, released in December 2015. FDOT's ongoing Complete Streets efforts include updating FDOT design standards and procedures. The Palm Beach MPO Complete Streets Design Guidelines will provide local guidance to complement FDOT's approach to Complete Streets. In addition, this document will provide local practitioners with new street design tools which are expressly rectified to provide context-sensitive designs for all users.

Busy pedestrian crossing in Delray Beach.

Goals

Develop a context sensitive design framework that integrates streets with adjacent land uses.

Provide local governments guidance and criteria for modifying, retrofitting, and constructing streets in accordance with surrounding development projects.

Emphasize multimodal safety and mobility across every element of the guidelines.

Implement a street network that is safe and convenient for all to encourage more people to walk, bike, and take transit.

Textured crosswalk with median crossing refuge in Boca Raton.

Background

What are Complete Streets?

Complete Streets are roadways designed and operated for the safety, comfort, and convenience of all users, allowing multimodal transportation for pedestrians, bicyclists, motorists, and transit riders of all ages and abilities. The Complete Streets terminology can be used to describe roadways that have been designed and planned to meet the needs of all users. Historically, roadway development has been automobile centric, with pedestrians, bicyclists, and transit alternatives being considered secondarily. An ideal Complete Street allows for the efficient movement of all transportation modes as determined by the design of the roadway and sidewalks. A typical Complete Street will have efficient vehicular travel while providing ample room for pedestrians and cyclists to safely utilize the route with reduced interaction with automobiles.

Source: Smart Growth America

Benefits of Complete Streets

Complete Streets support a variety of local benefits, including improvements in safety, public health, the environment, and the economy. The Complete Streets philosophy presents an opportunity to use Palm Beach County's public rights-of-way to impart benefits to all its citizens, every day.

Safety

Crashes involving motor vehicles often seriously injure or kill pedestrians and bicyclists. As vulnerable road users, pedestrians and bicyclists greatly benefit from physical separation from vehicles. All road users, including vehicle occupants, are safer when road speeds are calmed. Reductions in speed can reduce both the frequency of crashes, by providing more time to see and react, and the severity of crashes by reducing the energy involved in a collision. According to the National Complete Streets Coalition (NCSC), over 40 percent

of pedestrian fatalities occur where no crosswalk is available and more than 50 percent of pedestrian fatalities occur along streets classified as arterial roadways in the functional classification system. In Complete Streets without safe places to walk, cross, bike, or catch a bus put people at risk. Figures 1-1 through 1-4 illustrate the trend of fatalities and injuries on Palm Beach County streets from motor vehicle collisions with pedestrians and bicyclists.

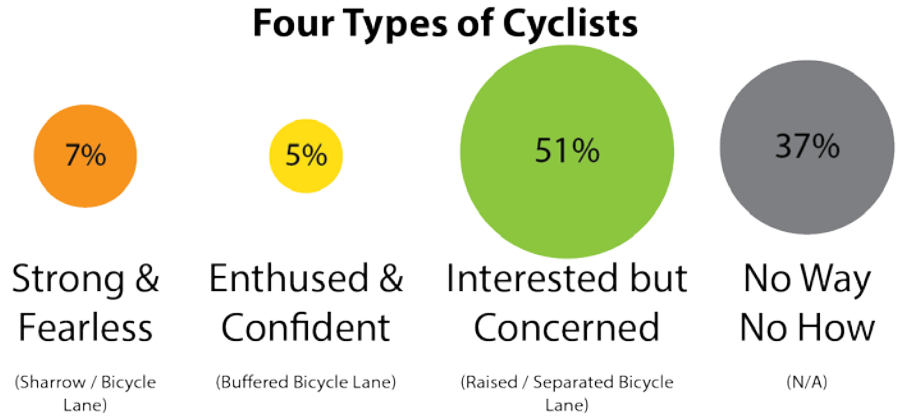
Bicyclists in a buffered bike lane on southbound U.S. 1 in Boynton Beach.

Mode Split

Safer streets for all users can attract bicyclists, transit users, and pedestrians. By providing these facilities, Complete Streets encourage a mode split that reduces reliance on motor vehicles and allows for a greater range of transportation options for all.

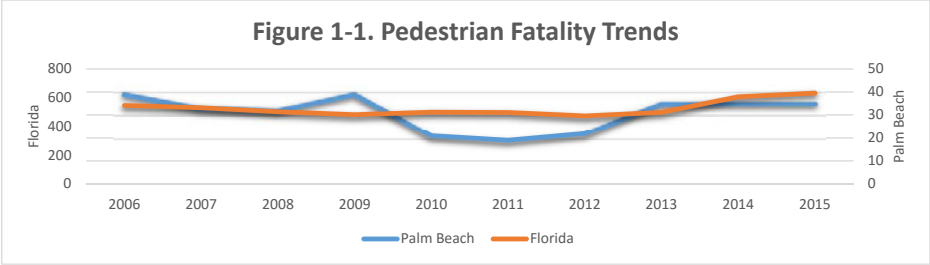
Revisiting the Four Types of Cyclists: Findings from a National Survey

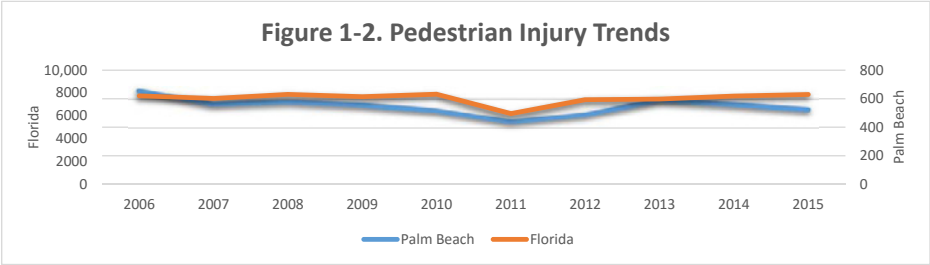
A survey of national interest in bicycling for transportation found that there are four main attitudes towards biking (Dill & McNeil, Transportation Research Record, 2016). The strong and fearless and enthused and confident groups are likely to need less infrastructure and separation from cars to choose to ride. Conversely, the no way no how group is unlikely to ride regardless of the level of comfort and separation a facility provides. These Complete Streets Design Guidelines are focused toward the interested but concerned group, which was shown to be approximately one-half of the bicycling population in the national survey. This group demonstrates interest in bicycling for transportation yet is concerned about riding alongside vehicles due to safety and lack of comfort sharing space with cars. Building a connected network of exclusive bicycle facilities and calming motor vehicle traffic can help to increase the comfort of this group and support their decision to bicycle for transportation.

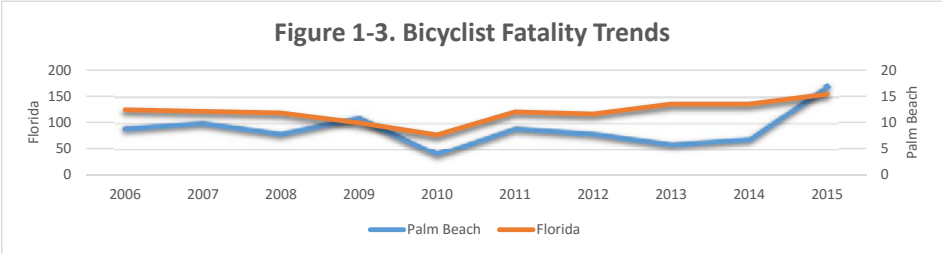


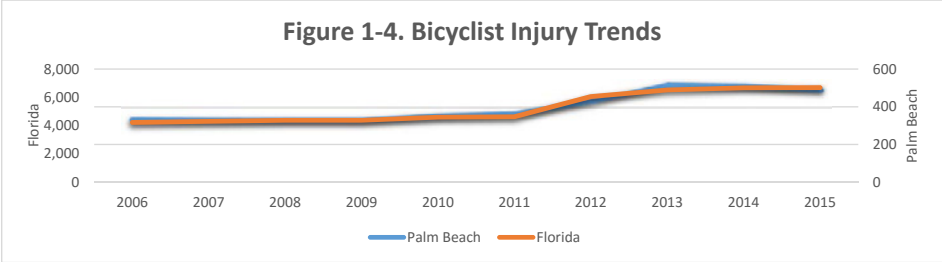
Source: Dill & McNeil, TRB 2016

Crash Trends



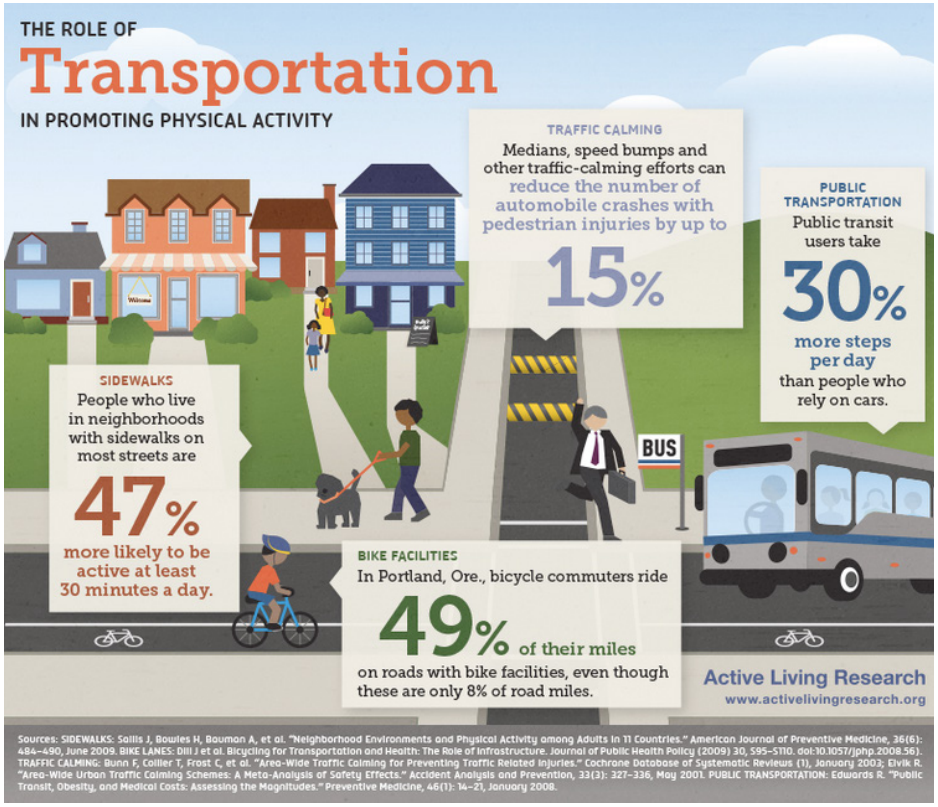






Public Health

According to the Florida Department of Health's Palm Beach County Community Health Assessment, nearly two-thirds (61.3 percent) of adults in Palm Beach County are overweight or obese. Public health suffers when sedentary lifestyles are reinforced by a reliance on motor vehicles for transportation. A lack of safe and connected sidewalks and bicycle facilities creates a barrier to walking or biking for shorter trips; these short trips are ideal targets for supporting active lifestyles, which can help reduce the percent overweight or obese. Local particulate pollution generated by vehicles also



Source: Active Living Research; Http://Activelivingresearch.org/Files/Alr.resources.summary_transport_06.12.13.Pdf

creates public health concerns for the development of asthma and other respiratory illnesses. Reductions in vehicle miles traveled can be combined with increased greenery to improve local air quality.

Environment

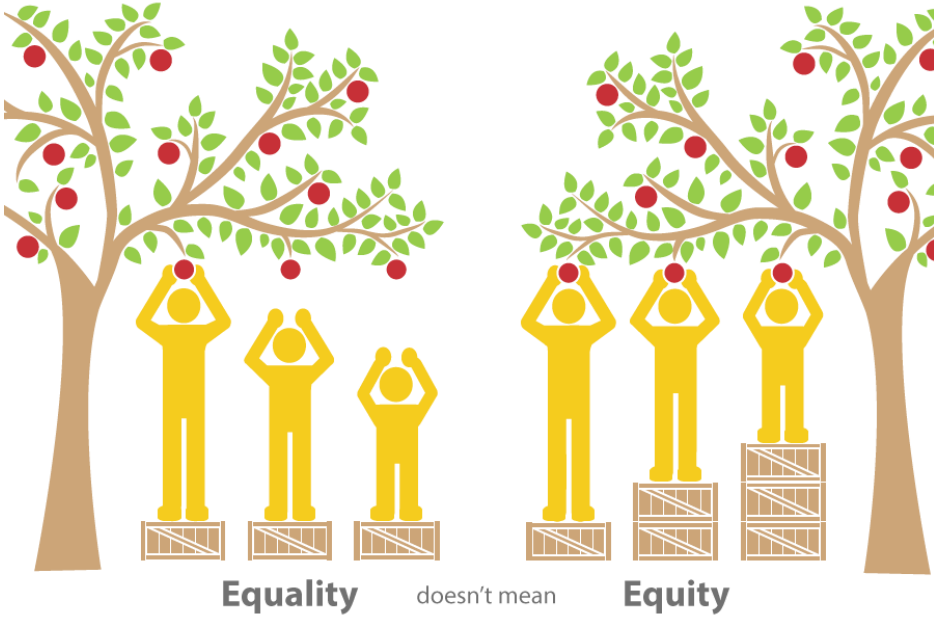
Traffic congestion and idling is associated with increased vehicle emissions, which degrade the environment. Complete Streets improvements can reduce emissions through increased alternatives to driving and calmer traffic flow. Roadway stormwater runoff can negatively impact water quality as oil, debris, and garbage is flushed from streets into local waterways. The addition of landscape elements to streets provides an opportunity to filter water naturally before either recharging groundwater or flowing into the storm sewer system.

Economy

Facilitating multimodal transportation can make it easier for residents and visitors to take transit, walk, or bike to destinations that can help stimulate the local economy. Local businesses can realize financial benefits from improving access for people traveling by foot or bicycle. In addition, the investment that local governments make in implementing Complete Streets can stimulate private investment, especially in retail districts and downtowns where pedestrians and bicyclists feel unwelcome in the current roadway environment. Vehicle ownership is one of the highest expenditures that residents of Palm Beach County face. Complete Streets prioritize equal access to the transportation network without the costs of operating a vehicle. According to data from the American Public Transportation Association (APTA), people living in urbanized areas can save upwards of $8,000 per year by switching to public transit instead of personal automobile for their daily commute.

Equity

Complete Streets are planned, designed, operated, and maintained to be safe and comfortable for everyone, regardless of age, ability, ethnicity, income, or chosen travel mode. According to data from the National Highway Traffic Safety Administration (NHTSA), minorities, older adults, and people of lower income are disproportionately represented among pedestrian deaths. Populations living near in Complete Streets suffer disproportionately in increased likelihood of illness, injury, and death. They are also more likely to be cut off from jobs, doctors, friends, and family, and to pay a much greater percentage of their budget for transportation than their counterparts.



Source: Active Living Research; Http://Activelivingresearch.org/Files/Alr.resources.summary_transport_06.12.13.Pdf

Complete Streets at the Palm Beach MPO

The Palm Beach MPO is actively working toward the realization of Complete Streets goals and principles on transportation projects in Palm Beach County.

Complete Streets Policy

The Palm Beach MPO Board adopted its Complete Streets Policy on March 17, 2016. More information can be found at www.PalmBeachMPO.org/complete-streets.

The Palm Beach MPO aims to achieve a safe and convenient transportation network by implementing Complete Streets within the context of Palm Beach County's diverse communities. The Palm Beach MPO will seek to promote Complete Streets by prioritizing the funding of Complete Streets infrastructure projects, providing educational opportunities, and encouraging local jurisdictions to adopt and implement local Complete Streets policies.

The purpose of this Complete Streets Policy is to accommodate the safety and convenience of all surface transportation system users into the planning, design, and construction of state and federally funded transportation projects programmed through the MPO's Transportation Improvement Program (TIP).

The Complete Streets Policy will provide a framework for the creation for a connected Complete Street network.

The Complete Streets Policy recognizes that every trip begins and ends as a pedestrian and that all street and users are different.

The Complete Streets Policy follows the Transportation User Considerations established wherein pedestrians are considered first during project design followed by bicycles, public transit, commercial vehicles, and finally personal vehicles.

Complete Streets Working Group

The Palm Beach MPO Complete Streets ad hoc working group met throughout the development of these guidelines to provide input on content development and share information about Complete Streets project opportunities, implementation successes, issues, and lessons learned.

Existing Design Guidance

Street Design Criteria and Guidelines

Engineers and planners follow established standards and guidelines to prepare designs for roadway projects. An inventory of existing roadway design standards, guidelines, and other Complete Streets elements was undertaken. The purpose of the inventory is to identify documentation for design elements to be included within the Complete Streets Design Guidelines. The following standards and guides were reviewed and help to inform the guidelines:

- The American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets (AASHTO Green Book)
- United States Department of Transportation (USDOT) Manual on Uniform Traffic Control Devices (MUTCD)
- USDOT Achieving Multimodal Networks: Applying Design Flexibility & Reducing Conflicts
- Americans with Disabilities Act (ADA) Standards for Accessible Design
- Institute of Transportation Engineers (ITE) Designing Walkable Urban Thoroughfares: A Context Sensitive Approach
- National Association of City Transportation Officials (NACTO) Urban Street Design Guide
- NACTO Urban Bikeway Design Guide (2nd Edition)
- NACTO Transit Street Design Guide
- Florida Department of Transportation (FDOT) Plans Preparation Manual (PPM)
- FDOT The Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways (the "Florida Greenbook")
- FDOT Complete Streets Implementation Plan
- Palm Beach County Engineering Standards

AASHTO Green Book

The AASHTO Green Book provides guidance for geometric design elements of highways and streets. The document is also intended as a comprehensive reference manual to assist in administrative, planning, and educational efforts pertaining to design formulation. Design guidelines are included for freeways, arterials, collectors, and local roads, in both urban and rural locations, based on the functional classification system used in highway planning. The guide is also used by some local governments as design standards for all streets. Design flexibility is encouraged by the AASHTO Green Book, including the use of 10 foot travel lanes depending on desired speed, capacity, and context of a roadway.

USDOT MUTCD

The MUTCD provides standards and guidance for the design and application of all allowed traffic control devices including roadway markings, traffic signs, and signals. The Federal Highway Administration (FHWA) oversees application of the MUTCD. The State of Florida chooses to adopt the Federal MUTCD as its manual for signs, pavement markings, and traffic control devices. Whereas many other documents are considered guidelines, the MUTCD allows for limited variations from approved traffic control methods due to the relationship between the MUTCD, the Code of Federal Regulations, and state law. Agencies can apply for experimental status for inclusion of innovative treatments in projects. Several recent Interim Approvals (IAs) have lessened restrictions on the use of specific bicycle facility design treatments.

USDOT Achieving Multimodal Networks

Published in 2016, Achieving Multimodal Networks: Applying Design Flexibility & Reducing Conflicts is a resource for practitioners seeking to build multimodal networks. In particular, the document focuses on design treatments for which engineers and planners can apply the design flexibility found in current national design guidance to address common roadway design challenges and barriers. The document highlights sources for design guidelines and criteria when mentioned. Achieving Multimodal Networks is divided into two parts – Applying Design Flexibility and Reducing Conflicts. Lane width, design speed, traffic calming, intersection geometry, road diets, and pedestrian crossing treatments are key themes included in the document.

Americans with Disabilities Act Standards for Accessible Design

The ADA standards are issued by the federal government and apply to all new construction and alteration projects. These standards ensure access to the built environment for all users. ADA standards govern accessibility for all infrastructure, including public transportation facilities, sidewalks, and curb ramps. The U.S. Access Board published Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG) in 2011. PROWAG will become the U.S. standard for accessibility in the public right-of-way when the Board issues a final PROWAG rule. Until that time the U.S. Department of Justice (USDOJ) 2010 ADA Standards and the USDOT 2006 ADA/Section 504 Standards provide enforceable standards applicable to the public right-of-way. Where the current standards do not address a particular issue, FHWA encourages agencies to draw upon the draft PROWAG for best practices.

ITE Designing Walkable Urban Thoroughfares

The ITE guidelines take a context-sensitive approach to Complete Streets design. The methodology guides practitioners to identify land use and building form and match a street's design elements to the context zone which the street supports. The land use context and the services provided on a street inform classification of a "thoroughfare type" as a supplemental guide to the traditional functional classification methodology. By combining context zone and thoroughfare type, the guide offers context-sensitive elements and design guidelines for inclusion on Complete Streets.

NACTO Guides

NACTO guides have quickly gained acceptance as approved design guidance in many states and cities. FHWA supports the use of NACTO guidance to help plan and design safe and convenient pedestrian and bicycle facilities. FDOT lists the NACTO guides as design resources in the 2016 draft of the revised

Florida Greenbook. Most treatments included in NACTO guides are either supported by or not precluded by the MUTCD standards and guidance. The NACTO Urban Bikeway Design Guide, Second Edition does identify some bicycle facility treatments that would require request for experimentation from FHWA to implement. The NACTO guides cover street design, including intersection design, and facilities specific to bikes and transit.

FDOT Manuals

Minimum standards for street design in Florida are governed by FDOT's Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (commonly known as the Florida Greenbook). FDOT applies the criteria and standards in the Plans Preparation Manual (PPM) to all state highways. Deviations from the minimum design criteria found in the PPM require approval through FDOT's design variance process. These manuals provide design standards and guidance based upon design speed and traffic volumes. Their context-sensitivity is typically limited to urban vs. rural settings. Complete Streets elements in the PPM are included in Chapter 2 (Design Geometrics and Criteria), Chapter 8 (Pedestrian, Bicycle, and Public Transit Facilities), Chapter 21 (Transportation Design for Livable Communities), and Chapter 25 (Design Criteria for Resurfacing, Restoration, and Rehabilitation [RRR] projects). The May 2013 Florida Greenbook became effective September 7, 2015. The previous version, May 2011, included significant modifications expanding on Chapter 8 (Pedestrian Facilities) and Chapter 9 (Bicycle Facilities) to provide improved guidance, as well as the addition of a chapter on Traditional Neighborhood Development (TND). An update to the Florida Greenbook is anticipated in Spring 2017; the 2016 draft of the Florida Greenbook includes an adjustment of guidance to approve minimum through lane widths of 10 feet for streets where truck traffic is below 10% of traffic and the design speed is below 40 mph.

FDOT Complete Streets Implementation Plan

FDOT published the Complete Streets Implementation Plan in December 2015 in conjunction with Smart Growth America. The Plan was published to guide FDOT's efforts to implement the Complete Streets Policy adopted in September 2014. The Plan outlines a five-part implementation framework and process for integrating a Complete Streets approach into FDOT's practices to ensure that future transportation decision-making and investments address the needs of all users of the transportation network and respond to community goals and context. The Plan provides detailed recommendations for updating ten FDOT documents including the PPM, which is in the process of being transitioned into the FDOT Design Manual (FDM), which will include a new section establishing a framework for making decisions based on a context-sensitive approach during project development.

Palm Beach County Engineering Standards

The County's engineering standards are the prescriptive standards which have long been the standard that agency staff and engineers have used in design of local streets. Solutions are clearly defined in the standards, with a focus on uniformity. The Complete Streets Design Guidelines complement the County's engineering standards and allow the practitioner to identify street design elements which are applicable to the particular situation.

Other Resources

Access to Transit

America's public transportation infrastructure plays a vital role in our economy, connecting millions of people with jobs, medical facilities, schools, shopping, and recreation. Unlike many U.S. infrastructure systems, the transit system is not comprehensive, as 45 percent of American households lack any access to transit, and millions more have inadequate service levels. According to the American Society of Civil Engineers (ASCE), Americans who do have access to transit have increased their ridership 9.1 percent in the past decade, and that trend is expected to continue. Although investment in transit has also increased, deficient and deteriorating transit systems cost the U.S. economy $90 billion in 2010, as many transit agencies are struggling to maintain aging and obsolete fleets and facilities amid an economic downturn that has reduced their funding, forcing service cuts and fare increases.

Complete Streets improvements have the potential to enhance access to transit by creating safer and more comfortable walking and bicycling routes for people to travel to bus stops and transit stations. Polling data indicate that over 70 percent of Americans support investments in more robust public transit systems. Approximately two-thirds of public transit ballot initiatives since 2000 have passed.

Voters in Palm Beach County approved a one-cent Infrastructure Surtax Initiative on the November 2016 election ballot, which can fund Complete Streets improvements such as sidewalks, pathways, lighting improvements, and bicycle paths, among other transportation-related improvements.

Transportation Planning and Health

The USDOT is committed to promoting better consideration of health outcomes in transportation focused on the following objectives:

- Promote safety.
- Improve air quality.
- Respect the natural environment through Context Sensitive Solutions.
- Improve social equity through access to jobs, health care, and other community services.
- Create additional opportunities for the positive effects of walking, bicycling, and public transportation.

The USDOT and the Centers for Disease Control and Prevention (CDC) have jointly released the Transportation and Health Tool (THT), which provides data on transportation and public health indicators for each State, Urbanized Area, and Metropolitan Statistical Area (MSA) that describe how the transportation environment affects safety, active transportation, air quality, and connectivity.

https://www.transportation.gov/transportation-health-tool

Aging in Place

Safe Routes to Age in Place is aimed at fostering accessible, safe, comfortable, and active transportation options for adults of all ages and abilities. Focusing on better walking environments on our streets and roadways allows seniors to remain active, healthy, and independent within their own communities. The majority of older adults wish to live independently and reside in their homes for as long as possible. However, many communities lack proper services to allow for prolonger independent living. One of the most important components of independent living is having the ability to easily access needed destinations, such as grocery stores, medical services, parks, libraries, and bus stops.

There are numerous health benefits associated with community and social engagement among all people, but this can be especially true of older adults. Community engagement, physical activity and social connectivity that come with the ability to age in place can provide a better quality of life and help to keep older adults healthy, both physically and mentally (Brummett et. al., 2001). When older adults give up driving, they report a lower quality of life. This decline can be countered through other mobility options. Access to alternatives to driving allow for enhancing social networks and social interaction and creating a sense of control and independence among older adults, which leads to a greater quality of life (Musselwhite & Haddad, 2010).

How to Use the Guidelines

The Palm Beach MPO Complete Streets Design Guidelines were developed using a typology approach, which allows for context-sensitive design. Streets and land uses were classified into distinct typologies, as will be seen in Chapter 3, based upon characteristics such as function and scale. Historical street design processes focused largely on the movement of motor vehicles, designing to its “functional classification” rather than examining the street’s role within a community. By contrast, context-sensitive design recognizes that streets vary in function in separate land use contexts and that design should respond to that changing purpose.

Design guidance in Chapter 4 focuses on this blended approach. Guidelines in Chapter 4 are organized into three sections: Pedestrian Realm/Streetside; Roadway Realm; and, Intersections. This approach reinforces the need to consider every aspect when designing Complete Streets; safety and comfort are equally important and necessary in each of these street components.

Users of these guidelines will find that some recommendations are prescriptive, with minimum and target dimensions recommended, while others are tools for inclusion where they support a street’s needs. The typology approach allows dimensions to apply across the region because context-sensitivity is already included; flexibility is maintained through the provision of minimums and absence of maximums.

2

Best Practices

Chapter 2. Best Practices

Introduction

Research shows that in implementing Complete Streets programs, many leading cities update their street design guidance to assess, inventory, and better align across departments and agencies the many processes and procedures involved in the design, delivery, and maintenance of local government street networks. In most cases prior to the Complete Streets movement, these processes had previously evolved across multiple departments with reference only to the specific purview of those departments, and without regard to the experience of the full range of users of any given streets.

Review of Example Design Guidelines

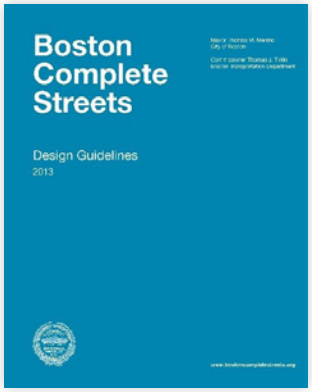
Among agencies with best-in-class approaches to Complete Streets, many, including Chicago, Boston, Nashville, Philadelphia, and the Broward MPO have developed design guidelines that focus at least as deeply on process and context as on technical design guidance. This is in part because jurisdiction over every element of the roadway involves so many different local departments. Clear guidance about context and usage as they relate to specific design elements—as well as about the agencies that must be consulted regarding each element of the roadway—helps to provide a path toward resolving competing priorities that must be resolved to achieve Complete Streets goals.

- Best in class Complete Streets design guidelines typically address the following items.
  - Overarching Complete Streets approach and goals
  - Street elements (sidewalks, intersections, curbsides, etc.)
  - Street typologies and land use considerations by street type
  - Design parameters (cross-sections)
  - Roles of agencies and entities involved in the delivery of streets

Chicago, Illinois

Chicago's Complete Streets Design Guidelines take an approach based upon the form and function of both buildings (seven types) and roads (six types). These typologies are applied consistent with a modal hierarchy that emphasizes the priority of pedestrians, then transit, bicycles, and automobiles. With these characteristics established, Chicago takes a "design tree" approach to identifying the design focus and appropriate elements for inclusion in projects. The guidelines provide target, maximum, and constrained dimensions (widths) for various typical section elements such as pedestrian zone, furniture zone, through lanes, and center median. The typical section elements are presented by roadway type, with context-sensitive differences provided based on building form and function. The guidelines also establish a compliance committee composed of city departments to oversee the implementation of the design process as well as make recommendations for policy revisions to accommodate the Complete Streets philosophy.

Boston, Massachusetts



Boston's approach to Complete Streets Design Guidelines combines land use and street function into a comprehensive set of "street types." Recommendations for target and constrained widths are thus applied to nine street types. Boston's guidelines provide extensive detail regarding each street element, providing guidance on the benefits as well as considerations that should be understood when applying each

element. A rendering style was developed and used to illustrate the design features, benefits, and considerations. Specific design guidance is organized into four chapters – sidewalks, roadways, intersections, and smart curbsides. A project development and review process is established to guide the inclusion of Complete Streets elements in transportation projects.

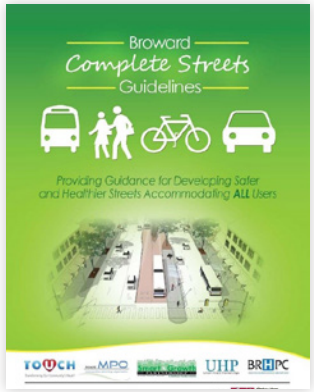
Nashville, Tennessee

Nashville established a Major and Collector Street Plan to guide the development of Complete Streets implementation. It includes guidance for both the character and function of the streets through the dual approaches of "Context Sensitive Solutions" and "Complete Streets." Nashville takes a Transect approach to defining the environmental context of a street, with seven distinct categories moving from natural to urban core. Street context is defined by one of three categories: residential; mixed use; industrial. These categorizations are combined with one of six functional design types to determine the appropriate designs for a street. Design guidelines are then provided for general standards, pedestrian zone, green zone, parking zone, bike zone, and vehicle zone.

Philadelphia, Pennsylvania

Like the approach of Boston, Philadelphia's Complete Streets Design Handbook identifies street types through a combination of context and street function. Eleven street types are identified and dimension recommendations for each street component are provided by street type. Street type maps are provided by area of the City. Complete Street components and design treatments are provided by street types, including dimensions provided for key elements such as walking zones, furnishing zones, bicycle facilities, lane widths, and medians, among others.

Broward, Florida

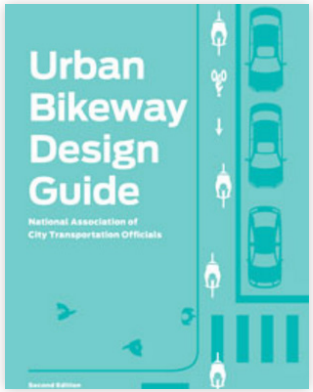


The Broward Complete Streets Guidelines was prepared by a multi-disciplinary partnership including the Broward MPO and the Broward Regional Health Planning Council. The guidelines were customized for local Broward jurisdictions and reflected local conditions, Florida State Statutes, and Florida design criteria. The Broward Complete Streets Guidelines are divided into fifteen chapters, covering topics such as Travel Way Design, Intersection Design, Pedestrian Crossings, Bikeway Design, Transit Accommodations, Traffic Calming, Streetscape Ecosystem, Designing Land Use Along Complete Streets, and Retrofitting Suburbia. A Technical Advisory Committee (TAC) was established to guide the development of the manual and provide input from stakeholder agencies including the Florida Department of Transportation (FDOT), Broward County Public Works, Broward County Transit, Broward MPO, Smart Growth Partnership, Bicycle Pedestrian Advisory Committee (BPAC), and several local municipalities.

NACTO

NACTO is a coalition of municipal transportation departments in North American cities. NACTO has published several guidebooks that provide innovative street design guidelines specifically for urban settings. The first of these was the NACTO Urban Bikeway Design Guide, published in 2011, which provides technical guidance on over twenty different bicycle infrastructure

designs including buffered bike lanes, separated bike lanes (cycle tracks), bike boxes, and several other treatments. The NACTO Urban Street Design Guide, published in 2013, provides guidance for innovative street design in urban areas focused on achieving safety through low speed design principles, placemaking, and streets as economic engines. The NACTO Transit Street Design Guide, published in 2015, showcases how to improve transit using innovative street design. NACTO guides are available on their website www.nacto.org.



Flexibility in Design

FHWA and USDOT have embraced flexibility in design, the concept that designers should be provided with the ability to use professional judgment in applying guidelines rather than applying a purely prescriptive design approach. Consistent with that philosophy, FHWA issued a revision in the Federal Register to 23 CFR 625 on May 5, 2016. The revision reduced the number of controlling design criteria on roadways with design speeds under 50 mph from thirteen to two – design loading structural capacity and design speed. There are now ten controlling design criteria for high-speed roadways (design speeds of 50 mph or greater). The practical effect of this change is enhancing the practitioner's ability to exercise flexibility in roadway design based on engineering judgment and local context.

Fixing America's Surface Transportation Act (FAST Act)

The Fixing America's Surface Transportation Act (FAST Act) encourages flexibility in design to meet the needs of all users and to improve communities. For projects that are direct recipients of Federal Funds (i.e. Federal grants such as TIGER) on roadways under the ownership of the local jurisdiction and not part of the Interstate System, the local jurisdiction can obtain approval from the State to use a different design publication than the State uses – provided the publication is recognized by FHWA.

Prior to the FAST Act, FHWA released a memorandum regarding flexibility in the design of bicycle and pedestrian facilities ("Bicycle and Pedestrian Facility Design Flexibility," August 20, 2013). This guidance expressed support for supplementing the AASHTO design guides with the NACTO Urban Bikeway Design Guide and the ITE Designing Walkable Urban Thoroughfares documents. FHWA explicitly encourages agencies to use these guides to fulfill USDOT's "Policy Statement on Bicycle and Pedestrian Accommodation" enacted in 2010. "DOT encourages transportation agencies to go beyond the minimum requirements, and proactively provide convenient, safe, and context-sensitive facilities that foster increased use by bicyclists and pedestrians of all ages and abilities, and utilize universal design characteristics when appropriate."

FDOT Complete Streets Policy

The Department will routinely plan, design, construct, reconstruct and operate a context sensitive system of 'Complete Streets.' While maintaining safety and mobility, Complete Streets shall serve the transportation needs of transportation system users of all ages and abilities, including but not limited to: cyclists, freight handlers, motorists, pedestrians, and transit riders.

The FDOT Complete Streets Implementation Plan identifies "necessary updates to FDOT's documents and practices to align with the Complete Streets Policy." FDOT held internal training workshops with the assistance of Smart Growth America to develop institutional knowledge regarding Complete Streets and identify necessary modifications to FDOT practices. Through these workshops the Implementation Plan was established to update existing documents and practices and promote design flexibility.

Toward More Flexible Design

According to Toward More Flexible Design (FHWA-HRT-16-003), Hilton and Goodman (2016) note that the changes to the controlling criteria issued in 23 CFR 625 are a significant step in supporting FHWA's partners and stakeholders as they work to implement projects that result in better and more sustainable outcomes, such as improved connectivity and mobility for people of all ages and abilities, enhanced safety, and increased equity. The changes to the controlling criteria also demonstrate how much the focus of the Federal-aid highway program has evolved since its creation. Today, FHWA focuses on the safety of all users of the transportation system and on connecting people to work, schools, and other important destinations in ways that meet the needs of all modes and are sensitive to community character, livability, and quality of life.

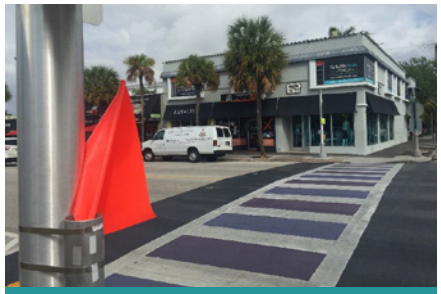
Complete Streets Elements

Several street design elements fall within flexibility in design guidance provided by FHWA and FDOT. Flexibility is provided through ranges in design values to encourage facilities that are sensitive to local context and incorporate the needs of pedestrians, bicyclists, and motorists.

- **Bicycle facility type** – Conventional bike lanes are only one of many bicycle facilities that can be considered depending on the street typology, land use context, and incorporation of the roadway in a bicycle route network plan. FHWA's "Bicycle and Pedestrian Facility Design Flexibility" memorandum encourages the selection of bicycle facilities based on context that foster the increased use by people of all ages and abilities. Design flexibility provides for the use of one-way and two-way cycle tracks (separated bike lanes), buffered bike lanes, and contra-flow bike lanes.

Separated bicycle lane.

- **Marked crosswalks** – Careful consideration should be given to when to mark a crosswalk and when enhanced crossing treatments are needed. In Florida, state statutes dictate that any intersection of two or more public streets represents a legal pedestrian crossing, whether the crossing is marked or unmarked and regardless of whether the intersection is signalized. At crossing locations with relatively high traffic volumes and speeds, designers should consider enhanced crossing treatments such as crossing islands, beacons, or traffic signals. FHWA's Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations recommends substantial crossing improvements be installed to supplement a marked crosswalk where the speed limit exceeds 40 mph and the average daily traffic exceeds 12,000 or greater (without a raised median refuge) or 15,000 or greater (with a raised median refuge). The MUTCD includes flexibility for the designer to consider factors besides traffic volume during an engineering study to justify the installation of an actuated flashing beacon or traffic signal at a marked crosswalk.



Marked crosswalk on an uncontrolled intersection approach with enhanced crossing treatments.

- **Design speed** – The AASHTO Green Book allows for flexibility by providing a range of values for design speed on urban arterials between 30 and 60 mph. Additional national resources recommend lower speeds: the NACTO Urban Street Design Guide recommends a design speed of less than 35 mph for urban arterials and ITE's Designing Walkable Urban Thoroughfares recommends a design speed of 25 to 35 mph for a "Boulevard," which is similar to an arterial. Design speed

Arterial roadway with 35 mph design speed and 10-foot through lanes, narrowed from 12 feet to provide a buffered bicycle lane.

should be selected by the engineer on a project-by-project basis based on several factors including horizontal curvature, vertical curvature, land use context, and intersection spacing.

- **Through travel lane width** – For urban arterials, AASHTO suggests a range of travel lane widths from 10 feet to 12 feet depending on desired speed, capacity, and context of a roadway. FDOT provides for standard lane widths of 11 feet on urban arterials, with provisions to reduce to 10 feet on roadways with low truck percentages and a design speed less than 40 mph.
- **Turn lane width** – In urban areas, turn lane widths can range from 9 to 12 feet according to AASHTO and FDOT guidelines. The FDOT PPM allows for turn lanes to be reduced to 9 feet only if the purpose is to utilize a strategy of lane narrowing for adding a bicycle facility to a roadway during a resurfacing project; otherwise the minimum turn lane width is 10 feet.
- **Curb return radii** – The ITE publication Designing Walkable Urban Thoroughfares recommends a flexible approach to selecting curb return radii based on the principle of effective curb radius, which is often wider than the actual (built) curb radius. ITE recommends a typical minimum curb return radius of 15 feet in urban centers and where high pedestrian volumes are reasonably anticipated. A curb return radius of 15 feet allows a typical passenger car to turn with no encroachment into an adjacent lane at the end of the turn. Occasional encroachment of turning buses, moving vans, fire trucks, or delivery vans into an adjacent lane is acceptable. The AASHTO Green Book recommends curb radii of 10 to 15 feet for local streets in urban environments. For arterial street design, the AASHTO Green Book recommends that adequate radii for vehicle operation be balanced against the needs of pedestrians and the difficulty of acquiring additional right-of-way.

Local commercial street with 15-foot curb radii at intersections serving delivery trucks.


ONE WAY
ONE WAY

3

Multimodal Street Typology Framework


86
THIS VEHICLE STOPS AT ALL RAILROAD CROSSINGS
STOP

Chapter 3. Multimodal Street Typology Framework

Framework

Typology is a common approach to categorizing elements by similar characteristics. This approach allows for planning and treatment identification based on a reflection of a typology's defining elements. In the context of Complete Streets, identifying both streets and land use context by typologies allows for a context-sensitive approach to design. A framework for categorizing the street network includes understanding the urban context and the balance between land use & transportation modes. Understanding the roles and relationships of a street with its surrounding context is a critical step in the Complete Streets design approach.

This chapter identifies a range of street types and land use types for Palm Beach County. Examples have been selected that illustrate typical typology conditions. In addition, maps are included that display the results of an analysis of Palm Beach County streets and land use that categorized local conditions according to the typology framework developed. The typology will be used in the next chapter as a basis for establishing various aspects of Complete Streets design guidelines.

The approach to categorizing streets and land use is consistent with FDOT's recommended approach for Complete Streets:

Complete streets is a way to think about and design context-sensitive roads. Your community will benefit from a clear vision and plan for indicating areas of walkability and urban development. Establishing this "context" will then allow "context-based" streets to support the desired community vision.

Ideally, the community vision will include a form-based classification of contexts. FDOT's [Context Zone Classifications] rely primarily on the physical characteristics of a place to determine context. Non-physical characteristics, such as zoning or future land use plans, are considered as secondary measures when the physical form today does not match the desired design of the roadway. Having a form-based coding system helps insure future physical form will match future desired context.

Source: FDOT; http://www.fdot.gov/roadway/csi/faq.shtm

Typologies

Street Typologies

Streets have traditionally been classified based on their hierarchy within the vehicle network, based upon their ability to move a certain number of cars at a certain speed. The distinguishing characteristic is often framed as whether a street serves motor vehicle mobility (arterial roads) or property access (local streets). However, in many urban and suburban environments the ability to accurately classify streets as either mobility roads or accessibility streets is blurred by surrounding land use patterns. Commercial and institutional uses often exclusively locate along arterial roads and exhibit frequent driveway connections with no other access to the property. Furthermore, suburban residential development patterns often necessitate that even short vehicle trips must use arterial roads due to a lack of connectivity and redundancy within the street network.

Complete Streets are developed from a philosophy that streets have many different roles, functions, and characteristics depending on their context. Focus is placed on the type of trips served including pedestrian, bicyclist, transit, and motor vehicle trips. The design objectives for a particular street are revealed from a greater understanding and analysis of the different roles of the street. Based on an analysis specific to Palm Beach County roads and streets, a street typology consisting of five categories was developed.

- Limited Access Facilities – LA
- Major Corridors – MC
- Main Connectors – CN
- Community Connectors – CC
- Neighborhood Streets - NS

Table 3-1 demonstrates on a basic level the generalized relationship between the identified street typologies and the traditional FHWA functional classification system.

Table 3-1 Generalized Relationship between Street Typology and Functional Classification

	Major Corridors	Main Connectors	Community Connectors	Neighborhood Streets
Principal Arterial				
Minor Arterial				
Collector				
Local				

Land Use Typologies

Land uses are categorized more broadly than the traditional zoning designations. Streets can thus respond to changes in the building form and function, elements which transcend whether a particular building is an office or apartment building. These land use typologies focus on building and parking orientation, in addition to the potential uses, as the orientation can affect the types of trips a building supports.

- Urban Core – UC
- Urban General – UG
- Suburban – SB
- Rural Town – RT
- Rural – RU
- Natural - NA

Street typologies and land use typologies when taken together provide a framework for design decisions.

Street Types

Limited Access Facilities

Code	LA	
Description	Provide regional and interstate trips and support freight and goods movement between markets and shipping locations. Generally, less responsive to the context zone.	
Classification	Interstates and expressways	
Characteristics	Lanes	Vary
	Signal Spacing	N/A
	Intersection Density	N/A
	Flow	2-way with barrier separation
Examples	▪ I-95 ▪ Florida's Turnpike	

Florida's Turnpike - Source: Google Streetview

I-95 - Source: Google Streetview

Major Corridors

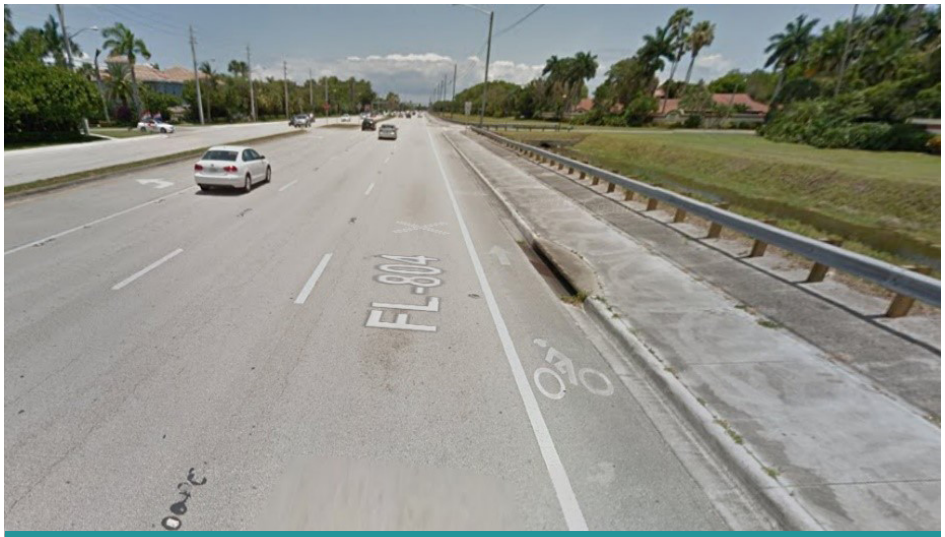
Code	MC	
Description	Regional roadways with higher volumes. Function and modal considerations can change through context zones.	
Classification	Primarily principal arterials	
Characteristics	Lanes	Primarily 6-8
	Signal Spacing	Long, typically >0.5 miles
	Intersection Density	Low
	Flow	2-way, with median
Examples	▪ Military Trail (West Palm Beach) ▪ Boynton Beach Boulevard (Boynton Beach) ▪ Forest Hill Boulevard (Greenacres)	

Military Trail in West Palm Beach

Military Trail north of Okeechobee Boulevard (West Palm Beach) - Source: Google Streetview

Boynton Beach Boulevard in Boynton Beach

Forest Hill Boulevard in Greenacres



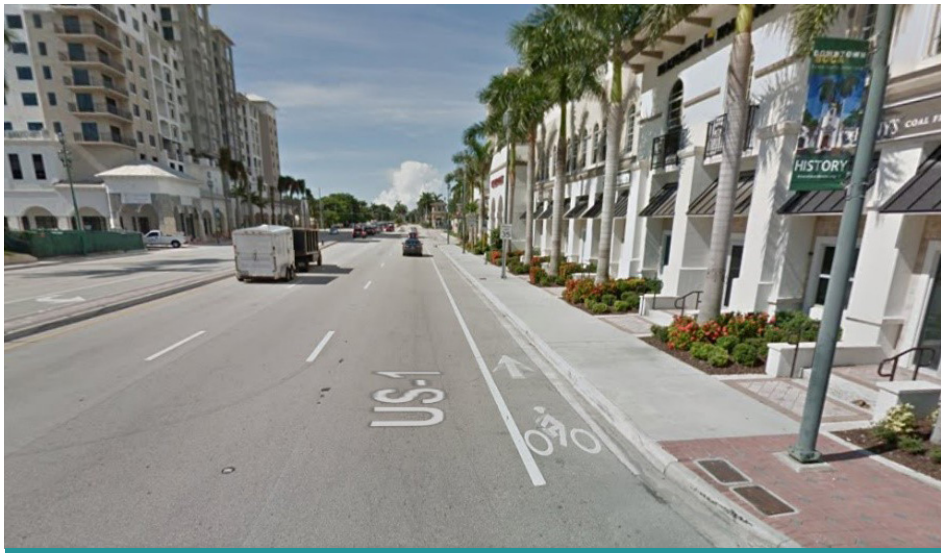
Boynton Beach Blvd west of I-95 (Boynton Beach) - Source: Google Streetview

Forest Hill Boulevard west of Jog Road (Greenacres) - Source: Google Streetview

Main Connectors

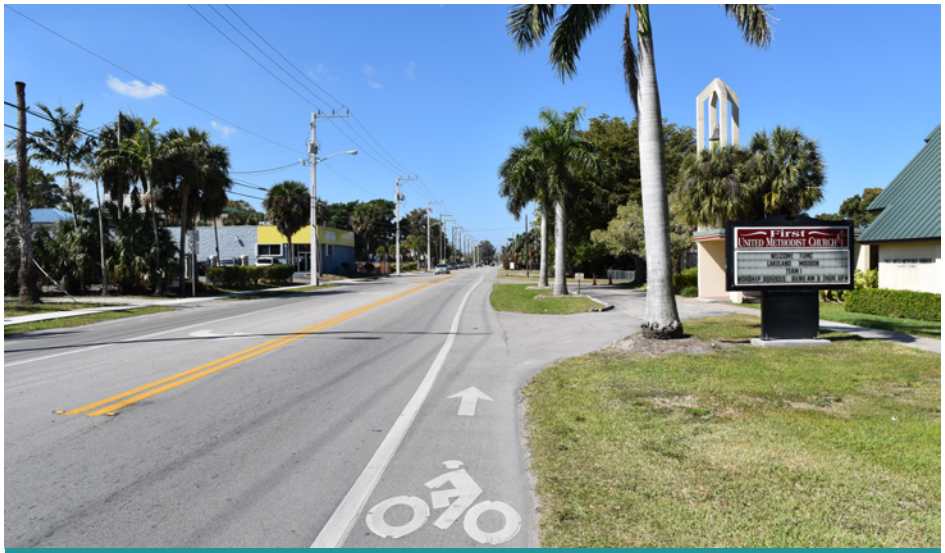
Code	CN	
Description	Connects to major corridors and community connectors. Includes roadways with volumes typically lower than major corridors. Function and modal consideration change through context zones.	
Classification	Primarily major or minor arterials, major or minor collectors	
Characteristics	Lanes	Primarily 4-6
	Signal Spacing	2-4 signals per mile
	Intersection Density	Medium
	Flow	2-way, with potential median
Examples	▪ US 1 (Boca Raton) ▪ Lucerne Avenue (Lake Worth) ▪ Main Street (Pahokee)	

US 1 north of Camino Real (Boca Raton)



US 1 north of Camino Real (Boca Raton) - Source: Google Streetview

Lucerne Avenue in Lake Worth



Main Street in Pahokee

Lucerne Avenue east of US 1 (Lake Worth) - Source: Google Streetview

Main Street south of 7th Street (Pahokee) - Source: Google Streetview

Community Connectors

Code	CC	
Description	Connects adjacent neighborhoods as well as provides local connections to major corridors and main connectors.	
Classification	Primarily urban collectors	
Characteristics	Lanes	2-4
	Signal Spacing	4-5 signals per mile
	Intersection Density	High
	Flow	2-way, with potential median
Examples	▪ NE 2nd Avenue (Delray Beach) ▪ Royal Palm Beach Boulevard (Royal Palm Beach) ▪ A1A (Jupiter)	

NE 2nd Avenue in Delray Beach

NE 2nd Avenue north of Lake Ida Road (Delray Beach)

Source: Wantman Group

Royal Palm Beach Boulevard in Royal Palm Beach

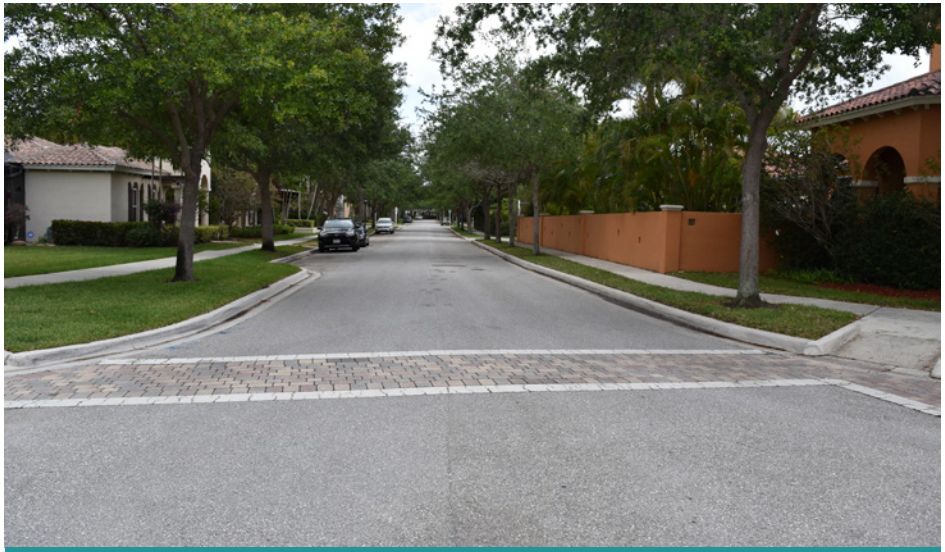
A1A in Jupiter

Royal Palm Beach Boulevard north of
Okeechobee Boulevard (Royal Palm Beach) - Source: Google Streetview

A1A/Ocean Boulevard (Jupiter) - Source: Google Streetview

Neighborhood Streets

Code	NS	
Description	Local streets which provide direct access to residences and businesses.	
Classification	Local	
Characteristics	Lanes	2
	Signal Spacing	None
	Intersection Density	High
	Flow	1 or 2 way
Examples	▪ Barcelona Road (Jupiter) ▪ La Mancha Avenue (Royal Palm Beach) ▪ W 22nd Court (Riviera Beach)	



Barcelona Road in Jupiter

Barcelona Road near Central Boulevard (Jupiter)- Source: Google Streetview

La Mancha Avenue in Royal Palm Beach

West 22nd Court in Riviera Beach

La Mancha Avenue near Prado Street (Royal Palm Beach)- Source: Google Streetview

West 22nd Court (Riviera Beach)- Source: Google Streetview

Land Use Types

Code	UC
Description	Higher density areas that include a mix of uses with mainly attached buildings. Includes areas with a well-connected roadway network and high pedestrian activity. The urban core includes Central Business Districts or areas with other centers or major destinations. May include some main streets.
Building Placement	Buildings are built to the street.
Parking	Parking is typically in the rear or in garage parking, with limited parking in the front.
Land Uses	▪ Retail ▪ Office ▪ Institutional/Civic ▪ Multi-Family Residential
Data Source	Developed from area types from the Southeast Florida Regional Planning Model (SERPM) including Central Business District including edits made by stakeholders.
Examples	▪ Downtown West Palm Beach ▪ Downtown Boca Raton

Olive Avenue (West Palm Beach)


Palmetto Park Road near Mizner Boulevard (Boca Raton)

Urban General

Code	UG
Description	Mix of uses primarily including attached and detached residential as well as neighborhood scale businesses and office found in areas with a well-connected roadway network. Could include some main streets at a neighborhood scale.
Building Placement	Includes smaller building setbacks than those found in suburban areas.
Parking	Parking is typically on the side or rear of the building, with some in front.
Land Uses	▪ Single-Family Residential ▪ Multi-Family Residential ▪ Institutional/Civic ▪ Neighborhood scale retail and office
Data Source	Developed from area types from the SERPM included High Intensity Areas outside of the Central Business District as well as several additional areas east of I-95 including edits made by stakeholders.
Examples	▪ Delray Beach along Atlantic Avenue west of Swinton Avenue ▪ Riviera Beach along Blue Heron Boulevard near US 1

Atlantic Avenue near W 5th Avenue (Delray Beach)

Blue Heron Boulevard (Riviera Beach)

Suburban

Code	SB
Description	Residential and non-residential areas with detached buildings. The roadway network is typically not as densely connected as Urban Core or Urban General areas.
Building Placement	Can include larger setbacks and blocks than those found in Urban Core or Urban General.
Parking	Commercial parking is typically found in surface lots in front of the building.
Land Uses	▪ Single-Family Residential ▪ Multi-Family Residential ▪ Large building footprint retail ▪ Institutional/Civic ▪ Industrial
Data Source	Developed from Urban/Suburban Tier on the west side of the county from the Palm County Managed Growth Map as well, including areas in the 2010 FHWA Adjusted Urban Areas not part of Urban Core or Urban General. The new developments of Westlake, Avenir, and Arden were also included.
Examples	▪ Wellington ▪ Jupiter

Guilford Way (Wellington)

Central Boulevard (Jupiter)

Rural Town

Code	RT
Description	A smaller enclave of more developed areas found in rural areas. They could include a smaller number of blocks with a mix of uses consistent with characteristics found in Urban General. Could include some main streets.
Building Placement	Building placements are similar to Urban General.
Parking	Parking is typically provided on the side or rear of the building, with some in front.
Land Uses	▪ Single-Family Residential ▪ Multi-Family Residential ▪ Retail ▪ Office ▪ Institutional/Civic
Data Source	Developed from Urban/Suburban Tier on the west side of the county from the Palm County Managed Growth Map, including areas in the 2010 FHWA Adjusted Urban Areas not part of Urban Core or Urban General.
Examples	▪ Belle Glade ▪ Pahokee

SR 80 (Belle Glade)

Main Street (Pahokee)

Rural

Code	RU
Description	Sparsely developed areas that may include agricultural land and some lower intensity development.
Building Placement	N/A
Parking	N/A
Land Uses	■ Single-Family Residential ■ Agriculture
Data Source	All Other areas not part of the other land use context types.
Examples	■ Unincorporated Palm Beach County along US 441 ■ Agricultural areas around Belle Glade

Duda Road (Belle Glade)

US 441 (unincorporated Palm Beach County)

Natural

Code	NA
Description	Conservation and protected lands. May also include larger park space or recreational lands.
Building Placement	N/A
Parking	N/A
Land Uses	▪ Conservation Land ▪ Open Space ▪ Larger park space/recreational lands
Data Source	Developed from Conservation areas from the Palm County Managed Growth Map.
Examples	▪ Pond Cypress Natural Area ▪ JW Corbett Wildlife Management Area

SR 7 Extension near Pond Cypress Natural Area (unincorporated Palm Beach County)

Bee Line Highway near JW Corbett Wildlife Management Area (unincorporated Palm Beach County)

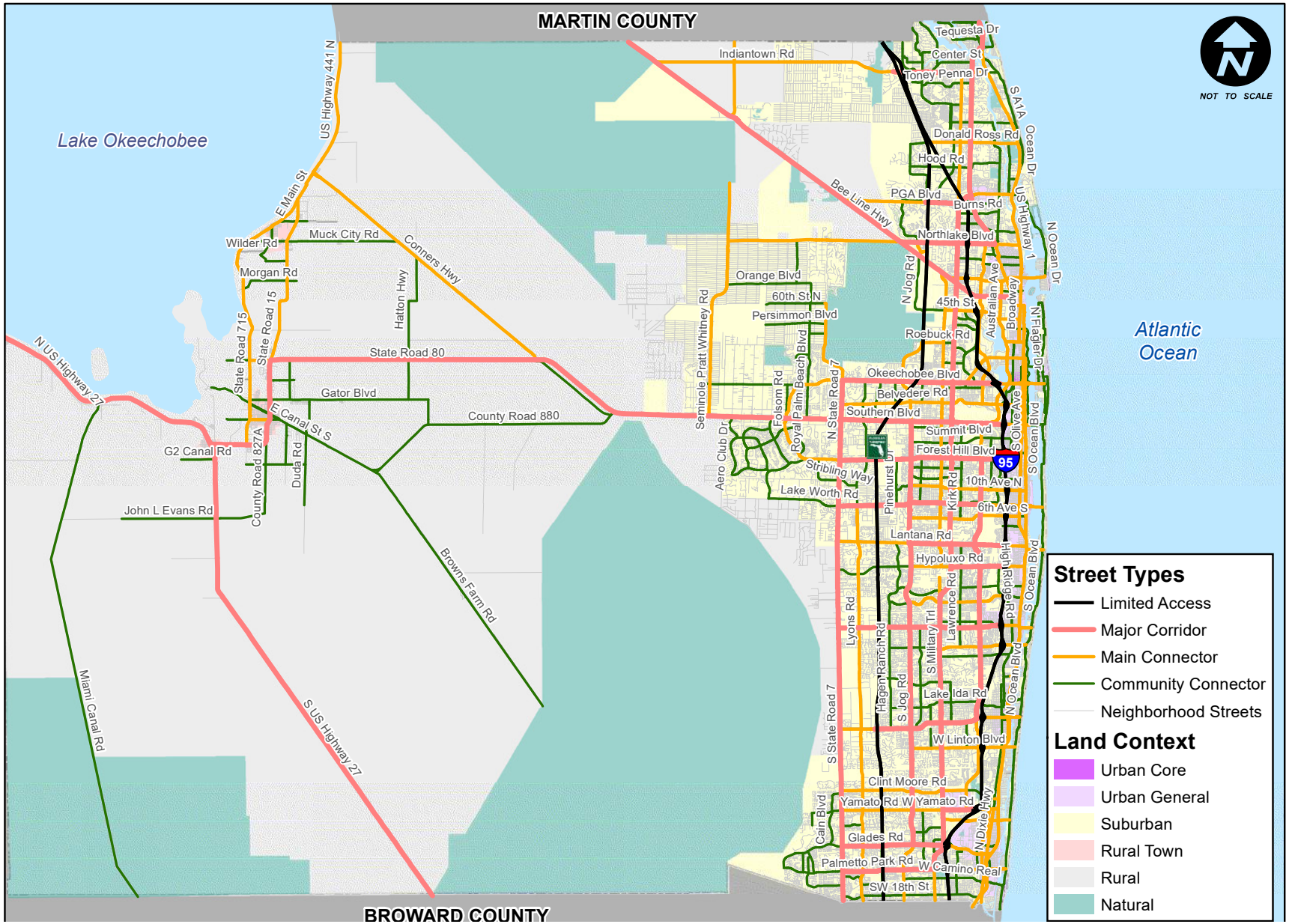
Street Type Table

Street Type	Description	Classification	Lanes
Limited Access Facilities	Includes I-95 and Florida Turnpike	Interstates and expressways	Limited Access, lanes vary
Major Corridor	Regional roadways with higher volume. Function and modal considerations change through context zones.	Primarily Principal Arterials	Primarily 6 to 8 lanes
Main Connector	Connects to major corridors and community connectors. Includes roadways with volumes typically lower than major corridors. Function and modal consideration change through context zones.	Primarily Major or Minor Arterials, Major or Minor Collectors	Primarily 4 to 6 lanes
Community Connector	Connects adjacent neighborhoods as well as connections to major corridors and major connectors.	Primarily Urban Collectors	Primarily 2 to 4 lanes
Neighborhood Streets	Local streets	Local	Primarily 2 lanes

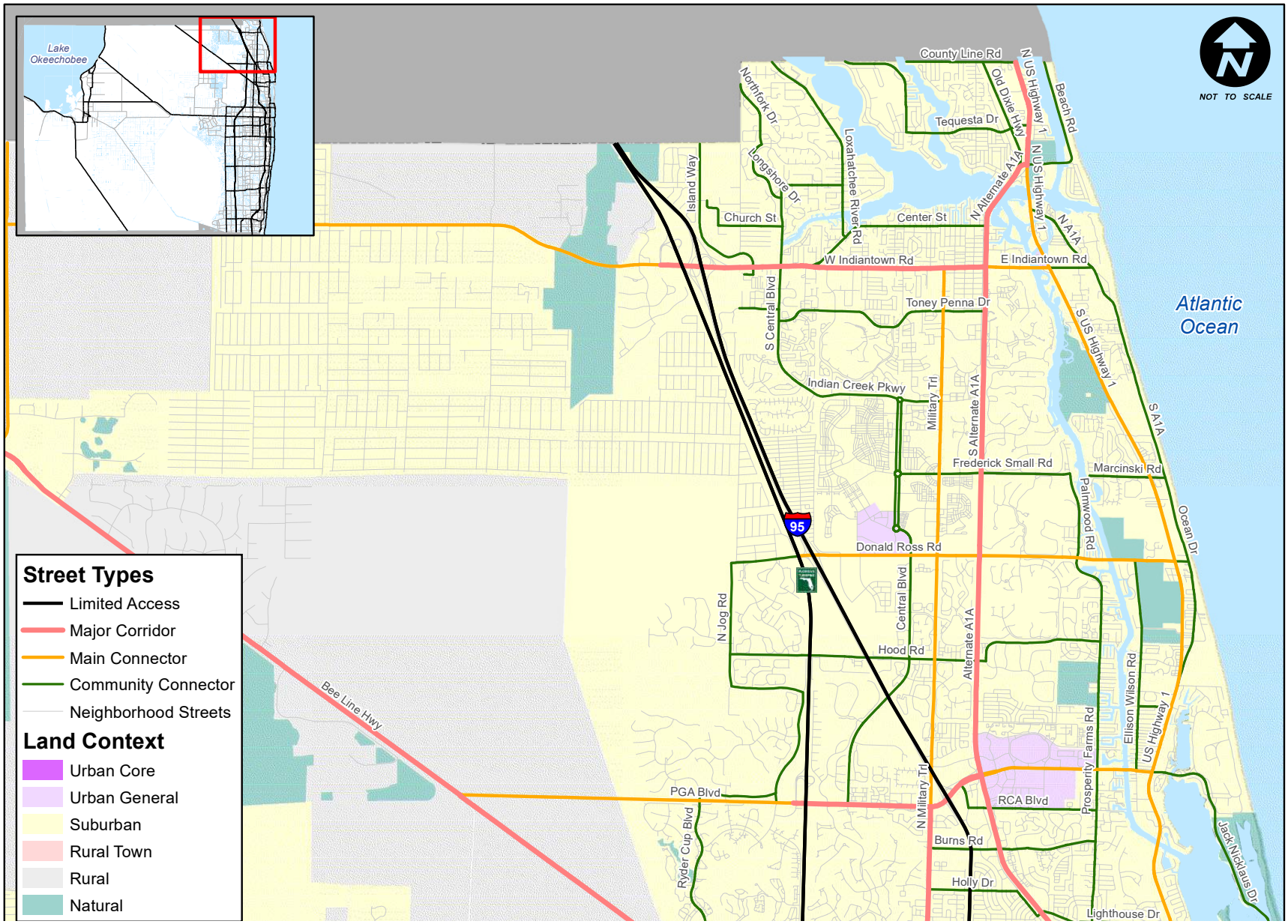
Land Use Type Table

Land Use Context Type	Description	Building Placement and Parking	Land Uses	Data Source
Urban Core	Higher density areas that include a mix of uses with mainly attached buildings. Include areas with a well connected roadway network and high pedestrian activity. They include Central Business Districts or areas with other centers or major destinations. Could include some main streets.	Buildings are built to the street. Parking is typically in the rear or in garage parking with some in front.	Retail, Office, Institutional/Civic, Multi-Family Residential	Developed from area types from the Southeast Florida Regional Planning Model (SERPM) including Central Business District including edits made by stakeholders.
Urban General	Mix of uses primarily including attached and detached residential as well as neighborhood scale businesses and office found in areas with a well connected roadway network. Could include some main streets at a neighborhood scale.	Include lower building setbacks than those found in suburban areas. Parking is typically on the side or rear of the building with some in front.	Single-Family or Multi-Family Residential, Institutional/Civic, Mainly neighborhood scale Retail and Office	Developed from area types from the Southeast Florida Regional Planning Model (SERPM) included High Intensity Areas outside of the Central Business District as well as several additional areas east of I-95 including edits made by stakeholders.
Suburban	Residential and non-residential areas with detached buildings. The roadway network is typically not as densely connected as Urban Core or Urban General areas.	Can include larger setbacks and blocks than those found in Urban Core or Urban General. Commercial parking is typically found in lots in front of the building.	Single-Family or Multi-Family Residential, Retail areas are typically horizontal with large building footprints, Industrial, Institutional/Civic	Developed from Urban/Suburban Tier on the west side of the county from the Palm County Managed Growth Map as well, including areas in the 2010 Federal Highway Administration (FHWA) Adjusted Urban Areas not part of Urban Core or Urban General. The new developments of Westlake, Avenir, and Arden were also included.
Rural Town	A smaller enclave of more developed areas found in rural areas. They could include a smaller number of blocks with a mix of uses consistent with characteristics found in Urban General. Could include some main streets.	Building placements are similar to Urban General. Parking is typically on the side or rear of the building with some in front.	Retail, Office, Institutional/Civic, Single-Family or Multi-Family Residential	Developed from Urban/Suburban Tier on the west side of the county from the Palm County Managed Growth Map, including areas in the 2010 Federal Highway Administration (FHWA) Adjusted Urban Areas not part of Urban Core or Urban General.
Rural	Sparsely developed areas that may include agricultural land and some lower intensity development.	N/A	Agricultural or Single-Family Residential.	All Other areas not part of the other land use context types.
Natural	Conservation and protected lands. May also include larger parkspace or recreational lands.	N/A	Conservation Land, Open Space, or larger parkspace/recreational lands.	Developed from Conservation areas from the Palm County Managed Growth Map.

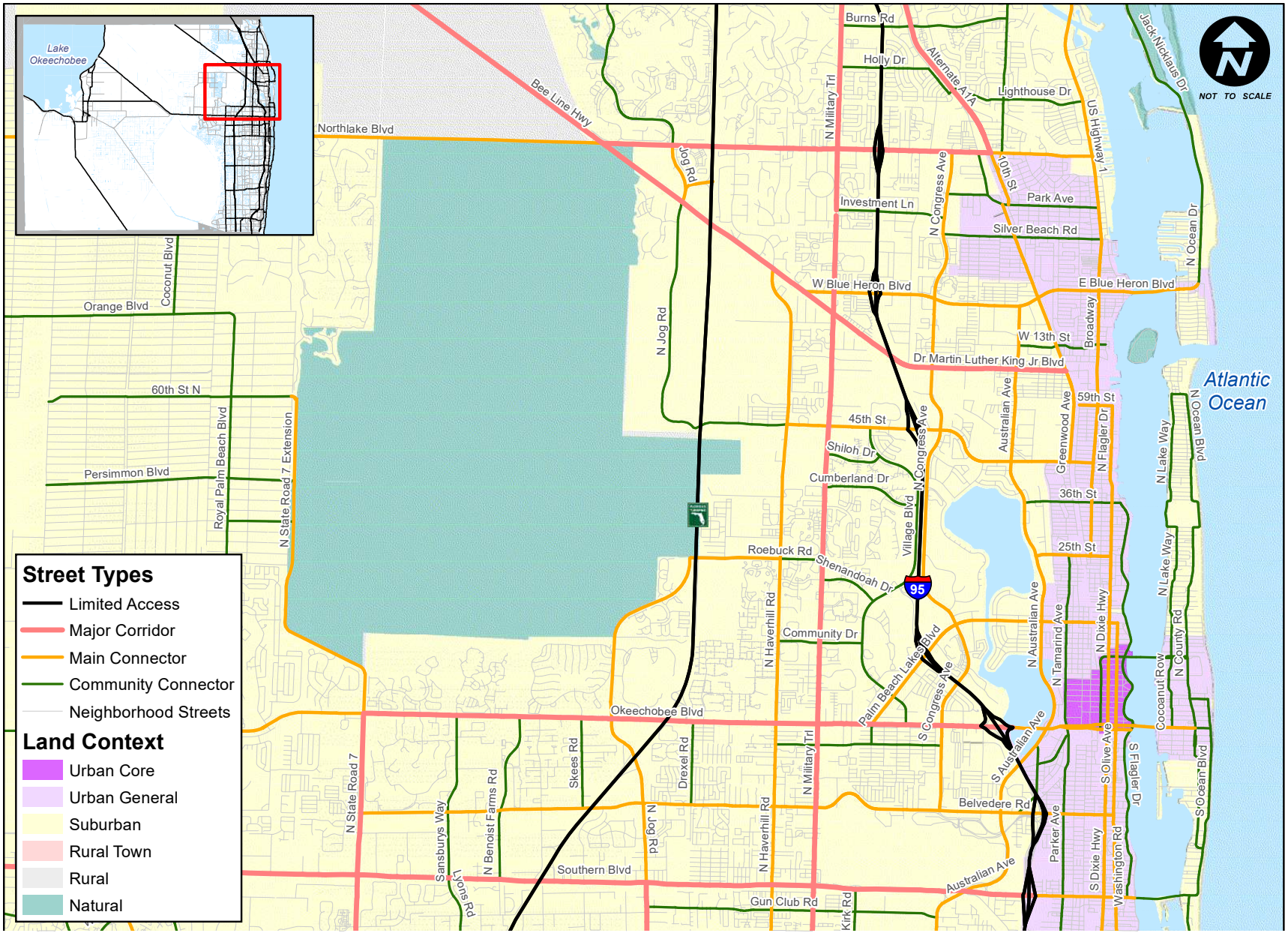
Street and Land Use Maps



Zoom 1


Lake Okeechobee
NOT TO SCALE
Atlantic Ocean
County Line Rd
Tequesta Dr
Northfork Dr
Longshore Dr
Loxahatchee River Rd
Island Way
Church St
Center St
N Alternate A1A
N US Highway 1
Old Dixie Hwy
Beach Rd
N A1A
W Indiantown Rd
E Indiantown Rd
S Central Blvd
Toney Penna Dr
S US Highway 1
Indian Creek Pkwy
Military Trl
S Alternate A1A
S A1A
Frederick Small Rd
Marcinski Rd
Palmwood Rd
Ocean Dr
95
Donald Ross Rd
N Jog Rd
Central Blvd
Hood Rd
Alternate A1A
Ellison Wilson Rd
US Highway 1
Bee Line Hwy
Prosperity Farms Rd
PGA Blvd
N Military Trl
RCA Blvd
Ryder Cup Blvd
Burns Rd
Jack Nicklaus Dr
Holly Dr
Lighthouse Dr
Street Types
Limited Access
Major Corridor
Main Connector
Community Connector
Neighborhood Streets
Land Context
Urban Core
Urban General
Suburban
Rural Town
Rural
Natural

Zoom 2


Lake Okeechobee
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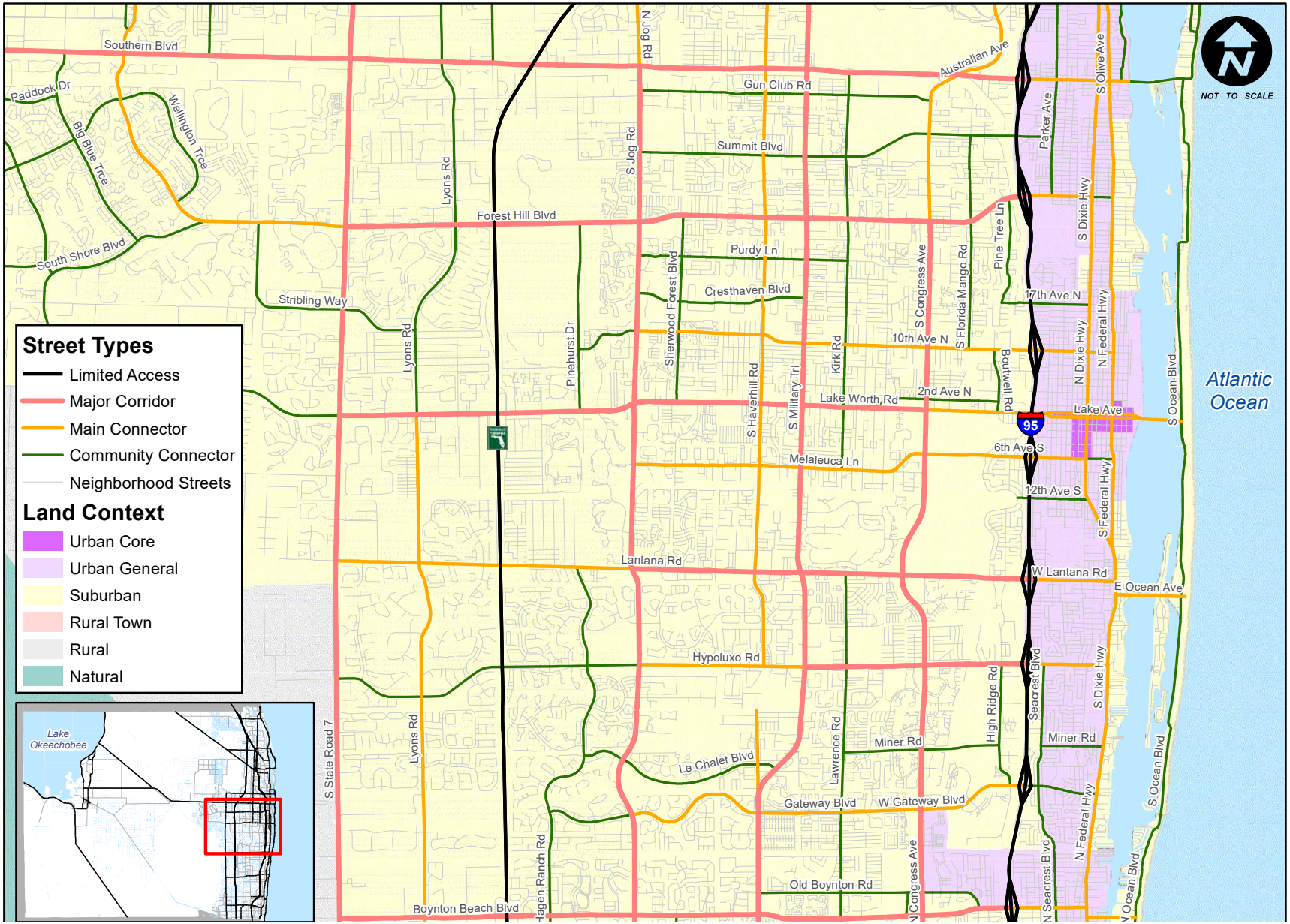
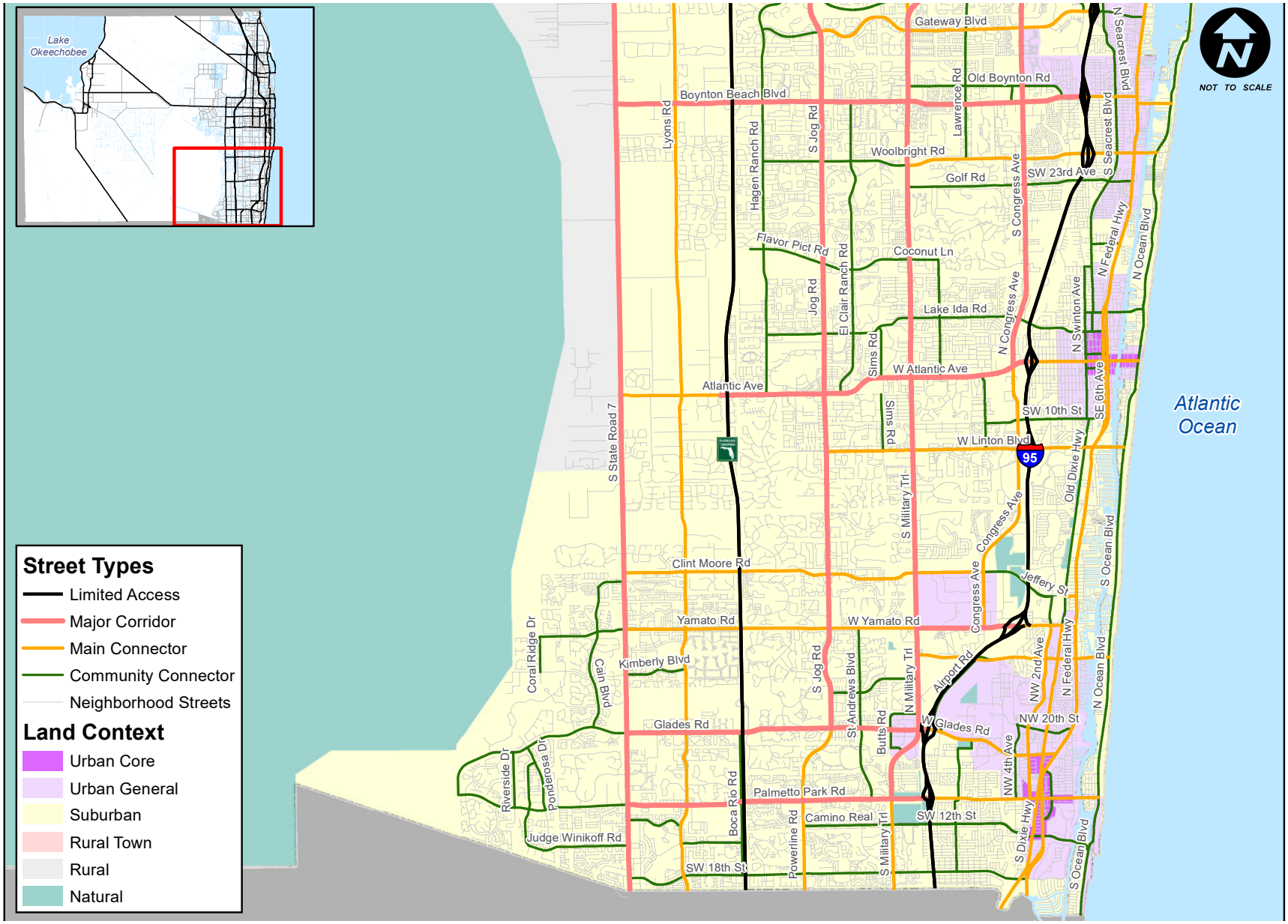
Northlake Blvd
Bee Line Hwy
Burns Rd
Holly Dr
Alternate A1A
Lighthouse Dr
Jack Nicklaus Dr
US Highway 1
N Military Trl
Jog Rd
N Congress Ave
10th St
Park Ave
Investment Ln
Silver Beach Rd
N Ocean Dr
W Blue Heron Blvd
E Blue Heron Blvd
Coconut Blvd
Orange Blvd
N Jog Rd
W 13th St
Broadway
Dr Martin Luther King Jr Blvd
60th St N
Australian Ave
59th St
45th St
Greenwood Ave
N Flagler Dr
N Ocean Blvd
Shiloh Dr
Cumberland Dr
Persimmon Blvd
Royal Palm Beach Blvd
N State Road 7 Extension
36th St
N Lake Way
Village Blvd
Roebuck Rd
25th St
Shenandoah Dr
95
N Haverhill Rd
Community Dr
N Australian Ave
N Tamarind Ave
N Dixie Hwy
N County Rd
Palm Beach Lakes Blvd
S Congress Ave
Okeechobee Blvd
Cocoanut Row
S Australian Ave
S Olive Ave
S Flagler Dr
S Ocean Blvd
Skees Rd
Drexel Rd
N Military Trl
Belvedere Rd
N State Road 7
Sansburys Way
N Benoist Farms Rd
N Jog Rd
N Haverhill Rd
Parker Ave
S Dixie Hwy
Washington Rd
Southern Blvd
Lyons Rd
Australian Ave
Gun Club Rd
Kirk Rd

Zoom 3


Street Types
Limited Access
Major Corridor
Main Connector
Community Connector
Neighborhood Streets
Land Context
Urban Core
Urban General
Suburban
Rural Town
Rural
Natural
Lake Okeechobee
NOT TO SCALE
Atlantic Ocean
Southern Blvd
Paddock Dr
Big Blue Trce
Wellington Trce
South Shore Blvd
Stribling Way
Lyons Rd
Forest Hill Blvd
N Jog Rd
S Jog Rd
Gun Club Rd
Australian Ave
Summit Blvd
Purdy Ln
Cresthaven Blvd
Sherwood Forest Blvd
Pinehurst Dr
S Haverhill Rd
S Military Trl
Kirk Rd
S Congress Ave
S Florida Mango Rd
Pine Tree Ln
Parker Ave
S Olive Ave
S Dixie Hwy
N Dixie Hwy
N Federal Hwy
S Federal Hwy
17th Ave N
10th Ave N
2nd Ave N
Lake Worth Rd
Bowman Rd
Lake Ave
95
6th Ave S
12th Ave S
Melaleuca Ln
S Ocean Blvd
Lantana Rd
W Lantana Rd
E Ocean Ave
Hypoluxo Rd
Seacrest Blvd
High Ridge Rd
Miner Rd
Le Chalet Blvd
Lawrence Rd
Gateway Blvd
W Gateway Blvd
Hagen Ranch Rd
Old Boynton Rd
Boynton Beach Blvd
S State Road 7

Zoom 4


Lake Okeechobee
NOT TO SCALE
Atlantic Ocean
Gateway Blvd
Old Boynton Rd
Boynton Beach Blvd
Woolbright Rd
Golf Rd
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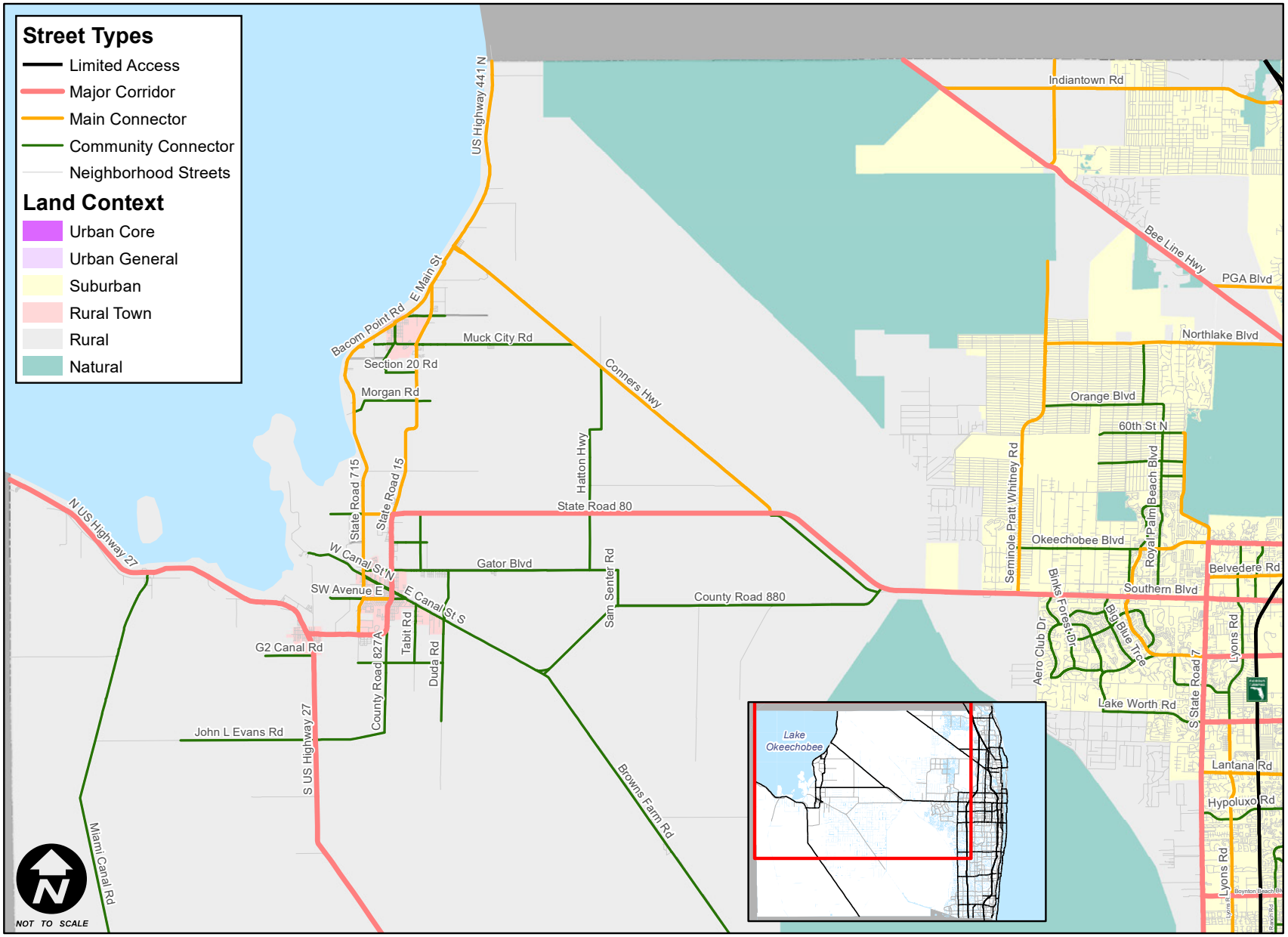
Coconut Ln
Lake Ida Rd
W Atlantic Ave
Atlantic Ave
SW 10th St
W Linton Blvd
95
Clint Moore Rd
Jeffery St
Yamato Rd
W Yamato Rd
Kimberly Blvd
Glades Rd
W Glades Rd
NW 20th St
Palmetto Park Rd
Camino Real
SW 12th St
Judge Winikoff Rd
SW 18th St
Lyons Rd
Hagen Ranch Rd
S Jog Rd
Lawrence Rd
S Congress Ave
N Congress Ave
El Clair Ranch Rd
Jog Rd
Sims Rd
N Swinton Ave
SE 6th Ave
S Seacrest Blvd
N Seacrest Blvd
N Federal Hwy
N Ocean Blvd
S Ocean Blvd
Old Dixie Hwy
S Military Trl
N Military Trl
Congress Ave
Airport Rd
NW 2nd Ave
NW 4th Ave
S Dixie Hwy
S State Road 7
Coral Ridge Dr
Cain Blvd
Riverside Dr
Ponderosa Dr
Boca Rio Rd
Powerline Rd
St Andrews Blvd
Butts Rd
Street Types
Limited Access
Major Corridor
Main Connector
Community Connector
Neighborhood Streets
Land Context
Urban Core
Urban General
Suburban
Rural Town
Rural
Natural

Zoom 5


Street Types
Limited Access
Major Corridor
Main Connector
Community Connector
Neighborhood Streets
Land Context
Urban Core
Urban General
Suburban
Rural Town
Rural
Natural
US Highway 441 N
E Main St
Bacom Point Rd
Muck City Rd
Section 20 Rd
Morgan Rd
Conners Hwy
Hatton Hwy
State Road 715
State Road 15
State Road 80
N US Highway 27
W Canal St N
SW Avenue E
E Canal St S
Gator Blvd
Sam Senter Rd
County Road 880
Tabit Rd
Duda Rd
County Road 827A
G2 Canal Rd
John L Evans Rd
S US Highway 27
Miami Canal Rd
Browns Farm Rd
Indiantown Rd
Bee Line Hwy
PGA Blvd
Northlake Blvd
Orange Blvd
60th St N
Seminole Pratt Whitney Rd
Royal Palm Beach Blvd
Okeechobee Blvd
Belvedere Rd
Southern Blvd
Binks Forest Dr
Big Blue Trce
Aero Club Dr
Lyons Rd
Lake Worth Rd
State Road 7
Lantana Rd
Hypoluxo Rd
Lake Okeechobee
NOT TO SCALE


HEARTS

4

Blended Typology Approach


PalmTran

Chapter 4. Blended Typology Approach

Introduction

The design guidance in this chapter builds upon the typologies established in Chapter 3. A design tree is introduced to assist in assembling a context-sensitive street design. Subsequent sections focus on the distinct realms of street design, with recommended elements and dimensions to support the street design goals. The design guidance in this chapter is organized by the three major realms of street design.

- Pedestrian Realm
- Roadway Realm
- Intersections

The typical section of a roadway includes elements that can be organized as belonging to either the Pedestrian Realm or the Roadway Realm.

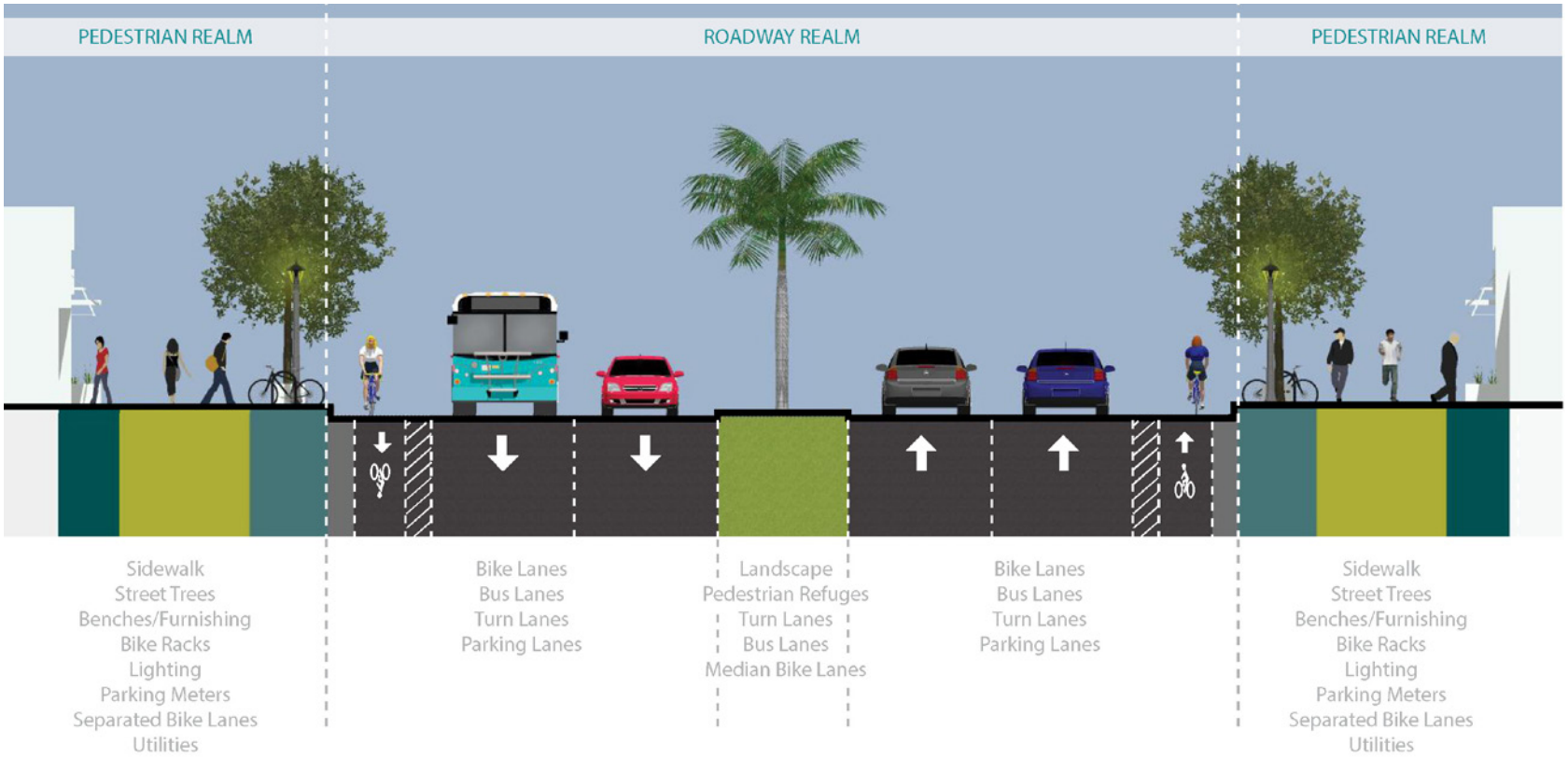


Figure 4-1 Street Elements in the Pedestrian Realm and the Roadway Realm

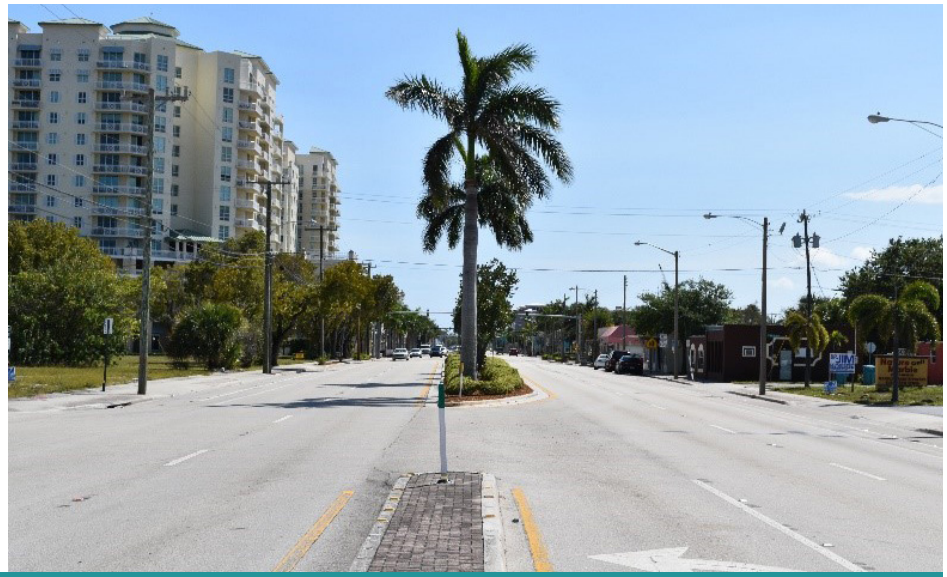
Pedestrian Realm/Streetside

Everyone is a pedestrian at some point of every journey, or sometimes for an entire trip. The Pedestrian Realm is comprised of the sidewalk, street furnishings, landscaping, and frontage to the surrounding land use. Sidewalks connect people to transit at bus stops, to cars via street parking and loading zones, and to the character and culture of a neighborhood through plazas and benches. An inviting and safe Pedestrian Realm makes walking a more viable and enjoyable means of transportation; increases in walking can reduce traffic and emissions while increasing physical and emotional wellbeing.

Images of Pedestrian Realms illustrating comfortable walking space, separation from the adjacent roadway, and building frontages.

Roadway Realm

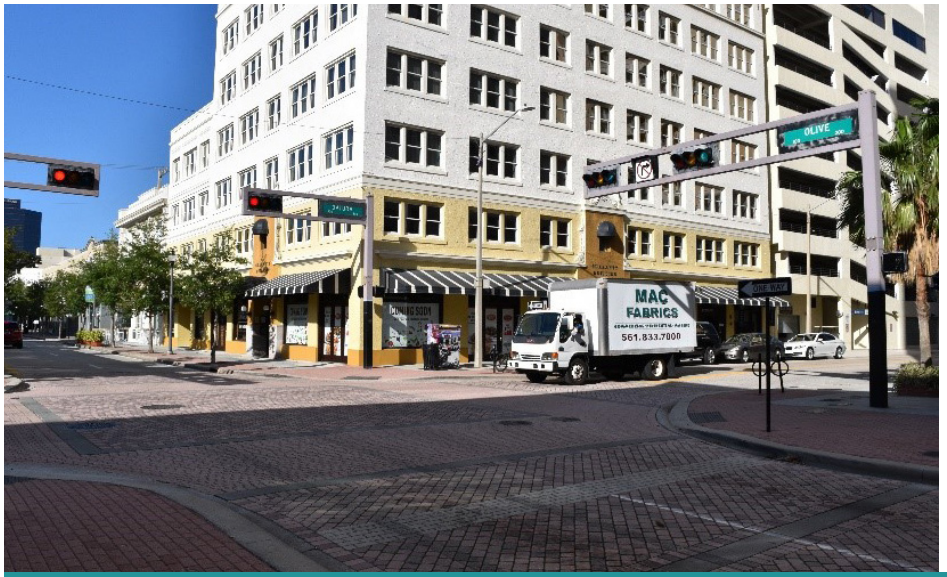
The Roadway Realm is the space between the curbs on a street generally allocated to the safe movement of people, either in motor vehicles, on bicycles, or riding transit. The Roadway Realm can also support the adjacent land use through parking and freight loading/unloading. Vehicular speed is a major concern; bicyclists are vulnerable users and should be provided safe, separated facilities where appropriate. Streets can move people more efficiently through the provision of dedicated transit lanes; buses have substantially more throughput capacity than personal vehicles. The design of the Roadway Realm is crucial for person movement capacity, multimodal mobility, and economic vitality.



Images of Roadway Realms with elements such as through lanes, turn lanes, medians, landscaping, bicycle lanes, and parking.

Intersections

The Pedestrian Realm and the Roadway Realm come together at intersections. Intersection design should continue the safety of the pedestrian and vehicular zones. For example, a comfortable sidewalk can only achieve limited benefits if crosswalks and intersections remain dangerous and intimidating. The principles outlined in these Guidelines enable the design of intersections to function well for all modal users. Some elements that improve the conditions for one mode may reduce the comfort or convenience of another, but these should never supersede the need for safety of all users.

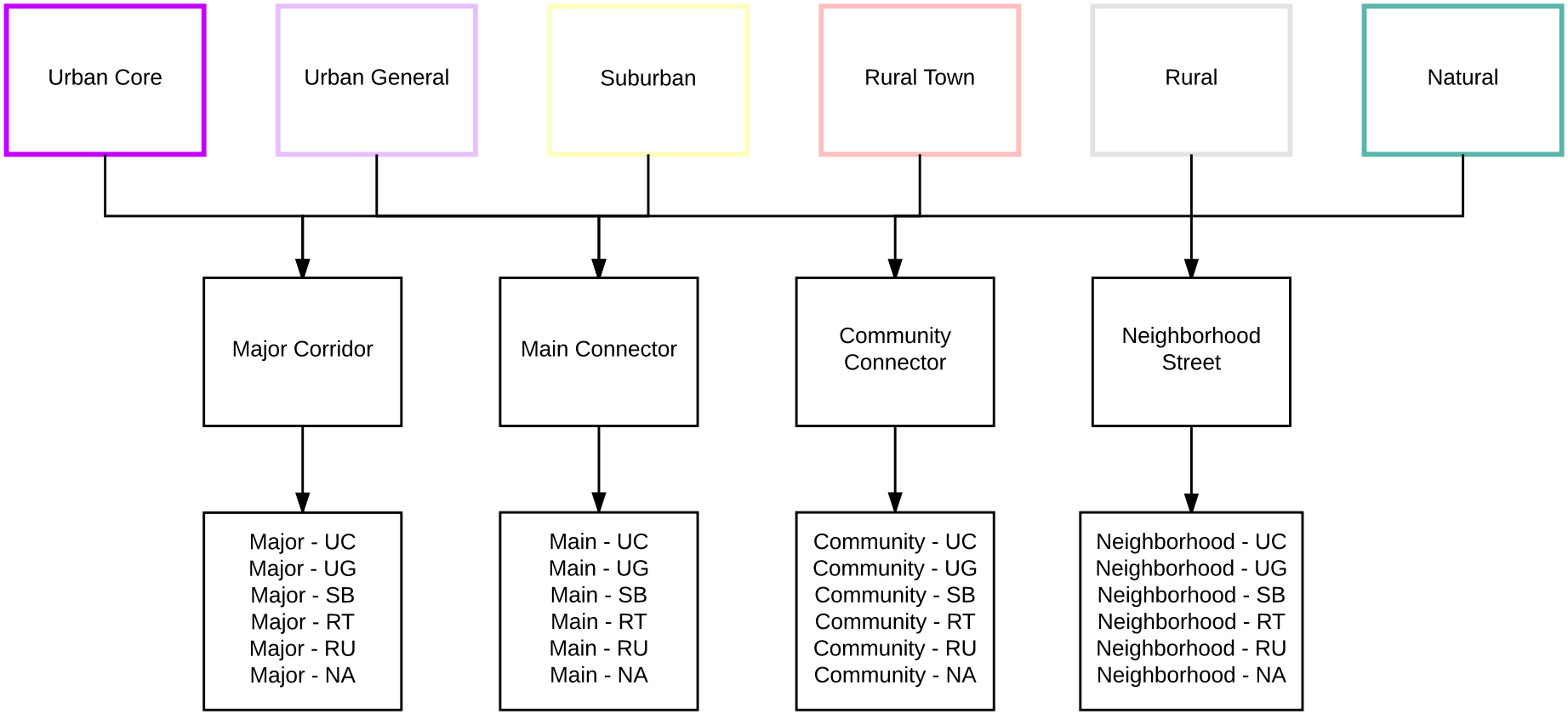


Intersections are locations where people cross from one side of a street to another either on foot, on a bicycle, or in a motor vehicle.

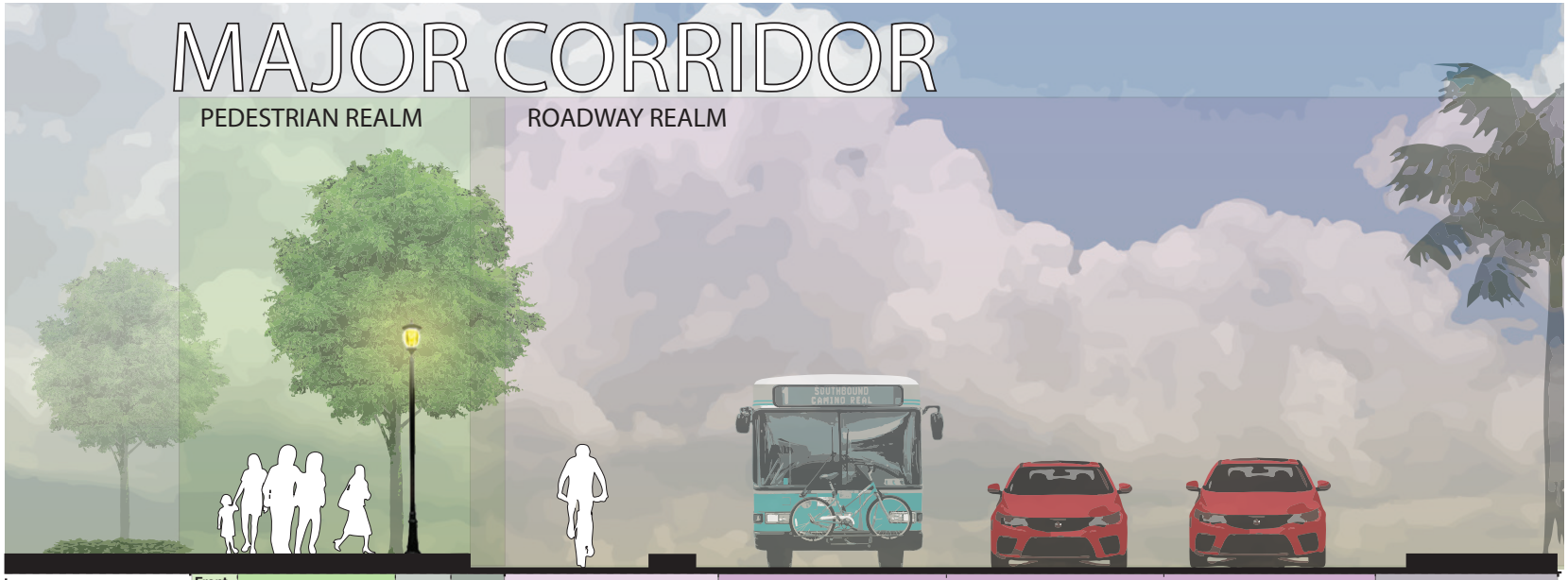
Design Tree and Typology

Street type and land use contexts are blended through the design tree to identify the appropriate street typology for inclusion in a project. The blended street typology is supported by summary design guideline tables which provide both target and constrained values for Pedestrian Realm/Streetside and Roadway Realm.

Design Tree

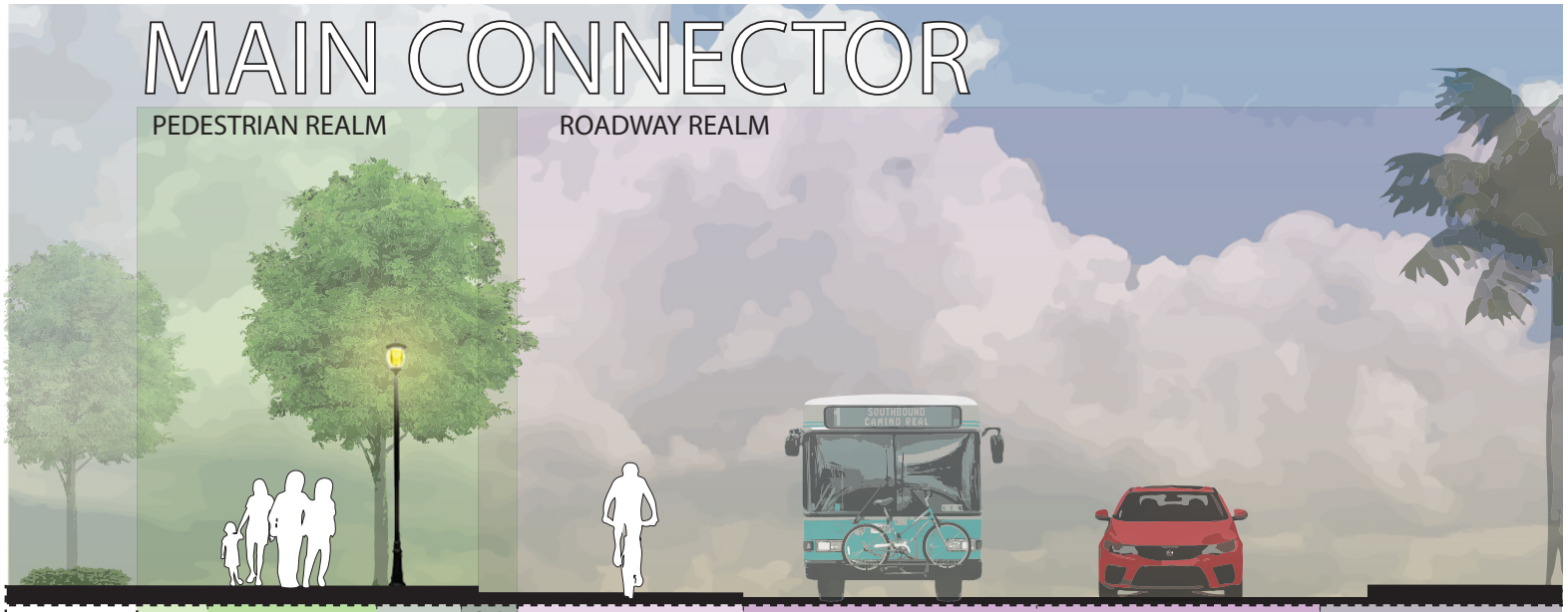


Summary Design Guidelines



Typical (Constrained)	Front-age Zone (ft)	Pedestrian Zone (ft)	Furnish-ing Zone (ft)	Curb Zone (ft)	Bicycle Facility (ft)	Through Lane (ft)	Through Lane (ft)	Through Lane (ft)	Half of Center Median (ft)
Urban Core	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Urban General	1	6	0	2	8 (4)	11	11	11	10 (9)
Suburban	1	6	0	2	8 (4)	11	11	11	10 (9)
Rural Town	1	6	5 (4)	2	5 (4)	11	11	11	8 (5)
Rural	2	6	6	4	10 (5)	11	11	N/A	10
Natural	2	5	7	4	10	11	11	N/A	10

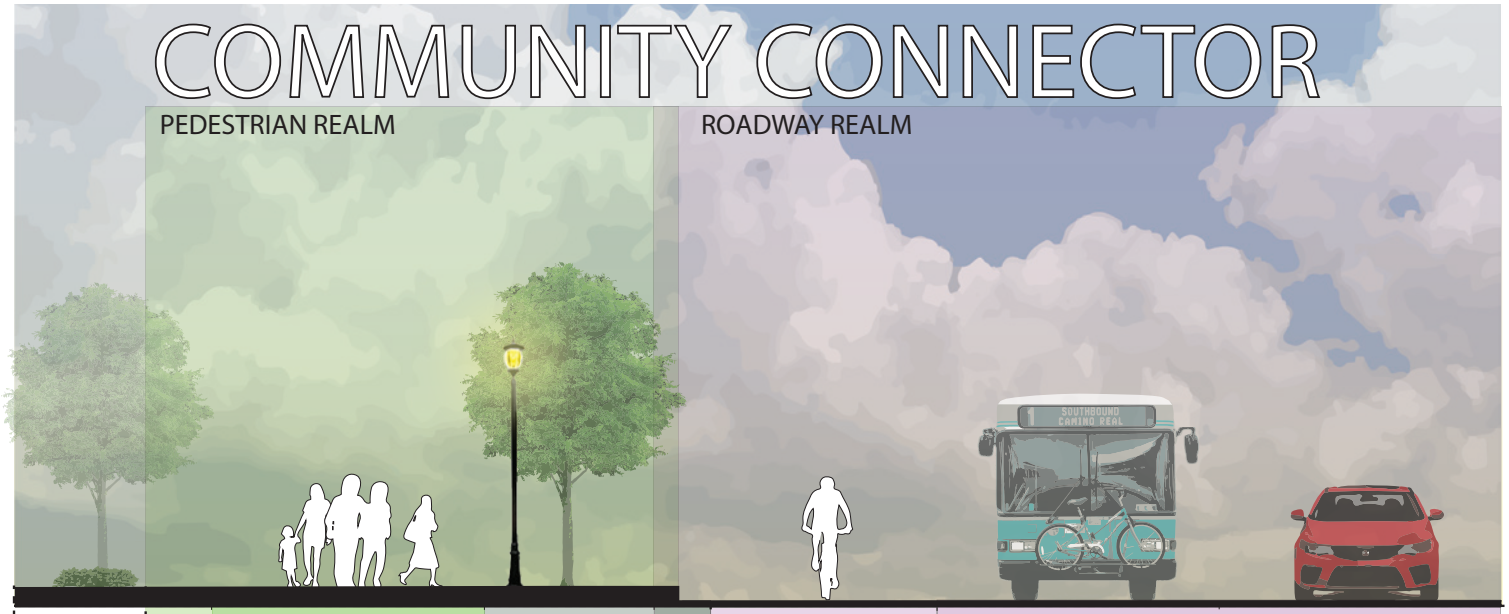
NOTES
- Dimensions shown in the table reflect typical values with constrained values shown in parentheses.
- Separated bicycle lanes are preferred because they are most likely to attract a wider range of bicyclists.
  Design speeds of 50 mph or greater may require greater separation between through lane and a raised separator.
  Where driveway density and/or drainage concerns prevent the introduction of separated bicycle lanes, buffered bike lanes are acceptable.
- Turn lane will exist in median space where applicable.
- When used, on-street parking should be provided in the roadway realm with a total width of 8 feet, which may be inclusive of an 18-inch gutter pan on curb-and-gutter roadways.



Typical (Constrained)	Frontage Zone (ft)	Pedestrian Zone (ft)	Furnishing Zone (ft)	Curb Zone (ft)	Bicycle Facility (ft)	Through Lane (ft)	Through Lane (ft)	Half of Center Median (ft)
Urban Core	3 (1)	6	3 (2)	2	8 (4)	10	10	8 (5)
Urban General	3 (1)	6	3 (2)	2	8 (4)	10	10	8 (5)
Suburban	1	6	3 (0)	2	8 (4)	11	11	8 (5)
Rural Town	1	8 (6)	4 (0)	2	5 (4)	11	11	8 (5)
Rural	2 (1)	6 (5)	7 (1)	4	6 (4)	11	11	8 (5)
Natural	2 (1)	6 (5)	7 (1)	4	6 (4)	11	11	8 (5)

NOTES

- Dimensions shown in the table reflect typical values with constrained values shown in parentheses.
- Design speed in urban core and urban general areas is assumed to be 35 mph or less.
- Raised bicycle lanes are preferred because they are most likely to attract a wider range of bicyclists.
  Raised bicycle lane may include mountable curb apron and valley gutter drainage.
  Where driveway density and/or drainage concerns prevent the introduction of raised bicycle lanes, buffered bike lanes are acceptable.
- Turn lane will exist in median space where applicable.
- When used, on-street parking should be provided in the roadway realm with a total width of 8 feet, which may be inclusive of an 18-inch gutter pan on curb-and-gutter roadways.



Typical (Constrained)	Frontage Zone (ft)	Pedestrian Zone (ft)	Furnishing Zone (ft)	Curb Zone (ft)	Bicycle Facility (ft)	Through Lane (ft)	Through Lane (ft)
Urban Core	3 (1)	10 (8)	6 (4)	2	8 (5)	11 (10)	N/A (10)
Urban General	3 (1)	10 (8)	6 (4)	2	8 (5)	11 (10)	N/A (10)
Suburban	3 (1)	10 (8)	6 (4)	2	8 (5)	11 (10)	N/A (10)
Rural Town	3 (1)	10 (8)	6 (4)	2	8 (5)	11 (10)	N/A (10)
Rural	3	6	12	0	8	11	N/A
Natural	3	6	12	0	8	11	N/A

NOTES

- Dimensions shown in the table reflect typical values with constrained values shown in parentheses.
- Design speed in any land use with 10' lanes is assumed to be 35 mph or less.
- Separated or raised bicycle lanes are preferred because they are most likely to attract a wider range of bicyclists.
  Where driveway density and/or drainage concerns prevent the introduction of separated or raised bicycle lanes, buffered bike lanes are acceptable.
- When used, on-street parking should be provided in the roadway realm with a total width of 8 feet, which may be inclusive of an 18-inch gutter pan on curb-and-gutter roadways.

Pedestrian Realm/Streetside Design Guidance

The Pedestrian Realm is critical to the function of a street. Basic purposes of the Pedestrian Realm are listed below.

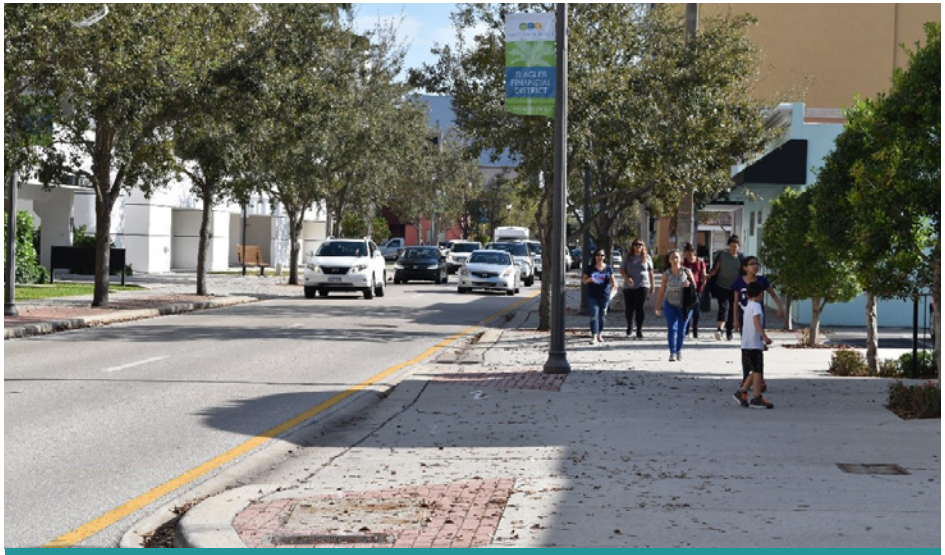
- People movement
- Transit access
- Public space
- Landscaping
- Utilities
- Support of adjacent land use, especially retail uses in business districts

The movement of people is facilitated through ample sidewalk width. Seating, transit shelters, and trees should all be situated to leave a clear, straight walking path. Width should support the anticipated number of people and should provide a convenient and obvious direction, particularly at intersections and driveways.

With an emphasis on public space amenities, such as shade trees and benches, the Pedestrian Realm can be made more inviting. The space can promote community cohesion and increase the value of properties along the sidewalk.

An inviting sidewalk can increase foot traffic, which can help support adjacent retail uses and make a community more successful. Space for people to slow down and examine window displays or advertising boards increases interaction with storefronts and businesses. Opportunities for café seating can expand the capacity of smaller restaurants and adds activity to the sidewalk.

The Pedestrian Realm also plays a key role in leveraging street infrastructure for environmental benefit. Public spaces that provide for stormwater detention and filtration improve public waterways and can reduce street flooding. A healthy tree canopy promotes biodiversity, emotional wellbeing, and air quality.



Wide Pedestrian Realm on Olive Avenue in West Palm Beach, Florida.

The Four Zones of the Pedestrian Realm

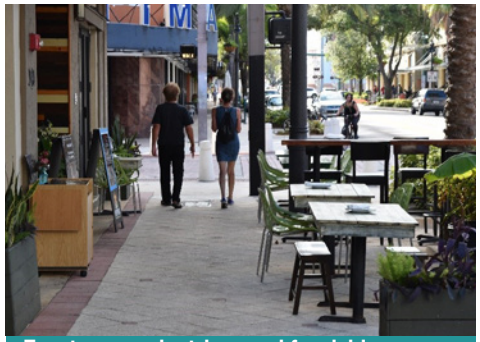
The Pedestrian Realm on the streetside can be divided into four zones, which serve different but complementary purposes. Unfortunately, some streets only have the Pedestrian Zone, which typically leads to an uncomfortable walking environment with no separation from traffic and many obstructions in the sidewalk. Although the boundaries between the four Pedestrian Realm zones can sometimes be blurred, the design of each zone is unique and must be treated with detailed attention to make the whole work together as an integrated system.

Frontage Zone

The Frontage Zone occupies the space between the front of a building or yard and the through movement space of the Pedestrian Zone. Space is provided as a buffer between engagements with a building (opening a door, stopping to view a display) and people walking past. In residential areas, the Frontage Zone may provide a buffer between the sidewalk and improvements on the adjacent property such as a fence or hedge. In suburban commercial areas, the frontage zone may help buffer the sidewalk from an adjacent parking lot. Café seating, business displays, and planters are examples of items that can be placed within the Frontage Zone. The minimum width of the Frontage Zone typically ranges from 1 to 3 feet depending on typology, as shown in the Summary Design Guidelines tables. Wider Frontage Zones can be provided as necessary depending on context and available space.

Pedestrian Zone

People walk along the sidewalk through the Pedestrian Zone. A straight path that lines up with crosswalks should be provided wherever feasible to facilitate convenient through movement and clear lines of sight. The Pedestrian Zone should remain free of obstructions to avoid tripping hazards and obstacles to flow. Surfaces and slopes must be Americans with Disabilities Act (ADA) compliant and should remain slip resistant when wet. Lighting should illuminate this zone to create a safe walking environment and widths should be sufficient for the anticipated volumes of people. The minimum width of the Pedestrian Zone typically ranges from 5 to 10 feet depending on typology, as shown in the Summary Design Guidelines tables. Wider Pedestrian Zones can be provided as necessary depending on context and available space.



Frontage, pedestrian, and furnishing zones on Clematis Street in West Palm Beach, Florida.

Furnishing Zone

The Furnishing Zone exists between the Pedestrian Zone and the Curb Zone and provides space for many of the public space elements of the Pedestrian Realm, as well as serving as the primary separation of people on the sidewalk from vehicular traffic. Landscaping, street trees, furniture, litter and recycling bins, transit shelters, utility equipment, and parking meters should all be placed within the Furnishing Zone where space permits. In urban core areas, café seating can be provided within the Furnishing Zone in cases where the Frontage Zone is not wide enough to accommodate it. Care should be taken to ensure that the adjacent Pedestrian Zone is clear from obstacles. Placement of these items within the Furnishing Zone leaves the Pedestrian Zone free of obstacles and provides a buffer between moving vehicular traffic and people on the sidewalk. In some suburban and rural areas with flush shoulders in the Roadway Realm, the Furnishing Zone may take the form of the swale area. However, many of the functions of the Furnishing Zone are consistent including providing space for separation from vehicular traffic, bus shelters, and utilities.

Example of an 8-foot sidewalk adjacent to a 7-foot furnishings zone.

Curb Zone

The Curb Zone occupies the space between the edge of the Roadway Realm and the Furnishing Zone and typically consists of the street curb, although in some cases it may consist of other items. It should remain clear of vertical obstacles. The Curb Zone may also be expanded to include sidewalk-level separated bicycle lanes (raised bicycle lanes) or elements that expand the sidewalk into the Roadway Realm (e.g. parklets).

Design Elements of the Pedestrian Realm

Numerous design elements provide an enhanced user experience within the Pedestrian Realm. Overviews of elements for consideration are included below. Additional detailed design guidance can be obtained through the "Street Resources" noted in Chapter 1, most notably in the NACTO guides.

Seating

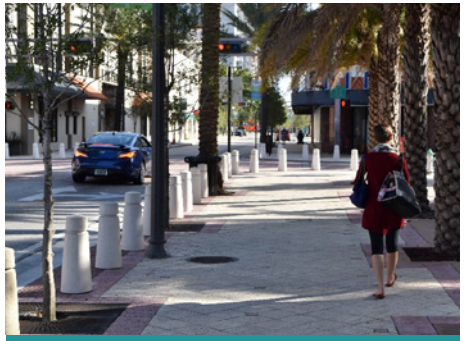
Seating allows people an opportunity to stop and enjoy sidewalk life, pause to eat a snack from a local shop, and physically rest during a walk. A sidewalk with seating illustrates that people are invited to the sidewalk, not just meant to hurry along it. Seating can be provided via benches or through landscape planters with extended edges.

Seating and an adjacent trash receptacle.

Seating should be oriented towards the Pedestrian Zone, allowing for easy access and focusing views towards passersby. Seats should be placed in either the Frontage or Furnishing Zones to leave the Pedestrian Zone clear. Armrests or dividers can be placed to discourage laying down across benches longer than 4 feet. Clear zones must also be provided to allow for ADA access and for maintenance of both the seating and surrounding items such as utilities.

Bollards

Bollards provide physical separation to separate realms and to enhance safety by restricting vehicular access. They are particularly effective in plazas or flush streets where separation of pedestrian and vehicular spaces needs reinforcing. Bollards can also be placed along curb extensions to prevent vehicles from turning on to the sidewalk and can be used as curb extensions for temporary installations. Bollards are also effective as protection for elements which extend into the street, such as parklets, stormwater features, and mid-block crosswalk extensions.



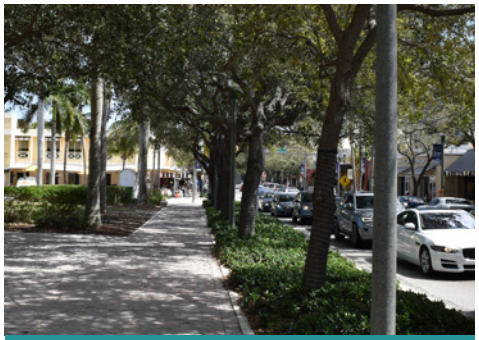
Bollards can separate the Pedestrian Realm from the Roadway Realm.

Lighting

Street lighting is a critical component of a comfortable and safe Pedestrian Realm. Lighting provides a sense of safety to people walking at night and can increase activation of a block in the evenings. Light fixtures can also be designed to unify a corridor or district, creating a sense of place. In urban core, urban general, and rural town areas, it is important that human-scaled light fixtures be provided (shorter than 20 feet) and focused down on the sidewalk to minimize stray light. Human-scaled lighting for sidewalks and crosswalks ensures that pedestrians are more visible to motorists and illuminates potential tripping hazards. Human-scaled lighting at bus stops is particularly important.

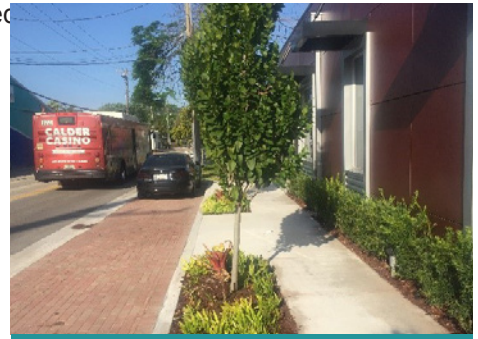
Street Trees/Landscaping

Trees and landscaping can transform a barren sidewalk into a lush outdoor environment. Trees provide shade to pedestrians walking and sitting alike while also helping to block wind that is funneled down streets. Trees and landscaping elements provide a buffer between the Roadway Realm and the Pedestrian Realm; trees that provide a canopy over the Roadway Realm can even help to calm traffic by visually narrowing the roadway.



Street trees between the sidewalk and the roadway on Atlantic Avenue in Delray Beach, Florida.

Even if right-of-way space is constrained provide functional sidewalk design. Street trees can be placed at regular intervals within the sidewalk as long adequate pedestrian clear width is maintained (5 feet preferred, 4 feet minimum) adjacent to the tree well. In this case the line between the furnishings zone and the pedestrian zone is somewhat blurred; however, minimum widths may still be maintained.



Despite a narrow right-of-way, this Pedestrian Realm still includes the four basic elements: curb zone (0.5 feet), intermittent furnishings zone (3.5 feet), pedestrian zone (4.5 feet), and frontage zone (1 foot).

Green elements are also an important component of stormwater filtration and management. Runoff from both the sidewalk and street can be directed into tree trenches and planters where it can be filtered before trickling into the groundwater or making its way into drainage pipes. Plantings should be selected for resilience to dirt, oil, and debris from the roadway as well as occasional trampling by pedestrians.

Paseos

Paseos improve the walkability of a district or neighborhood. Paseos are pedestrian-only "cut-through" locations where people can walk from one street to an adjacent parallel street within a block. Paseos incentivize pedestrian travel by shortening travel time, especially in locations where block lengths are relatively long by pedestrian scale (>500 feet). Paseos should be designed with a clear line of sight from one street to the adjacent street and be at least 10 feet in width. Paseos may provide access to adjacent land use and often are integrated into the surrounding land use. Paseos are often located adjacent to or within parks and plazas. Other typical uses of paseos include access to small-scale businesses off of the adjacent street and to serve as beach access between two adjacent properties.

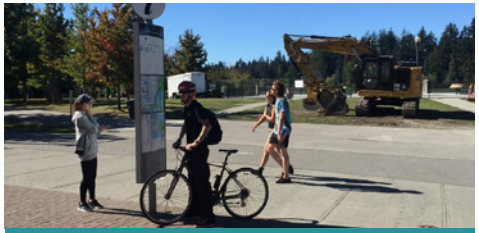
Paseo connecting Dixie Highway and Olive Avenue along theoretical 2nd Street in West Palm Beach, Florida.

Parklets

Parklets are a special type of Curb Zone amenity that extend the Pedestrian Realm into the Roadway Realm. Parklets are most frequently constructed in place of existing on-street parking. A parklet is often constructed using lighter materials and is not rigidly fixed to the street. Parklets match the sidewalk level and drainage along the gutter is usually preserved, lowering the cost of implementation. A parklet can provide increased public seating on sidewalks that are otherwise constrained and can be paired with cafés to provide seating to both customers and the public.

Pedestrian Wayfinding

Wayfinding is an important component of facilitating walking as a mode of transportation, just as cars are provided with directional signage. Pedestrian wayfinding helps people orient themselves in physical space and navigate from place to place. Wayfinding should include key destinations and attractions with distance and approximate time needed to walk there.



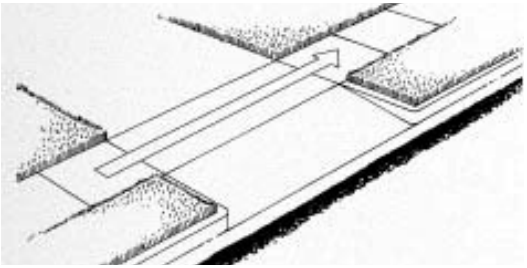
Pedestrian-scale wayfinding signage.

Example of pedestrian wayfinding with heads-up map orientation and walking times displayed on concentric circles.

Best practice wayfinding systems include 5-, 10-, and/or 15-minute

walksheds and “heads-up” orientation from the perspective of the person viewing the sign (“heads-up” orientation in which the compass directions are rotated to correspond with the direction the person is facing). Signage should be placed at each intersection or at each decision point to continue to point pedestrians in the right direction.

Driveways



Source: FHWA

From the perspective of the sidewalk user, driveways are locations where curb cuts connect to access drives to buildings and loading areas and can significantly impact the Pedestrian Realm experience. Ideally the Pedestrian Zone area of the sidewalk should remain straight across the driveway with no change in cross-slope. Driveways should not be excessively wide. Curb radii should remain small to slow entering and exiting vehicles. To prevent sidewalk interruptions and to reinforce the priority of pedestrians over vehicles on the sidewalk, a driveway should ramp up to sidewalk level and sidewalk surface materials should continue across the driveway.

Bicycle Parking

Inverted-U bicycle parking racks placed in a line.

Accessible, ample, and secure bicycle parking is an important component of supporting bicycling as a mode of transportation in Palm Beach County. Bicycle racks should be provided in the Furnishing Zone to avoid conflicts between bicycles and people walking. Where there is sufficient room, placing bicycle parking in the Frontage Zone could take advantage of overhangs to provide shelter during inclement weather.

Bicycle parking racks should be placed in a line and should allow for two points of contact between a bicycle frame and the rack to keep the bicycle stable. The design should allow for securing both a wheel and the frame to the rack. The Association of Pedestrian and Bicycle Professionals (APBP) publishes a Bicycle Parking Guide, which provides detailed design guidance.

Sidewalk Bicycle Facilities

Sidewalk bicycle facility.

Although bicycle facilities are typically provided in the Roadway Realm, bicycle facilities may be provided in the Pedestrian Realm in some unique circumstances. Bicycle facilities may be marked on the sidewalk using pavement markings where it is desired to provide a continuous separated bicycle facility outside of the roadway. Other applications for sidewalk bicycle facilities include to route bicyclists around an obstruction or potential obstruction in the roadway. If provided, sidewalk bicycle facilities should always be clearly distinguished from the pedestrian zone to minimize the potential for conflict between pedestrian and bicyclists. More detail on the design of bicycle facilities can be found in the Roadway Realm section of the Guidelines.

Dismount Zones

Dismount zone sidewalk marking.

Local jurisdictions may restrict wheeled-vehicles, such as bicycles and skateboards, on narrow sidewalks in downtown districts where high volumes of pedestrian traffic are common. Often local jurisdictions may post signs listing

prohibited vehicles, fine amounts, and specific municipal ordinances. A best practice for jurisdictions that may want a less aggressive approach to restricting bicycling on sidewalks in certain areas while still encouraging people to use bicycles where appropriate is to provide separated bicycle lanes on street to encourage people to ride in the street rather than on the sidewalk. On streets where this is not possible due to right-of-way or other constraints, a secondary solution is to mark dismount zones on the sidewalk so that bicyclists are informed where sidewalk riding is not allowed in a less discouraging manner than prohibition signs.

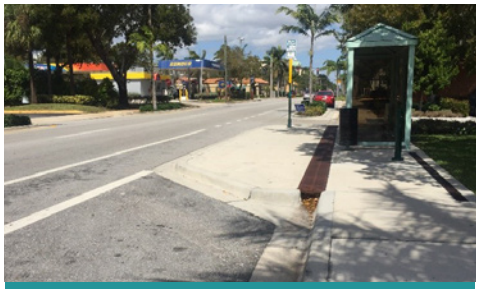
Transit Stops and Shelters

Transit stops are typically found in the Pedestrian Realm/Streetside. Transit stops should include amenities to provide a safe and comfortable environment for waiting riders, including the following:

- Benches
- Shelter(s)
- Trash/recycling receptacle
- Bicycle racks or lockers
- System/route map
- Real-time information display (bus arrival times) if available
- Lighting
- Local wayfinding displays (for both boarding and alighting passengers, as well as passersby)

Bus stop placement is typically guided by Palm Tran policies in conjunction with the roadway jurisdiction agency. Stops can be placed near-side of an intersection, far-side, or mid-block to line up with key destinations and transfers to other routes. Far-side bus stops are typically preferred to facilitate intersection operations. Crosswalks should be provided close to bus stops. The NACTO Transit Street Design Guide provides guidance on stop lengths, position, and recommended clear distances around stop amenities to remain ADA-compliant.

Shelters are particularly important for their protection from sun, wind, and rain. Where there is insufficient space for a shelter, a “bus bulb,” or transit curb extension, can be used to increase the sidewalk space available for a bus stop, or to provide ample space for walking in locations where the shelter must be placed in the Pedestrian Zone. Bus bulbs benefit transit riders through increased space and safety; operations are also improved by eliminating delays associated with merging in and out of lanes.



Bus bulbs provide additional sidewalk space around bus shelters placed on a narrow sidewalk in Delray Beach, Florida.

Local jurisdictions can pursue easements to place bus shelters behind the sidewalk to reduce barriers to walking and increase the separation between transit patrons and moving traffic.

A well-lit bus shelter is important to improve the sense of security for nighttime operations.

Roadway Realm Design Guidance

The Roadway Realm is the space between the curbs of a street right-of-way. Palm Beach County's vehicular ways provide a platform for countywide mobility via bicycle, bus, and car. The vehicular realm supports nearly all transportation options and, consequently, is the most critical part of any street design. Complete streets projects prioritize safety above all else, for all street users.

Urban and suburban street design has become more complex over time given rapid growth in Palm Beach County. The roadway is not just about moving motorized vehicles – its design affects multimodal mobility, the safety and comfort of the Pedestrian Realm, the ability to cross the street, economic vitality, and quality of life.

This section focuses on designing mid-block portions of roadways. Intersection design is discussed in the next section. Topics related to bicycling and transit ways are included in this section because they typically occur in the Roadway Realm. The practitioner has many tools to increase street safety, including speed reductions, traffic calming, and dedicated facilities for bicycles.

Design Speed

The AASHTO Green Book defines design speed as *"a selected speed used to determine the various geometric features of the roadway. The assumed design speed should be a logical one with respect to the topography, anticipated operating speed, the adjacent land use, and the functional classification of the highway."*

Design speed is different from the other controlling criteria in that it is a design control, rather than a specific design element. In other words, the selected design speed establishes the range of design values for many of the other geometric elements of the roadway. Because of its effect on so much of a roadway's design, the design speed is a fundamental and very important choice that a designer makes. The selected design speed should be high enough so that an appropriate regulatory speed limit will be less than or equal to it. Desirably, the speed at which drivers are operating comfortably will be close to the posted speed limit. For most cases, the ranges provide adequate flexibility for designers to choose an appropriate design speed without the need for a design exception. *A Guide for Achieving Flexibility in Highway Design (AASHTO)* provides additional information on how to apply this flexibility for selecting appropriate design speeds for various roadway types and contexts.

The AASHTO Green Book provides for a range of design speeds based on functional classification, terrain, and urban or rural form. For example, the range of design speeds for urban arterials in level terrain is 30 to 60 mph.

According to *Mitigation Strategies for Design Exceptions* (FHWA), "*Research confirms that lower speeds are safer and lowering speed limits can decrease both crash frequency and severity. However, speeds cannot be reduced simply by changing the posted speed limit. Geometric and cross-sectional elements, in combination with the context, establish a driving environment where drivers choose speeds that feel reasonable and comfortable."* These geometric and cross-sectional elements are known as traffic calming. Adding features such as curb extensions and median islands helps to slow and calm traffic without major flow disruptions. Finally, adding dedicated and protected facilities for bicycles improves both perceived and actual safety for all users; bicyclists are better protected from errant drivers and drivers have one less conflict to monitor while driving.

Target Speed

Target speed is the intended speed of travel for drivers based on a street's context. The concept of target speed represents an evolution over the traditional design and posted speed approach. Traditionally, streets are designed for one speed and then posted at speeds 5 or 10 mph lower. This approach leads to speeding as drivers recognize that a road supports speeds

higher than the speed limit. The target speed approach aligns the design and posted speeds and results in a street designed for the desired travel speed. As noted above, geometric and cross-sectional elements such as lane widths and curb radii help to reinforce the set target speed by physically inhibiting speeding.

Lane Width

The AASHTO Green Book recommends a range of lane widths be considered based on desired speed, capacity, and context of a roadway.

Table 4-1 AASHTO Green Book Lane Width Ranges

Road Type	AASHTO Recommended Width Rural (feet)	AASHTO Recommended Width Urban (feet)
Arterial	11-12	10-12
Collector	10-12	10-12
Local	9-12	9-12

The Draft 2016 Florida Greenbook provides for minimum lane widths based on functional classification, area type, design speed, and average daily traffic (ADT). Minimum lane widths generally range from 9 to 12 feet. For urban arterial roadways, lane widths range from 11 feet (design speed less than or equal to 45) to 12 feet (design speed greater than 45). In constrained areas where truck and bus volumes are low and speeds are less than 35 mph, lane widths of 10 feet may be used. The FDOT Plans Preparation Manual (PPM) also provides for the use of 10-foot through lanes on streets with design speeds of 35 mph or less and truck volumes less than 10 percent.

Table 4-2 FDOT Green Book Lane Width Ranges

Road Type	FDOT Recommended Width Rural (feet)	FDOT Recommended Width Urban (feet)
Arterial Through Lane	12	11-12 [1]
Collector Through Lane	10-12	11 [1]
Local Through Lane	9-12	10
Turn Lane	11-12	10-12
Parking Lane	7	7
Conventional Bicycle Lane	5	4-5
Buffered Bicycle Lane	6-7	6-7

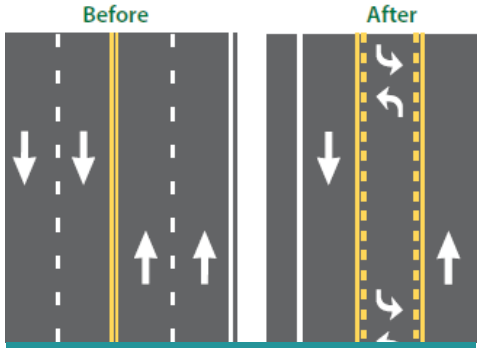
[1] In constrained areas where truck and bus volumes are low and speeds are less than 35 mph, lane widths of 10 feet may be used.

As visualized in the Summary Design Guidelines, lane widths are recommended as either 10 or 11 feet. 10-foot lanes are preferable in the urban core and urban general land uses, particularly for the Major Corridor and Main Connector typologies. This guidance reflects the urban environment, where space is at a premium and speed of travel is a lower priority. For all other land use and street typologies, 11 foot lanes are recommended. This width balances utilization of the right-of-way space while allowing for driver comfort.

Road Diet

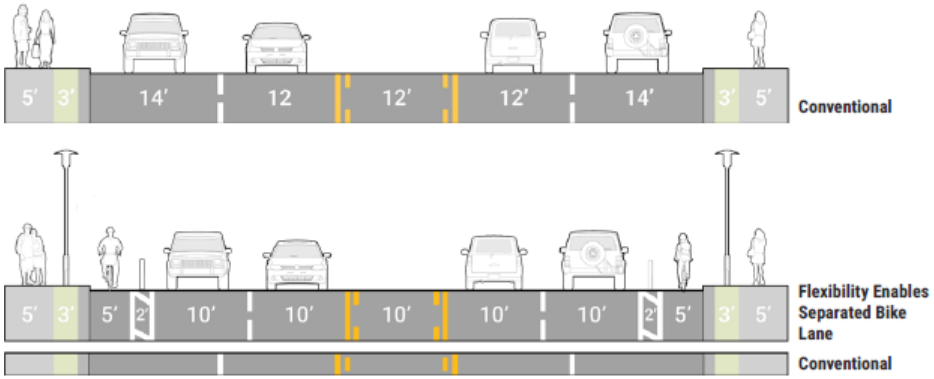
One approach to reduce speeds is to implement a “road diet.” A road diet removes excess vehicle lanes and reallocates the space to other modes, including bicycle lanes, bus-only lanes, and wider sidewalks. These lanes should also be sized appropriately per the guidance provided above – lanes

will be either 10 or 11 feet wide. The most common road diet transforms 4-lane, undivided streets into 3-lane streets with 1 lane in each direction and 1 center, two-way turn lane. Traffic operations are improved with provision of a turning lane while crashes and speeding are reduced by eliminating unsafe lane changes and passing maneuvers. Reallocated street space is often used to provide conventional or buffered bicycle lanes. Road diets can be implemented relatively inexpensively through restriping during road resurfacing projects.



Generalized example of a road diet; Source: FHWA

Lane Diet



Source: FHWA Achieving Multimodal Networks, Applying Design Flexibility & Reducing Conflicts

Just as a road diet reallocates excess lanes, a lane diet reallocates excess lane widths without removing lanes. The 12-foot wide lane, a carryover from prior highway engineering standards, provides additional space that can be reallocated to other purposes when narrowed to 10 to 11 feet in width . The image below illustrates multi-modal utilization of the space as a result of a lane diet.

Bicycle Elements

A variety of bicycle facility options are available to practitioners to suit a variety of street types, widths, and roles within the bicycle network. The recommended bicycle elements are presented below in descending level of comfort for bicyclists. Increased separation from vehicular traffic is important on higher speed, higher volume streets; by contrast, low volume, low speed local streets may benefit from a shared-space approach. It is equally important to focus on a bicycle network rather than isolated stretches of high quality facilities. For additional design guidance, consult the NACTO Urban Bikeway Design Guide, Second Edition and AASHTO's Guide for the Development of Bicycle Facilities, Fourth Edition. The table below presents target and constrained bicycle facility dimensions.

Table 4-3 Bicycle facility target and constrained widths

Element	Target		Constrained	
	Lane	Buffer	Lane	Buffer
Separated Bicycle Lane	7'	3'	5'	3'
Two-way Separated Bicycle Lanes	12'	3'	8'	3'
Raised Separated Bicycle Lane	6.5'	1' for vertical element 3' (next to parked cars)	4'	1' for vertical element 3' (next to parked cars)
Two-way Median Bicycle Lanes	12'	6' (3' for each side)	8'	6' (3' for each side)
Buffered Bicycle Lane	4'	3'	4'	2'
Conventional Bicycle Lane	6'	n/a	4'	n/a
Contra-Flow Bicycle Lane	6'	3'	5'	6"

Separated Bicycle Lanes

A separated bicycle lane is located between vehicles and the curb, offering a protected environment which is separated from vehicle conflicts other than at intersections and driveways. Separated bicycle lanes may also be referred to as protected bike lanes and are usually separated from traffic through various buffers, including parked vehicles, a curb or median, and bollards or planters. This facility provides the most comfortable on-street environment for bikes and eliminates the conflicts with parking or loading vehicles that other bike lanes face.

Parking separated bicycle lane.

Separated bicycle lane in Tampa, Florida.

Two-Way Separated Bicycle Lanes

Separated bicycle lanes can also be designed as 2-way separated bicycle lanes, allowing for bi-directional travel on one facility. 2-way separated bicycle lanes require mitigation for conflicts at intersections, including dedicated bike signals. Two-way separated bicycle lanes may be preferred in highly urban environments where it is easier to provide bicycle facilities only on specific streets, particularly if those streets are one-way to vehicles.

Two-way separated bicycle lane with bike share station in foreground and landscaped barrier in background.

Raised Separated Bicycle Lanes

Raised separated bicycle lanes provide an elevated surface for bicycle riders. This lane is most often at an interim elevation between the street level and sidewalk/curb level. Providing a raised surface makes bicycles and their riders more visible to drivers and helps to keep vehicles from driving in the bicycle lane. Perceived safety is increased through this vertical separation.

Raised, separated bicycle lane; Source: NACTO.

Median Bicycle Lanes

Conflicts between bicycles and right-turning vehicles can be eliminated using median bicycle lanes. These lanes create separated bicycle lanes in the middle of a roadway, either within space already used as a median or through striping bicycle lanes. Intersection conflicts require mitigation like 2-way separated bicycle lanes and contra-flow bicycle lanes, with bicycle signals provided to eliminate conflicts with turning vehicles. Median bicycle lanes require intersections to be signalized; non-signalized median openings should be closed as part of implementation. Median bicycle lanes are common in many South American cities. These bike lanes provide a high degree of separation from surrounding vehicles; their

A median bicycle lane in Lima, Peru.

A median bicycle lane in Washington, D.C.; Source: www.pedbikeimages.org/ ElvertBarnes.

comfort and safety help to facilitate longer trips by allowing for more consistent speeds.

Buffered Bicycle Lanes

Buffered bicycle lane on US-1 in Boynton Beach, Florida.

Buffered bicycle lanes are similar to conventional bicycle lanes with the addition of a striped or painted buffer that increases the separation between bicyclists and vehicles. The buffer can also be provided between the bicycle lane and a parking lane to reduce conflicts between bicycles and opening vehicle doors. Buffered bicycle lanes increase comfort over conventional bicycle lanes but are subject to conflicts with parking vehicles when a parking lane is present. The additional space provided by the buffer can also present an opportunity for loading and waiting vehicles to use the space; enforcement and signage are important components of keeping buffered bicycle lanes clear of vehicles. *Per FDOT, "7 foot buffered bicycle lanes are the standard for marked bike lanes"* (Roadway Design Bulletin 14-17, Nov 18, 2014). FDOT Standard Index 17347, part of FDOT's 2015 design standards, provides detailed drawings for buffered bicycle lane markings.

Conventional Bicycle Lanes

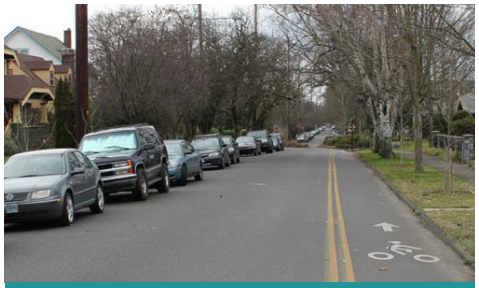
Conventional bicycle lane in Orlanda, Florida.

The conventional bicycle lane consists of a striped lane at the edge of the vehicle lanes and is the most basic form of a dedicated bicycle facility. Conventional bicycle lanes help bicycles know that there is space for them to travel along a street and benefit drivers by reducing mixing between bicyclists and vehicles. Bicycle lanes can be placed between vehicle lanes and the curb or, if parking is present, between travel lanes and the parking lane. In instances where on-street parking is provided, a wider parking lane can provide space for people to open doors without conflicting with bicycles.

Contra-Flow Bicycle Lanes

Bicyclist in contra-flow bicycle lane with green sharrow lane in the opposite direction.

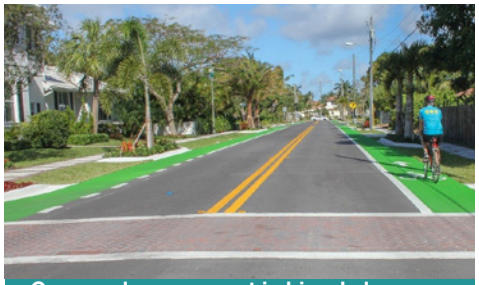
A contra-flow lane allows bikes to travel in the opposite direction of traffic; contra-flow lanes are used on one way streets to increase the connectivity of the bike network and reduce out of way travel. As with 2-way separated bicycle lane, special signage, markings, and bike signals may be required to alert motorists to the presence of contra-flow travel, particularly at intersections.



Contra-flow Bicycle Lane; Source: NACTO.

Green Color Bicycle Lanes

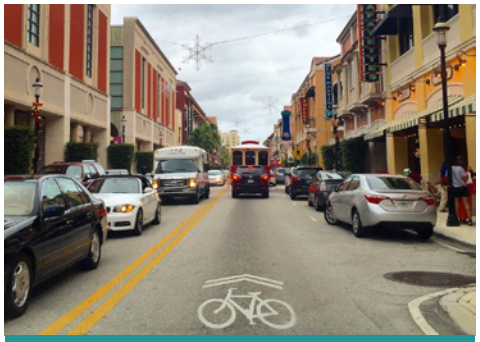
Green color pavement markings can be provided to enhance bicycle lanes. This treatment helps bicyclists to know where to ride and helps increase driver awareness of the potential presence of bicycles. FHWA has given an Interim Approval for the use of green colored pavement in bicycle lanes; this treatment can be used after requesting written permission by FHWA. FDOT PPM Chapter 8



Green color pavement in bicycle lanes on NE 2nd Avenue, Delray Beach, Florida. Source: Wantman Group.

expands upon the Interim Approval provided by FHWA. FHWA recommends that green colored pavement can be used in bicycle lanes and at conflict points between vehicles and bicycle lanes. FDOT states that green colored pavement will only be permitted on the State Highway System when used in conflict points, often called "keyholes." Practitioners must satisfy two conditions for use of green coloration on the SHS. The location must: 1) be at a traffic conflict area, and; 2) have a demonstrated need for safety treatments, either through crash history or through document failure of motor vehicles to yield to bicycles. Green colored pavement has been used on both 15th Street in West Palm Beach and NE 2nd Avenue in Delray Beach (pictured).

Shared Lane Markings



Shared lane marking on Rosemary Street, West Palm Beach, Florida.

A shared lane breaks with the dedicated facility approach and is only appropriate for low volume, low speed streets where bicycles are less likely to encounter high speed vehicles and are less likely to slow surrounding traffic. Shared lane markings, often called "sharrows," advise bicycles of where to position themselves within a lane, helping them to ride in the middle of the lane rather than along the gutter or next to parked cars in the door zone. The markings also serve as reminders to drivers that bicycles are allowed to ride in the lane, and to expect their presence. Shared lanes are more effective when paired with traffic calming features and diverters to reduce vehicle speeds and volumes. FDOT Standard Index 17347 provides guidance on lateral placement of shared lane markings. FDOT guidance places the markings in the center of the lane to maintain visibility of bicyclists and to discourage unsafe passing of bicyclists. Importantly, in situations where parking is provided adjacent to the travel lane, the shared lane marking should be placed in the center of the travel lane, not the combined parking and travel lane. This helps to keep bicyclists out of the "door zone" of parked cars. There is currently experimental clearance for using green colored pavement beneath the shared lane marking to highlight its presence. The MUTCD also allows black coloration beneath the marking, which can be useful in highlighting the marking on concrete streets.

Transit Elements

Dedicated transit facilities are effective tools for increasing the throughput capacity of a street. Transit vehicles are significantly more space efficient for the movement of people; a dedicated lane can greatly increase the efficiency of transit operations. Improved operations encourage ridership through faster travel times and increased on-time arrival reliability. Reductions in delays also help to lower operating costs.

Bus-Only Lane Type	Constrained Width
Curb Lane	11'
Offset Lane (bulb-out stations)	11'
Dedicated Median Lane	11'
Combined Bicycle/Bus Lane	12'

Curbside Bus Lanes

Curbside bus lane in New York; Source: NYC DOT.

A bus-only lane that runs alongside the curb provides an effective exclusive operating facility where parking is either not provided or underutilized and removed. For streets with heavy peak traffic flows a time-restricted parking lane can be converted to a curbside bus lane during peak periods while allowing for parking during the off-peak period. Curbside bus lanes are subject to conflict between vehicles turning into and

out of driveways and between vehicles loading or unloading at the curb. Implementation requires little beyond signage and pavement markings.

Offset Bus Lanes

An offset bus lane provides an exclusive lane separated from the curb by on-street parking or a separated bicycle lane. This configuration allows for curb activities to remain in place, limiting impacts on the street and conflicts between illegal stopping and transit vehicles. Conflicts will still arise between vehicles pulling into and out of parking spaces as well as double parked vehicles; enforcement is a crucial component of effective offset bus lane operations. To allow buses to remain in the offset bus lane stops can be placed on bus-bulbs, allowing for greater amenities.

Bus Bulb Stop.

Offset bus lane in New York; Source: NYC DOT.

Median Bus Lanes

Median bus lanes remove the conflicts that occur with parking lanes, loading zones, and driveways by placing the bus lanes in the center of the street. This treatment is effective for high frequency routes which have high ridership and experience significant delay due to congestion. Median bus lanes can be denoted by pavement markings or via curbs, creating a median guideway. Stops are also located in the median on the right side of the lane and are often placed on the far-side of intersections in offset pairs.

Passenger waiting at a bus bulb stop in Delray Beach, Florida.

Light Rail Lanes

Light rail lanes can be accommodated via a center median guideway similar to bus lanes. It is important that left turns be carefully managed; turns can be prohibited at minor intersections and provided at major intersections with an independent signal phase to remove conflicts with through transit vehicles. Due to their similar needs, center bus lanes are excellent candidates for conversion to light rail lanes if light rail is planned in the future.

Median bus lane; Source: NACTO.

Light rail station with signage; Source: NACTO.

Slow Streets

Slow streets represent a focus on slow speeds and safety for local streets. Designs should limit speeds to 20-25 mph to minimize the speed differentials between vehicles and bicyclists and to increase the safety and comfort of pedestrians. Traffic calming measures, discussed below in greater detail, allow designers to slow traffic through these streets. Per the NACTO Urban Bikeway Design Guide, “Streets developed as bicycle boulevards should have 85th percentile speeds at 25 mph or less (20 mph preferred).” FHWA’s Achieving Multimodal Networks provides further guidance on slow street design.

Shared Space

Shared space designs do not have delineation (or may have only partial delineation) between various modes of transportation and instead focus on streets that are safely shared by all users. This design removes the vertical separation between the sidewalk and street, creating a flush surface street that is available to all users. Special pavements, colors, and textures help to increase awareness of the shared nature of the street. Bollards, planters, benches, bicycle parking, and vehicle parking spaces can all be used to create some form of separation for pedestrians. Alternating the placement of these amenities can create a calming effect on the street, helping to slow motor vehicles. Providing drainage in the center of the street reduces the likelihood that pedestrian space will experience drainage problems. The term "woonerf" is a Dutch term that is sometimes used to refer to shared space streets, creating safe, inviting places while still allowing for local vehicular access to properties.

A woonerf on Bell Street in Seattle, WA. Source: Curbed Seattle.

A flush surface street on NE 1st Avenue in Boca Raton, Florida.

Neighborhood Greenways

Neighborhood greenways embrace the philosophy of a given set of streets, with low vehicle volumes and speeds, which are oriented to provide priority to bicycles and pedestrians. These streets feature traffic calming features which help to reduce traffic, such as diverters, to create a welcoming environment for users. Streets within this network are often provided with branded signage and wayfinding to help users find and stay on them while also informing drivers of their designation. Where neighborhood greenways cross larger, busier roads, signals and two-stage crossing refuges can be used to continue the safety and comfort of the greenway through intersections.

Neighborhood greenway signage. Source: Seattle Bike Blog.

Traffic Calming/Roadway Elements

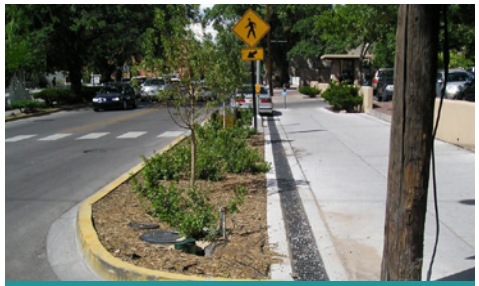
Target speed can be enforced through traffic calming elements which help to slow traffic and create a more comfortable environment for all users, drivers included. These treatments can be implemented both through tactical retrofits such as paint and flexposts or through more permanent reconstruction projects with concrete and asphalt.

Center Median Islands

Pedestrians often struggle to find acceptable gaps in traffic to cross streets when long blocks make crossing at intersections undesirable or infeasible. A center median island creates space for pedestrians to cross traffic one direction at a time and helps to slow vehicles by narrowing the street. Landscaping can also be included to capture and clean stormwater runoff. Center islands should be at least 6 feet wide to allow enough space to wait safely. Islands can also be placed at intersections where left turns need to be prohibited.

Median islands used for crosswalk refuges and landscaping; Source: NACTO.

Neckdowns



Landscaped island neckdown; Source: NACTO.

A neckdown helps to narrow the street from the curbs rather than from the middle. Neckdowns are sometimes known as “pinch-points” and are particularly effective on longer blocks where vehicles may continue to accelerate between intersections. If a bicycle lane is present, shared lane markings should be provided to bicycles to merge into traffic and travel safely through the neckdown. Landscaped stormwater filtration can be placed within neckdowns.

Speed Tables

Speed table; Source: Stocktongov.com.

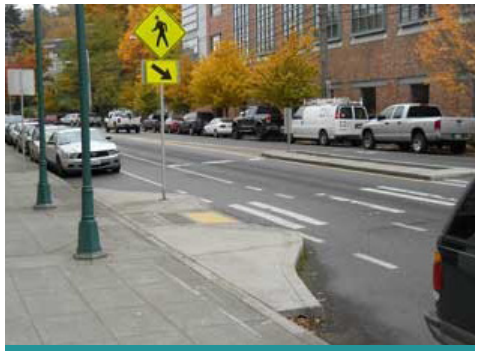
Speed tables are vertical elements with a flat top and are longer than the traditional speed hump or bump. Their design allows for slightly higher operating speeds and are do not obstruct emergency or transit vehicles access. Speed tables can be combined with mid-block crosswalks to provide pedestrians with a level crossing and to clearly prioritize pedestrians over vehicles at the crossing. As with crosswalks, clearly signage and markings are necessary to alert drivers to upcoming speed tables.

Parklets

Parklets add public seating space in the place of on-street parking, often converting one or more spaces into a platform which supports an extension of the sidewalk realm. They are typically designed to be 6 feet wide – the width of a parking space – and have flexible posts or bollards to separate them from the traveled way. Like other amenities, parklets should be placed far enough away from intersections to avoid inhibiting sight lines. Parklets are often designed to complement the block or even storefronts which they neighbor. Elements of parklets include seating, landscaping, and bike racks. While parklets may provide seating directly outside a café or restaurant, seating is typically available to the public rather than just to patrons of the business. Parklets are typically funded and maintained by local neighborhood groups or business associations. Because parklets are not permanent and do not affect the drainage of the roadway, implementation can be quick and can be done as part of a pilot program.

Parklets increase the landscape and seating along a street; Source: City of Minneapolis.

Mid-Block Crosswalks



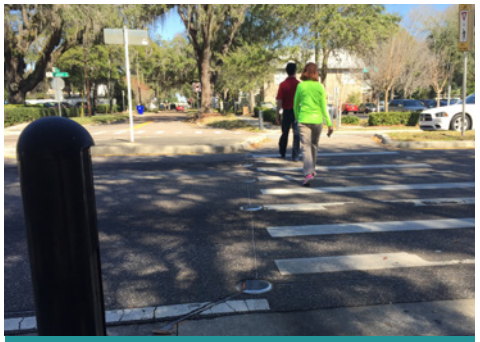
Mid-block crosswalk; Source: FHWA.

Mid-block crosswalks refer to any street crossing which occurs between intersections. These crosswalks can be useful in circumstances where long blocks would force pedestrians to walk relatively far out of direction to reach their destination. Crosswalks can be paired with paseos or alleys that have been activated and draw activity to cross mid-block. Similarly, shared-use paths often create crossing demands between intersections and require safe crossing accommodations on-par with the safety and comfort of the path.

It is imperative that mid-block crosswalks be prominently marked since both drivers and pedestrians may not be expecting them. Traffic calming features

such as neckdowns and median refuges can help to slow vehicles while increasing visibility of crossing pedestrians to drivers. Lighting is also an essential element of safe mid-block crossings. Street lighting is often focused on intersections and it may be necessary to add lighting to mid-block crosswalk locations.

Mid-block crosswalks also benefit from the use of bulb-outs or curb extensions. These devices help bring pedestrians out into drivers' line of sight prior to crossing. Extensions can often be landscaped so as to provide filtration opportunities for stormwater. To preserve safe sight lines for all users, any landscaping should consist mainly of grasses or low profile shrubs rather than trees or hedges.



Crosswalk on an uncontrolled approach with in-roadway warning lights and automated pedestrian detection bollard.

Crosswalks should be clearly marked with paint and signage to alert drivers to the need to yield to people crossing. Mid-block crosswalks with stop signs or signals require stop bars for vehicles placed 40 feet prior to the crosswalk as seen in FDOT Standard Index 17346.

On-Street Parking

On-street parking can provide traffic calming or placemaking as it helps to narrow the street both physically and visually. Drivers who pass by parked cars must slow down to monitor potential conflicts with opening doors and cars pulling into and out of spaces. Parking can also be used as a barrier to create physically protected bicycle lanes. Bicycle lanes placed adjacent to parked vehicles should include a buffered space for the "door zone" to avoid the conflict between opening doors and bicyclists. On-street parking lanes should provide 8 feet where curb and gutter is present – 6.5 feet of roadway and 1.5 feet of gutter. For streets without a gutter, a 7-foot parking lane should be provided.

Conventional bike lane adjacent to an on-street parking lane.

In "main street" settings, parking can help to create a sense of place by further increasing the distance between cars passing by and the sidewalk realm through angled parking. Angled parking can be provided in the traditional "head-in" configuration, wherein drivers pull forward into the spot, or through reverse-angled parking where drivers pass the space and then back into it. Reverse-angled parking creates a safer environment for all users. Drivers can monitor for conflicts as they pull out of the space, avoiding situations where they cannot see oncoming traffic and bicyclists. Loading the vehicle is also safer, since the trunk is adjacent to the sidewalk and open doors direct occupants directly towards the sidewalk.

Reverse-angle parking provides more visibility of bicyclists and allows motorists to monitor conflicts more effectively.

Loading Zones

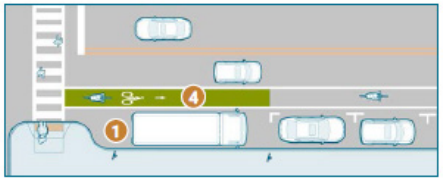
Freight and goods movement is critical to the economy of the region. In urban environments, shops and restaurants rely on frequent deliveries to cater to their customers. Delivery vehicles can vary from smaller trucks to large tractor-trailers and pose unique challenges to operating in urban rights-of-way. Providing adequate loading zones can help to reduce conflicts between trucks and other street users. Bicyclists are particularly at risk; in the absence of proper loading zones, trucks will park as close to the curb as possible, even

if that means blocking a bicycle lane. Bicyclists can then be forced to swing into the travel lanes, putting themselves at risk and catching drivers by surprise. The graphic from FHWA's Achieving Multimodal Networks guide shows potential arrangements for mitigating loading zone conflicts with bicycle lanes.

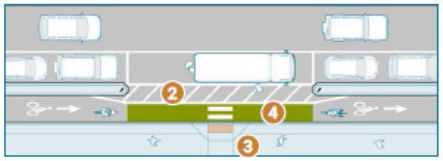
Intersection Design Guidance

Intersections represent significant opportunities to make streets safer and more comfortable for all users. They present the potential for numerous conflicts on Palm Beach County's streets. Redesigning them to focus on ease of use and prioritization for vulnerable users – bicycles and pedestrians – can greatly improve the street experience and serves to support Complete Streets features on the streets leading to and from intersections. Intersection design must also be accessible to all users; curb ramps, crosswalks, and signal timing must be ADA-compliant so that intersections do not create barriers to mobility for anyone.

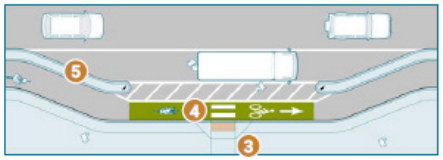
LOADING ZONE ADJACENT TO STANDARD BIKE LANE



LOADING ZONE ADJACENT TO SEPARATED BIKE LANE WITH ON-STREET PARKING



LOADING ZONE ADJACENT TO SEPARATED BIKE LANE WITHOUT ON-STREET PARKING



Source: FHWA Achieving Multimodal Networks

Intersection with textured crosswalks.

Traffic Control Elements

Fundamental to an intersection is the need to control how and when users pass through. Traffic control elements either actively or passively communicate right-of-way information to users to provide for safe movements. It is important to note that traffic control elements should be selected based upon policy goals such as queue management and safety provisions; traffic control devices are not used for speed management or traffic calming by themselves.

Signalized

Perhaps the most common traffic control setting in urban environments, traffic signals or "traffic lights" are used to allocate time between the various intersection approaches. Signalization is effective for managing larger volumes of traffic at intersections with multiple lanes per approach and can be an effective tool when vehicles from side streets cannot find acceptable gaps in traffic flow to safely complete turns. Signals can also be beneficial to pedestrians and bicycles who may otherwise have trouble asserting their right to use the intersection. Large intersections tend to have long signal cycle times which can significantly affect transit travel time reliability and create a barrier to walking. Shorter cycle times are recommended to reduce delay to all users.

Pedestrian Signals

Pedestrian signal heads communicate crossing permission to pedestrians. Pedestrian signals provide a walk indication signified by the symbol of a walking person, a change interval signified by the flashing hand or don't walk symbol and a countdown timer, and a don't walk indication of a solid red hand. The change interval should always include the countdown timer so that pedestrians are aware of how much crossing time is remaining. Timing is traditionally based on a walking speed of 3.5 ft/sec, although 2.8

Pedestrian WALK signal.

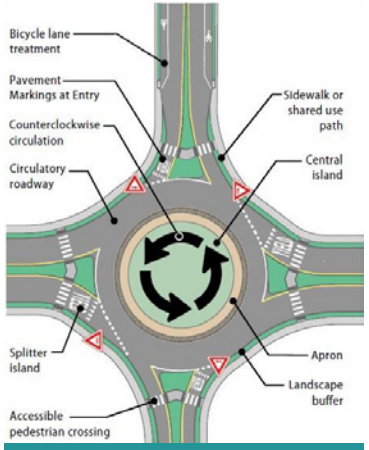
ft/sec is gaining greater acceptance, particularly in areas with larger senior populations who may need more time to cross.

Bicycle Signals

Bicycle signal head.

Bicycle signal heads can also be provided at signalized intersections. These signals resemble vehicle signals except that they replace the circular light with the symbol of a bicycle. These signals are effective for contra-flow and two-way separated bicycle lanes where bicycles would otherwise not have a traffic signal facing them. Bicycle signals can also be programmed to turn provide an early green indication; this allows bicycles to enter the intersection and be visible ahead of turning drivers. FHWA has granted Interim Approval for the use of bicycle signal heads. They are optional for use with bicycle lanes and must meet conditions as outlined in the approval. Bicycle signal heads are not allowed for use when bicycle movements on green or yellow indications would conflict with any simultaneous motor vehicle movements, including turns on red.

Unsignalized, Stop Controlled



Single-lane roundabout design elements; Source: FHWA.

Unsignalized intersections may have stop signs at all approaches (an all-way stop) or only at the minor street approaches. Stop control is significantly cheaper to install and maintain compared with signals. They can also reduce delays compared to signal cycles for roads with lower volumes. Stop signs require driver awareness of crossing pedestrians; this can be difficult for users in wheelchairs who may be below a driver's line of sight. Intersections with stop signs on the minor cross-street may make it difficult for pedestrians and bicycles to cross the major street if clear gaps are not present. A center median island can facilitate this crossing, particularly if paired with high visibility crosswalk markings and lighting.

Roundabouts

FHWA defines three essential characteristics of roundabouts: counterclockwise flow, entry yield control, and low speed (15-25mph).[1] Roundabouts are proven as safer and cheaper ways to provide traffic control at intersections while also reducing delays. FHWA designates roundabouts as a "Proven Safety Countermeasure" due to their reductions in intersection crashes that often lead to injuries and fatalities. In the event of a collision, damages and injuries are usually less significant due to the rear-end and side-swipe nature of collisions at roundabouts. By contrast, traditional intersections can result in right-angle collisions which are significantly more dangerous. Roundabouts increase the distance that pedestrians must travel to cross through an intersection but vehicle yielding can reduce their delays at crossings.

Neighborhood Traffic Circles

Neighborhood traffic circle; Source: NACTO.

Neighborhood traffic circles work to replace stop signs at low volume, low speed intersections. In contrast to roundabouts, neighborhood traffic circles do not divert cars as they enter the intersection. These "mini roundabouts" require slight deflections as cars travel through the intersection. Flow is interrupted less than a traditional roundabout and bicycles can continue straight through the intersection without changing direction.

[1] http://safety.fhwa.dot.gov/intersection/innovative/roundabouts/

The center of neighborhood traffic circles can be landscaped to beautify the intersection as well as filter and drain stormwater.

Intersection Geometry Safety

Intersection geometry should balance the needs of pedestrians and bicyclists with those of drivers and transit vehicles. The safety of vulnerable users can be greatly improved by decreasing crossing distances and reducing the speeds of turning vehicles. Turning speeds should be kept to between 0 and 10 mph to provide drivers with more time and stopping space to look for pedestrians crossing before turning. Among the most crucial decisions in designing an intersection is the selection of the controlling vehicle, which determines how a given vehicle will be able to use and turn through the intersection. Oftentimes, the largest possible vehicle is selected so that any and all vehicles can turn through at any time. However, the frequency of such vehicles should be taken into account; the controlling design vehicle should be one that frequently uses the intersection. Other accommodations can be put in place to allow for the occasional larger vehicle that must use the intersection. FHWA's Achieving Multimodal Networks guide provides this quote from the AASHTO 2011 Green Book, *"If turning traffic is nearly all passenger vehicles, it may not be cost-effective or pedestrian friendly to design for large trucks. However, the design should allow for an occasional large truck to turn by swinging wide and encroaching on other traffic lanes without disrupting traffic significantly."*

Curb Radii

The curb or corner radius controls the speed of turning vehicles and affects crossing distances. A small radius increases safety by reducing crossing distances and slowing turning vehicles; this is particularly important given the number of crashes in which turning vehicles strike pedestrians in crosswalks.

The effective curb radius can be increased, where necessary for larger vehicles, without increasing the actual radius. Textures and colored paint can be used to mark out a smaller curb radius without physically blocking large vehicles from turning through that space. Parking and bicycle lanes can also increase the effective radius. If the turn cannot fit within the existing geometry, the stop bar on the receiving street can be recessed to allow space for wide turns.

Table 4-4 Actual and Effect Curb Radii

	Land Use Context	Actual Curb Radius	Effective Curb Radius (the vehicular path) [1],[2]
Major Corridor [4]	All intersection corners w/o vehicle turns	5'	N/A
	UC, UG	15'	20'
	SB, RT	25'	30'
	RU, NA	30'	35'
Main Connector [4]	All intersection corners w/o vehicle turns	5'	N/A
	UC, UG	15'	20'
	SB, RT [3]	25'	30'
	RU, NA	25'	30'
Community Connector	All intersection corners w/o vehicle turns	5'	N/A
	UC, UG	15'	25'
	SB, RT [3]	25'	30'
	RU, NA	25'	30'
Neighborhood Streets	All intersection corners w/o vehicle turns	5'	N/A
	UC, UG	15'	20'
	SB, RT	15'	20'
	RU, NA	15'	20'

Notes:

[1] Bicycle lanes and parking lanes may increase the effective curb radius.

[2] Effective curb radius may be increased to 30 feet in urban center and urban general areas to accommodate a bus or a truck along certain corridors.

[3] Consider alternate strategies such as recessed stop bars and mountable curbs in unusual situations where 30 feet effective curb radius cannot be met.

[4] Where the potential for conflicts with pedestrians is high and intersection geometry necessitates an effective radius greater than 50 feet, evaluate installation of a channelized right-turn lane with a pedestrian refuge island.

Curb Ramps

Curb ramps are an important component of pedestrian safety and are required as part of ADA accessible design. Ramps assist people of all ages and abilities in walking between the roadway and the Pedestrian Realms; people who have trouble stepping up on a 6-inch curb, people who are pushing carts or strollers, and people walking bicycles all benefit from curb ramps. Curb ramps should line up directly with crosswalks and must include a detectible warning strip at the street edge.

Table 4-5 Recommended Curb Ramp Dimensions

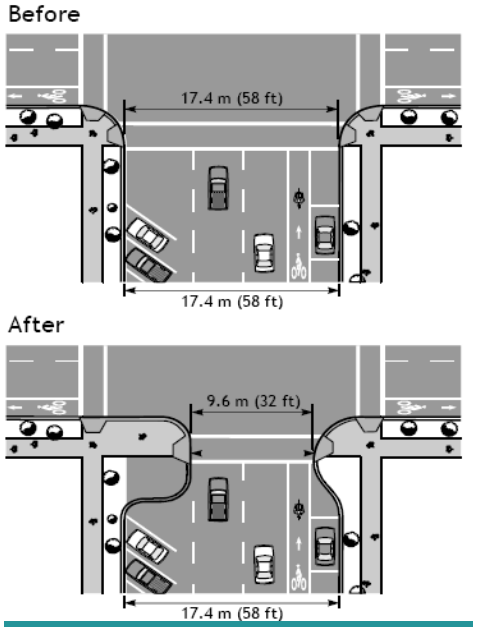
	Land Use Context	Constrained	Target	Maximum
Curb Ramp Width	All	4'	Width of Pedestrian Walking Zone	Width of Sidewalk Realm
Curb Extension Width	All	4'	8'	Do not block an existing or potential bicycle lane
Curb Extension Length	All	Width of Curb Ramp	20'	As needed to improve pedestrian visibility and prohibit parking near intersection
Crossing Refuge Island Width	All	6'	10'	Width of Median

Intersection Safety

A number of intersection features can be used to increase the safety of the intersection for vulnerable users. These features can be used to reduce crossing distances and allow provisions for larger vehicles to turn through without the need to increase corner radii.

Curb Extensions

Curb extensions extend the Pedestrian Realm into the vehicular realm at intersections, similar to neckdowns. Curb extensions reduce crossing distance and place waiting pedestrians in the driver's line of sight, past the obstructions of street furniture, parked cars, and trees. Extensions can also add space for wider curb ramps that might not fit within the existing sidewalk. Extensions are most appropriate in situations where there is an existing parking lane approaching an intersection; curb extensions help to enforce no parking zones, increasing visibility around the intersection and improving safety for all users.



Example of a curb extension reducing the pedestrian crossing distance; Source: FHWA.

Raised Intersections

A raised intersection brings the vehicular way's surface up to the level of the Pedestrian Realm. Vehicles slow down to navigate the change in surface level as they yield to pedestrians at the intersection level. Bollards can be used at raised intersections to keep vehicles from driving through the Pedestrian Realm, especially when turning. Traffic control can be accomplished through yield signs unless pedestrians may have trouble crossing with the right-of-way, in which case stop signs may be appropriate .

Textured Intersections

Textured intersections use pavement or pavers of different colors and materials to increase visibility of the intersection for all users. Textured treatments are often used in intersection crosswalks to highlight their presence and raise driver awareness of the potential for pedestrians in the intersection. Texturization is often successfully combined with raised crosswalks or intersections to further slow drivers and increase awareness of the vertical change in the roadway.

Channelized Right-Turns

In circumstances where a large turn radius is necessary, either due to frequent use by large vehicles or due to a skewed intersection alignment, channelized right-turns can provide this radius while providing for short crossing distances for pedestrians. The pedestrian island helps to break up the longer crossing, offering refuge between crossing the right-turn and the main intersection. The channelized turn can still be designed to provide high visibility between the driver and pedestrians and to create a slow turn through the channel.

Mountable Curb Aprons

A mountable apron is a distinct material between the traveled way and the sidewalk. It is designed to be occasionally driven over, or mounted, by large vehicles which would otherwise drive over the sidewalk in the process of making a turn. Apron material should be colored and easily distinguishable to prevent use by vehicles that can complete a turn in the traveled way.

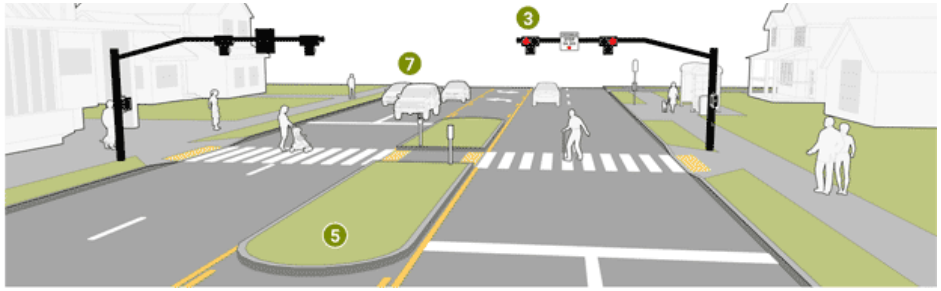
Pedestrian Elements

Mid-Block Crossing Signals

Practitioners have many signals and signs at their disposal to emphasize the priority of pedestrians crossing the street and gain compliance from drivers. At a minimum, yield to pedestrian signage can remind drivers that pedestrians have the right-of-way at the crosswalk.

Examples of RRFB crosswalks.

Rectangular Rapid Flashing Beacon (RRFB) systems can be installed to upgrade the pedestrian priority treatments. These systems include flashing signs activated by a push button and have been found to significantly increase the number of drivers who yield to pedestrians. They are relatively cheap to install and can be powered with a solar panel.



Source: FHWA PHB Signal with Crossing Islands

Pedestrian Hybrid Beacon (PHB) systems can be installed to further upgrade a crossing and are particularly effective for higher speed, multi-lane streets. PHB installations consist of two red lights above one yellow light and are mounted on mast arms over the roadway. Pedestrian activation starts a cycle that displays a red light to drivers, allowing pedestrians to cross. Per FHWA, PHBs have been shown to decrease pedestrian crashes up to 69% and total roadway crashes up to 29%.[2]

Crossing Islands

Crossing islands, or pedestrian refuges, resemble the median crossing islands for mid-block usage described in the traffic calming section. At larger intersections crossing islands can help to break crossing into two shorter segments, which is particularly helpful at unsignalized intersections. For large signalized intersections, slower pedestrians can make use of a crossing push button in the crossing island, allowing them two separate signal cycles to cross the intersection. Refuge should be a minimum 6 feet wide and should include a “nose” that extends into the intersection to protect pedestrians from left-turning vehicles.

[2] http://safety.fhwa.dot.gov/provencountermeasures/fhwa_sa_12_012.cfm

Bicycle Elements

Pavement Markings through Intersections

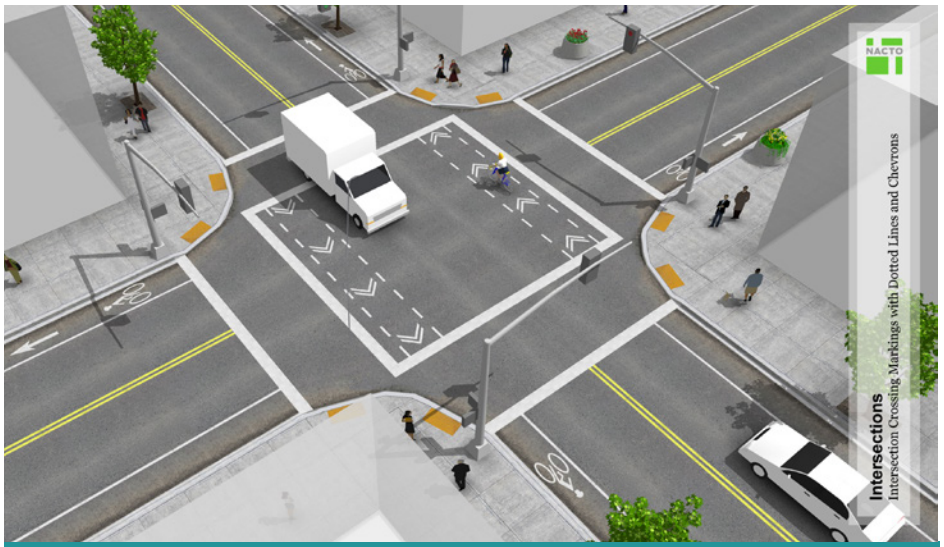
Pavement markings extend bicycle lane treatments through an intersection and reduce the comfort gap between protected facilities and intersections. Markings raise drivers' awareness of bicycles continuing through the intersection and show them where to expect bicycles. Treatments typically consist of dotted or striped lines of a width consistent with the bicycle facility to which they connect. Striping can be filled with green colored pavement to further highlight the markings. These treatments can also be applied at merges and driveways where drivers may not be aware of oncoming bicycles.

Green bicycle conflict markings through an intersection.

Bicycle Boxes

Bicycle boxes prevent bicycles from mixing with queued vehicles and turning vehicles at intersections. Boxes place bicycles at the front of the intersection and increase their visibility to vehicles behind them. This allows for positioning for left turns and allows them an opportunity to enter the intersection ahead of cars and to be seen by turning vehicles. Bicycle boxes are recommended as 10-16 feet deep with pavement markings and signage to indicate that vehicles should stop behind the box.

Bicycle box with green color pavement. Santa Monica, California.

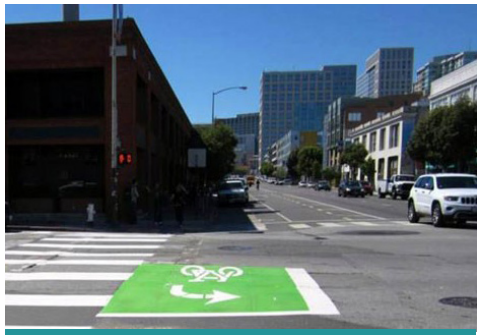


Example of bicycle lane markings extending through an intersection; Source: NACTO.

Rendering of a green color bke lane connecting to a bike box; Source: NACTO.

Two-Stage Turn Boxes

Left turns can be dangerous for bicycles as they merge across traffic before turning. Two-stage turn boxes eliminate this danger by allowing bicycles to continue through the intersection before using a two-stage turn box to pull out of through traffic and continue left in a second movement. Two through movements replace a left turn and bicycles can use provided on-street bicycle facilities in the process. This treatment is generally best for high-speed roads and separated bicycle lane applications where bicycles cannot merge to turn left.



A two-stage turn box provides space for left-turning bicyclists to re-orient outside of the path of through moving bicyclists in a visible location in front of motor vehicle traffic; Source: SFMTA.

A two-stage turn box at an intersection with a protected bicycle lane. Source: NACTO.

Right-Turn Lane Conflicts

Several configurations exist to mitigate conflicts between bicycles and right-turning vehicles, particularly where separated bicycle lanes approach intersections. These solutions range from bicycles and vehicles mixing and sharing the right-most lane to bicycle boxes to a merge point where bicycles and right-turning vehicles cross paths to allow bicycles to continue through the intersection. Yield signage, yield pavement markings, and colored pavement can help to distinguish right-of-way and proper placement for all users in the conflict space.

A combined right-turn and bicycle lane. Source: NACTO.

A continuous bicycle lane with a right-turn pocket. Source: NACTO

A shared right-turn/through lane for protected bicycle lanes. Source: NACTO.

Transit Elements

Queue Jump Lanes

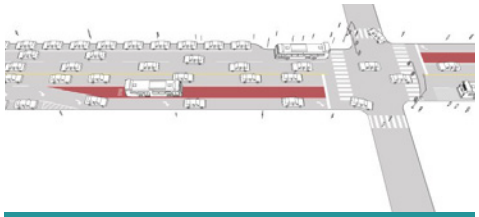
Schematic drawing of a bus queue jump lane; Source: NACTO.

Queue jump lanes create a dedicated lane immediately prior to an intersection to allow a vehicle to "jump" ahead of a queue at a traffic signal. A transit priority signal is used to give the vehicle an early green phase, allowing the bus to move ahead of queued traffic. A queue jump can also be combined with a near-side transit stop and will allow a bus to merge back into traffic more easily.

Transit Signal Priority (TSP)

TSP can accommodate frequent, high-quality transit service by reducing the running delay associated with signalized intersections. TSP is not the same as preemption – the system by which emergency vehicles and trains receive an exclusive phase immediately. Signal priority is triggered when a bus is determined to be behind schedule; a signal from the onboard GPS system is sent to the traffic signal which determines whether to provide priority. A green phase may be provided early to shorten the wait time or a green phase may be extended briefly to allow a vehicle to pass through the intersection. Further TSP requests are not granted until a signal recovers from the provision of the initial TSP.

Right-Turn Lane Conflicts



Bus only lane and an adjacent right-turn pocket; Source: NACTO.

Bus-only lanes can conflict with right-turning vehicles at intersections. When right turn volumes are moderate, vehicles may be permitted to use the bus-only lane to turn. At intersections with greater right turn volumes the bus may experience delays. A right-turn pocket can be provided to allow cars to merge across the bus-only

lane and into the turn pocket. In the case of a near-side bus stop, a floating bus bulb can provide a bus stop while still allowing for the right-turn pocket.

Placemaking

As defined by the Project for Public Spaces (PPS): "As both an overarching idea and a hands-on approach for improving a neighborhood, city, or region, Placemaking inspires people to collectively reimagine and reinvent public spaces as the heart of every community [...] and to see anew the potential of parks, downtowns, waterfronts, plazas, neighborhoods, streets, markets, campuses and public buildings." [3]

Placemaking pop-up project; Source: Congress for the New Urbanism.

Placemaking often involves the addition of art to public spaces through the addition of textures or paint to intersections and crosswalks and through the installation of public art, seating, and lighting. Placemaking can help to draw people to an intersection or district and increase the pedestrian activity of an area. Increasing the liveliness of Palm Beach County's streets and intersections is one measure to increase the profile of walking as a transportation mode.

Placemaking through intersection art in Portland, OR. Source: Project for Public Spaces.

3 https://www.pps.org/reference/what_is_placemaking/

5

Implementation and Actions

Implementation

Implementation of the design guidelines is crucial to improving transportation mobility, safety, and public health in Palm Beach County. The goals, guidelines, and design techniques presented herein are intended for incorporation into roadway design projects and as a supplement to the County's engineering standards. Projects already in design should be reviewed to incorporate the guidelines, techniques, and Complete Streets elements wherever feasible.

Adoption

MPO adoption of these guidelines is the first step in establishing Complete Streets as the guiding philosophy for roadway design in Palm Beach County. It is anticipated that municipal agencies will use these guidelines as a reference when designing roadways to incorporate Complete Streets elements. In addition, as public works manuals and street design standards are updated, agencies are encouraged to adopt and include Complete Streets elements as outlined in this document. Policies and objectives similar to those defined in these guidelines can be incorporated into the next comprehensive plan update to align the two documents. In addition, local municipalities are encouraged to adopt their own local Complete Streets Policies.

Regulatory Changes

Complete Streets design will be more easily facilitated as local policy documents are updated with regulations that reflect the best practices identified in these guidelines. Design elements and recommendations in this document have been developed from national best practices and documents and refined where necessary to meet local street design goals. In the interim, implementing parties can complete a variance process or request for experimentation, depending on the overseeing agency, to include the preferred Complete Streets solutions.

Quick Builds for Better Streets

Implementation can be facilitated using pop-up projects, demonstration projects, pilot projects, and interim design projects. These project delivery methods focus on temporary or semi-permanent improvements which can increase public support for projects. Cost-effective, reusable, temporary materials such as paint, moveable planters, flexpost traffic delineators, and flexible seating lower the barriers to quick and frequent implementation. These "quick build" delivery methods can also provide time for studying the efficacy of a Complete Streets project during a trial period in advance of a more permanent installation in the future.

Pop-up projects and demonstration projects often have a duration of a day, a weekend, or a week, and usually consist of highly temporary installations to showcase parklets, separated bicycle lanes, and other projects that repurpose roadway space into pedestrian space, bicycling space, landscaping, bus stops, and/or street furnishings. The short duration allows agency staff to be present throughout much of the pop-up's life to personally engage the community, gather feedback, and build support. If permanent installation is at the longest end of the spectrum, pop-up and demonstration projects would be at the shortest end of the spectrum in terms of time duration and cost as well.

Quick-build projects fall somewhere in the middle of the spectrum. Like permanent capital investment projects, quick-build projects are meant to be durable transportation improvements used by the public for months or even years. However, many other aspects of the projects are evolving, such as materials, process, and funding, to make them more amenable in the short-term. A quick-build project is typically led by a city or other local government, installed approximately within one year of the start of planning, planned and designed with the expectation that it may undergo change after installation, and built using materials that would allow such change. Quick-build projects can also be used for testing of a project such as evaluating the effects of a lane repurposing project on traffic flow and access.

Quick-build projects can be pilot projects or interim build projects. Pilot projects tend to be based more on the concept of testing a solution during a cost-effective quick-build implementation before deciding whether investment in a more permanent reconstruction is warranted. Interim build projects are used to provide the traveling public with the benefits of a project much earlier than otherwise would be available by waiting until the full reconstruction is funded, designed, and built. A good local example of a pilot project is the lane repurposing project on U.S. 1 in Delray Beach that was implemented first through flexible curbing and traffic delineator poles well in advance of the permanent reconstruction project that reduced the number of motor vehicle through lanes, provided continuous bicycle lanes, added landscaped traffic islands, and expanded bus stop areas.

Appropriate projects include larger pedestrian space reclamation projects such as removing an intersection slip lane, removing a through lane within a block, and separated bicycle lane projects. The increased duration requires materials that will last, such as roadway grade paint, flexible traffic delineators, temporary curbing products, and other street design elements that provide protection and separation while meeting durability requirements for roadway design. The longer evaluation period lends itself to data collection, such as motor vehicle, pedestrian, or bicycle volumes over the stretch of roadway undergoing the quick-build project, to enable a before and after comparison of the project's impacts on the roadway.

More information on quick-build projects can be found in Tactical Urbanism: Short-Term Action for Long-Term Change by Mike Lydon and Anthony Garcia, and Quick Builds for Better Streets: A New Project Delivery Model for U.S. Cities published by People for Bikes.

Design Exceptions and Experimentation

Design exceptions are required when a project feature would require one of the Florida Greenbook's thirteen controlling criteria to be not met. For roadway features whose implementation would require a modification from controlling criteria found in the Florida Greenbook, there is a design exception process found in Chapter 14 of the Florida Greenbook that outlines steps that a designer would need to take. Design exceptions would need to be recommended by the Professional Engineer responsible for design elements of the project and approved by the maintaining authority's designated representative with project oversight and compliance responsibilities. On a State Highway System roadway, the design exception would also need to be approved by the FDOT District Design Engineer (DDE).

Experimentation is an option available to local or State governments based on testing a new traffic control device not currently included in the Manual on Uniform Traffic Control Devices (MUTCD). There is a specific Request for Experimentation (RFE) process outlined in the MUTCD. The experimentation process has led to many effective traffic control devices eventually being approved for use on the nation's streets and roadways including shared lane markings ("sharrows"), pedestrian hybrid beacon (PHB) traffic signals, green color bicycle lanes, and rectangular rapid flashing beacon (RRFB) pedestrian crossing devices.

Design features included in the Palm Beach MPO Complete Streets Design Guidelines can generally be implemented without the need for design exceptions or experimentation. However, the need may arise on a case-by-case basis when working within severely limited right-of-way conditions if widths, cross-slopes, or other criteria cannot be met.

Other Plans

Streets in Palm Beach County can be the subject of multiple planning documents across multiple agencies and departments. The Complete Streets

approach is context-sensitive and supports all transportation modes; this approach can work with and accommodate existing plans for streets. As plans are reexamined and updated they should align their goals with the priorities set forth in this document.

Complete Streets Opportunities Map

This map is under development by MPO staff and is expected to be available in June 2017.

Refinement and Flexibility of Typologies

The typologies outlined in these guidelines are neither rigid nor permanent. As land use contexts change in Palm Beach County, and as street functions change with shifts in transportation technology, the identified typology definitions may need to be altered. There may be situations in which a street or land use does not neatly fit into one particular typology. Typologies are generalizations and thus the exercise of identifying the typology that fits should look at what is “best” rather than “perfect.”

Measuring Success

Measuring the success of any plan is an important component of the process of planning and implementation. Measures were identified to build upon the 5-Year Strategic Plan and Pedestrian and Bicycle Safety Study that the Palm Beach MPO has undertaken. Monitoring progress against targets allows for accountability and helps to inform future decisions surrounding Complete Streets implementation and the benefits that arise from these investments.

It is important that performance measures be documented prior to the commencement of projects to establish a baseline measure. Performance measures will likely be monitored by the implementing agency, whether that is the MPO or local municipalities.

Program:

- Number of municipalities adopting guidelines
- Requests for guidance in applying Complete Streets guidelines
- Mileage of protected bicycle lanes (separated bicycle lanes, buffered bicycle lanes) installed per year
- Increase in number of pedestrian count sites and total number of counted pedestrians
- Decrease in reported crashes where speed was a factor

Pedestrian and Bicycle Safety Study

- Reduce the number of pedestrian injuries, pedestrian fatalities, bicyclist injuries, bicyclist fatalities

5-Year Strategic Plan

- Facilitate pop-up/demonstration projects (2)
- Introduce innovative strategies (with partners) into already planned projects (10)

Other ideas to consider:

- Increase in assessed values of properties along Complete Streets projects
- Increase in number of street trees/stormwater filtration landscapes

Complete Street Policy Development

Adopting a Complete Streets Policy is an important step for local governments that formalizes the intent to change the way that transportation planning, design, and maintenance processes are undertaken. Policies provide the framework for communities to transition from automobile-based transportation planning to a more inclusive and multimodal process. The MPO’s Complete Streets Policy is provided in Chapter 1. In addition, Smart Growth America provides a range of resources for communities to use when planning for and developing a Complete Streets Policy.

https://smartgrowthamerica.org/program/national-complete-streets-coalition/policy-development/

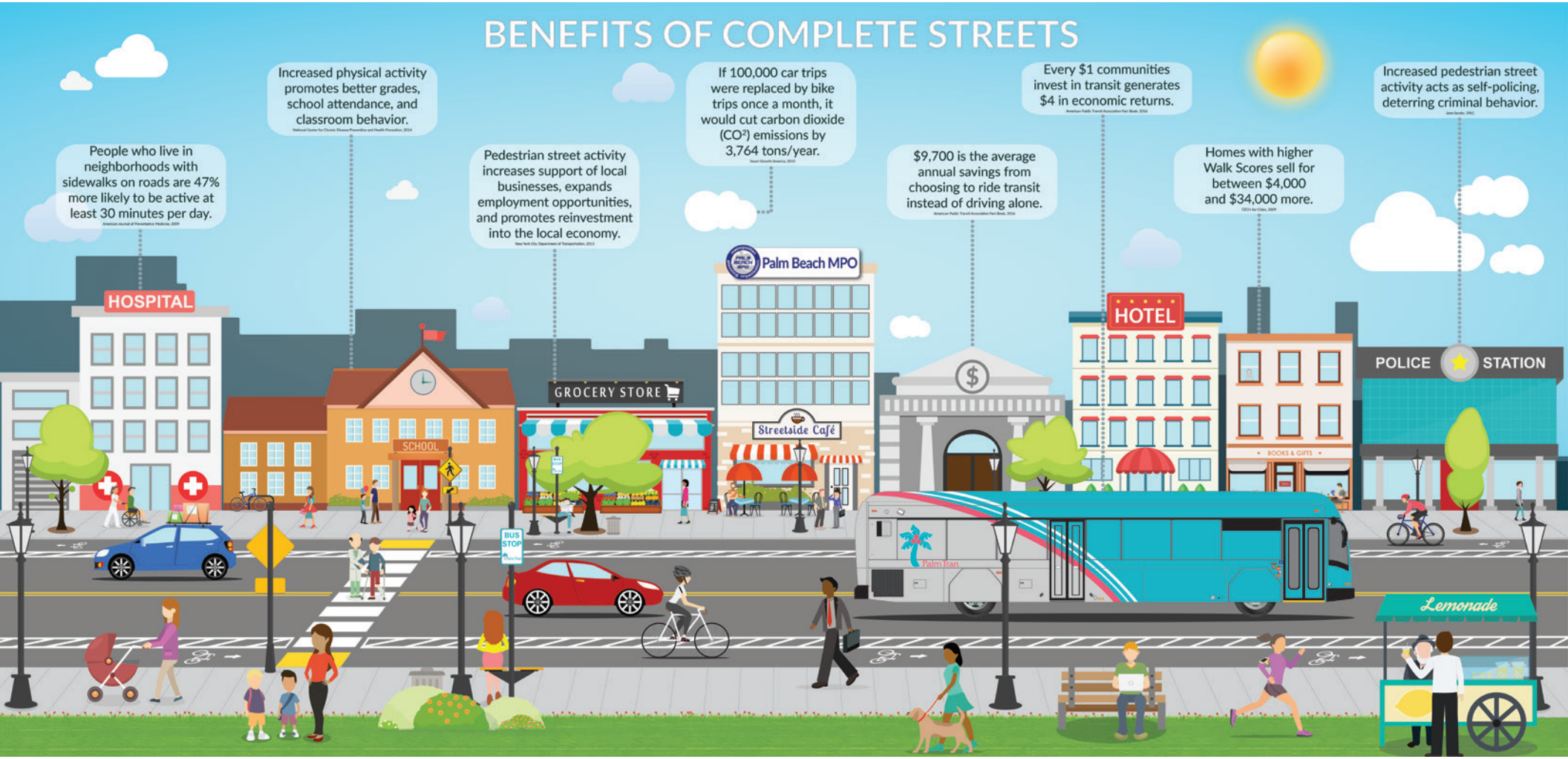
PLACEHOLDER FOR COMPLETE STREETS OPPORTUNITIES MAP

Index


BIKE LANE
STATE LAW

INDEX WILL BE PREPARED FOR FINAL DRAFT


DAVE'S
RESORT & RAW BAR
ARTISANS
IMPORTS


BENEFITS OF COMPLETE STREETS
People who live in neighborhoods with sidewalks on roads are 47% more likely to be active at least 30 minutes per day.
American Journal of Preventative Medicine, 2009
Increased physical activity promotes better grades, school attendance, and classroom behavior.
National Center for Chronic Disease Prevention and Health Promotion, 2014
Pedestrian street activity increases support of local businesses, expands employment opportunities, and promotes reinvestment into the local economy.
New York City Department of Transportation, 2013
If 100,000 car trips were replaced by bike trips once a month, it would cut carbon dioxide (CO^2) emissions by 3,764 tons/year.
Smart Growth America, 2015
$9,700 is the average annual savings from choosing to ride transit instead of driving alone.
American Public Transit Association Fact Book, 2016
Every $1 communities invest in transit generates $4 in economic returns.
American Public Transit Association Fact Book, 2016
Homes with higher Walk Scores sell for between $4,000 and $34,000 more.
CEOs for Cities, 2009
Increased pedestrian street activity acts as self-policing, deterring criminal behavior.
Jane Jacobs, 1961
HOSPITAL
SCHOOL
GROCERY STORE
Palm Beach MPO
Streetside Café
HOTEL
BOOKS & GIFTS
POLICE STATION
BUS STOP
Palm Tran
Lemonade