KITTELSON & ASSOCIATES

Infrastructure Needs Assessment

Identifying recommendations for a connected, multimodal transportation network within the planning area.

MULTIMODAL COMMUNITY PLANNING STUDY

NEXT STOP FORT LAUDERDALE

Advancing the Vision

September 2019

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MEMORANDUM

Date:	November 4, 2019	Project #: 22317.9
To:	Karen Warfel Transportation and Mobility Department City of Fort Lauderdale 290 N.E. 3rd Avenue Fort Lauderdale, FL 33301	
From:	Mary Raulerson, Fabian De La Espriella and Caitlin Tobin Kittelson & Associates, Inc. Transportation Engineering / Planning 200 SW 1st Avenue, Suite 1070 Fort Lauderdale, FL 33301	
Project:	Fort Lauderdale TOD Program	
Subject:	Infrastructure Needs Assessment Tech Memorandum	

INTRODUCTION

The purpose of the Next Stop Fort Lauderdale planning study is to advance the City's vision. The Fast Forward Fort Lauderdale Vision Plan 2035 states that neighbors want a multimodal community where people have a choice to get around by car, transit, bicycle or walking. Creating a safe and walkable city was identified as a top ranked priority in the plan. This project is exploring mechanisms that the City can use to foster a walkable, connected and livable environment to enhance the quality of life in our community.

In order to provide recommendations to create a connected, multimodal network within the planning area, the Kittelson team worked with City of Fort Lauderdale staff to apply a methodology that evaluates the baseline bicycle and pedestrian conditions in the system and identifies the modal priority for streets. To meet this goal, the following steps were completed:

- Bicycle Level of Traffic Stress (LTS) Assessment
- Bicycle Intersection Level of Comfort Evaluation
- Pedestrian Use Assessment
- Developed a multi-modal decision-making framework to assign a modal priority to every street in the network based on the bicycle LTS scores and pedestrian use classifications.
- Modal priority map - every street within the planning area is assigned a primary mode priority and a secondary mode priority
- Bicycle priority corridors map

Further details regarding the methodology of each of the analysis is provided in the methodology memo and the network comfort assessment memo. This document summarizes the infrastructure needs assessment and provides recommendations for consideration.

METHODOLOGY

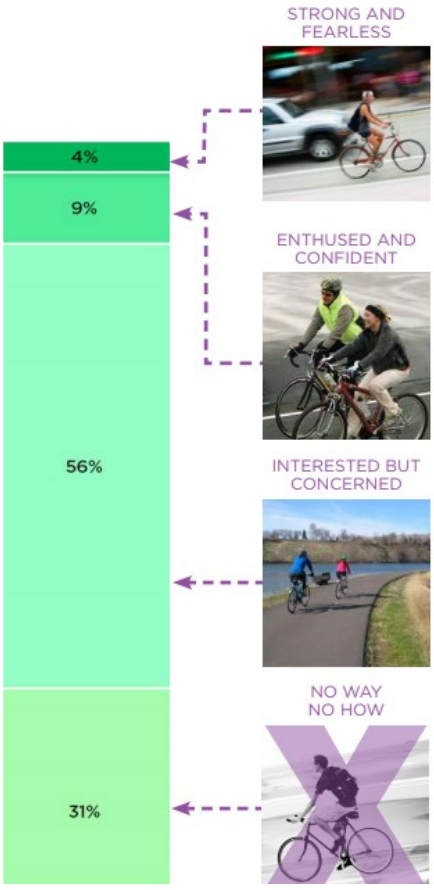
The baseline analysis and modal priority map was used to identify infrastructure needs for the pedestrian and bicycle network across the Study area. The facility type and design significantly impacts a pedestrian and bicyclist's comfort and whether they decide to travel by walking or biking. A key outcome of this assessment is to not only to identify infrastructure needs, but to identify solutions that are appropriate for the street context.

Bicycle Infrastructure Needs

As previously described in the Methodology memo, there are generally four types of bicyclists: Strong & Fearless, Enthused & Confident, interested but Concerned and No Way, No How. The majority of people fall into the "Interested but Concerned" category, which includes a wide range of people of all ages who enjoy cycling, but may only ride on shared use paths, low traffic local streets, or protected on-street facilities. In order to make biking appealing to the largest portion of the population, the bicycle network must not only be complete but the appropriate bike facilities must be selected for streets that are critical to the network.

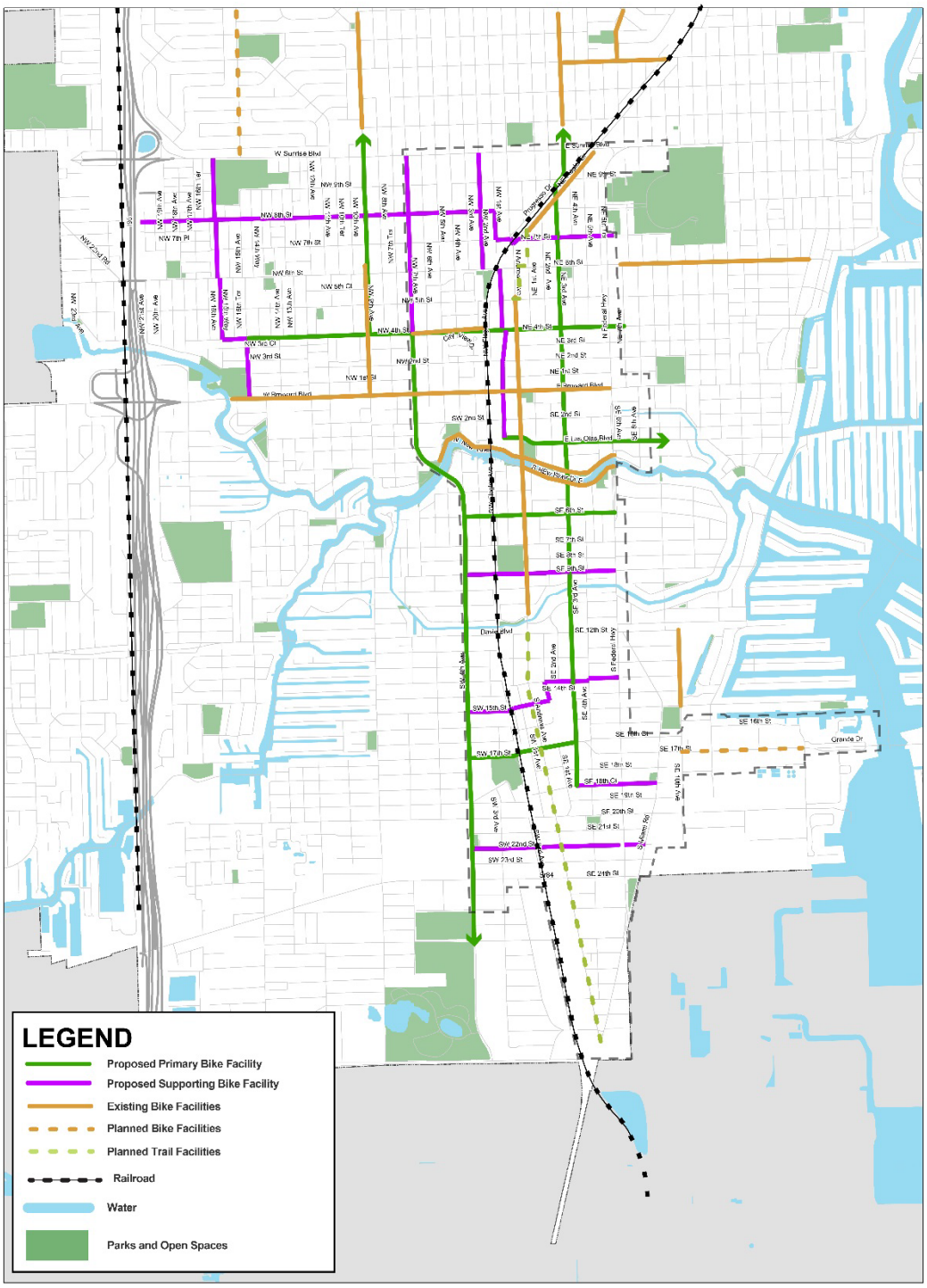
Identifying the bicycle infrastructure needs included a two-part process. The first part included leveraging the LTS and low stress Island analysis to identify critical corridors. Once LTS scores are identified for all roads in the network, LTS can be used to identify the ideal location(s) for adding or upgrading bike facilities. This is thought of as "unlocking" or "interconnecting" the low-stress system by identifying and overcoming the barriers to a complete network of facilities.

Figure 1 shows a map of the critical bicycle corridors. The Baseline Network Comfort Assessment Memo provides additional details on the development of this map.



Source: Jennifer Dill and Nathan McNeil. "Four Types of Cyclists? Testing a Typology to Better Understand Bicycling Behavior and Potential." Portland State University OTREC. August 2012.

Figure 1. Critical Bicycle Network



In the second part, a bicycle facility selection tool was used to identify the appropriate facility needed to make the street low stress. This process and outcomes are further explained in the following sections.

Bicycle Infrastructure Selection

It is generally accepted that less-experienced and risk-averse bicyclists account for most of the population. These bicyclists need to be connected via bike facilities/streets that are LTS 1 or 2 for the entirety of their trip. This makes it crucial to create connected networks AND to select and build a well-designed facility that meets the needs of these riders. In general terms, this user group prefers:

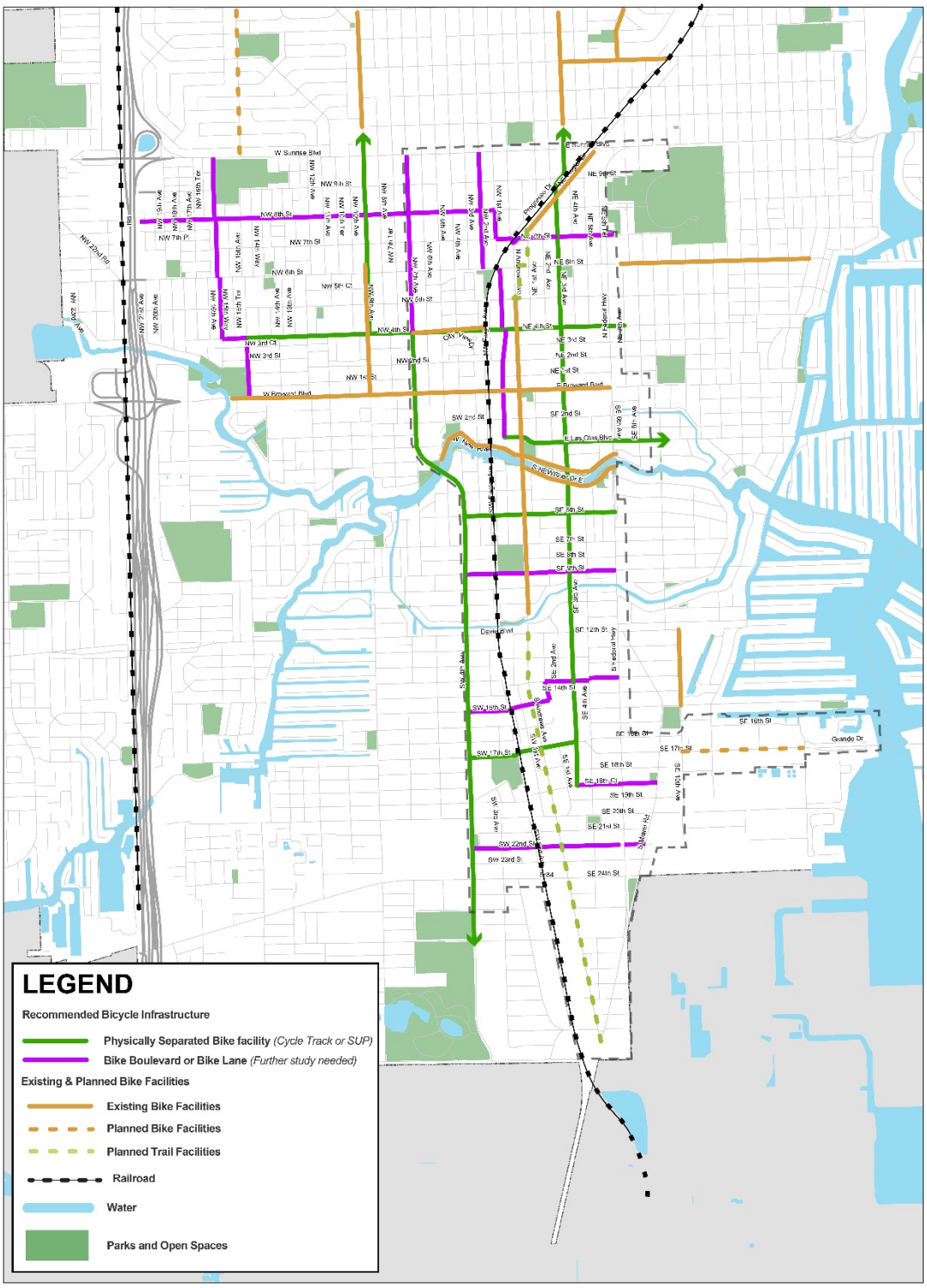
- Physically separated facilities such as protected bike lanes and trails
- Wide, preferably buffered bike lanes on medium to low speed and low volume streets, adjacent to the curb (not a parking lane)
- Bike boulevard treatments on low-stress neighborhood streets

If a street is an LTS 3 or 4, the street will require a bicycle facility with physical separation from traffic in order for it to be a low stress corridor. If a street is an LTS 1 or 2, bike boulevards with traffic calming treatments or curb side bike lanes may be sufficient to create a low stress experience. This approach was applied to the critical corridors to identify the bike facility necessary for the street to be considered part of the low stress network. This resulted in a recommendation for a protected bike lane network and a supporting network of bicycle boulevards and bike lanes.

The protected bike lane network serves as the bike network “spine”, providing a few key, direct bicycle connections that are separated throughout the study area. The supporting bicycle facility network are typically bicycle boulevards, bike lanes and buffered bike lanes. These are facilities that support the protected bike lane network by directing bicyclists to the protected network. These facilities are important because they maximize the use and value of a separated bike lane.

Figure 2 provides a map of the protected bike lane network and the supporting bicycle facility network.

Figure 2. Bicycle Infrastructure Recommendations



Pedestrian Infrastructure Needs

The type of pedestrian infrastructure needed on a street can vary based on the context of the street and the anticipated volume and type of pedestrian activity. In some places, there are high volumes of pedestrians who are walking side by side, while in others the pedestrian activity may be lower. There are also streets that incentivize pedestrians to gather in key areas (such as bus stops) or where sidewalk space is used for non-walking activities, such as sidewalk dining and landscape or art.

To identify the infrastructure needs for pedestrians, each street was assigned a pedestrian use and the key design elements were identified for each of the pedestrian uses. The infrastructure needs vary based on the pedestrian behavior and anticipated pedestrian experience.

The below matrix outlines key sidewalk elements for each pedestrian use category designation. This includes elements that impact the pedestrian experience such as cross-sectional elements (sidewalk width, buffer width etc.), building setbacks and street elements such as bus shelters and shading.

Figure 3. Pedestrian Use Criteria Table

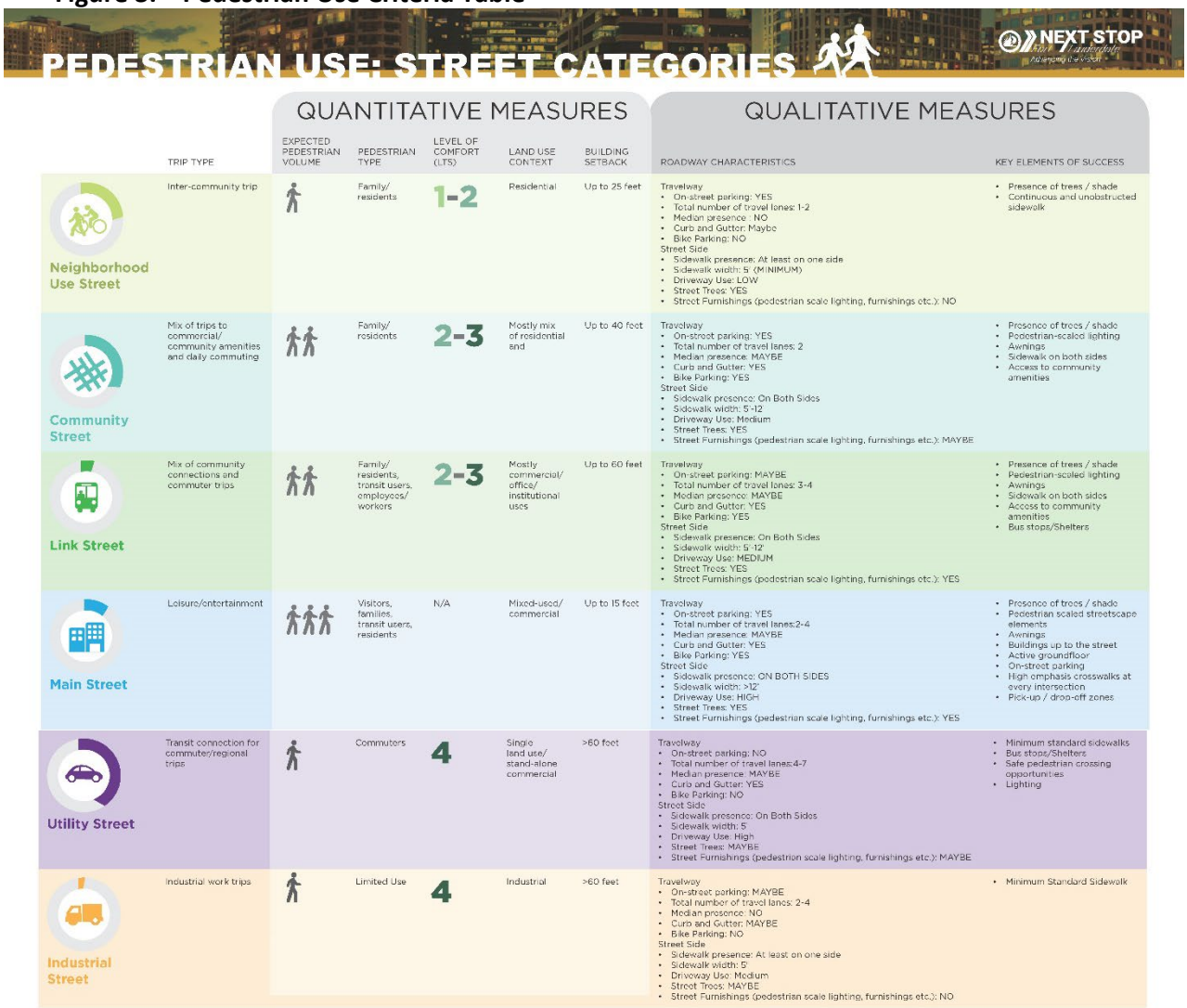


Figure 4. Pedestrian Use Map

Pedestrian System Infrastructure Needs

While specific infrastructure needs are needed on each corridor to meet the pedestrian's function for the corridor, there are also changes that can be implemented throughout the system to create a network that is safer and more comfortable for pedestrians. This includes the following recommendations to be implemented throughout the network, unless otherwise specified.

- **Provide same-side-of street pedestrian accommodation for pedestrians during construction.** The City regularly experiences construction that impacts the sidewalk, whether it is building construction or in street construction. In many cases, this can lead to pedestrian detours that can substantially impact pedestrian's mobility through the network. Also, since pedestrians are a slower mode of transportation, out of direction travel significantly contributes to pedestrian delay. It is recommended the City implements a policy that requires same-side of the street accommodations for pedestrians, with exceptions only when the safety of pedestrians cannot be met on the same side of street. However, all options should be exhausted, such as lane closures and overhead protection, before a pedestrian detour is implemented.

- **Implement Leading Pedestrian Intervals (LPI) at every intersection in the core downtown area.** In core downtown areas, the network tends to experience a lot of turning traffic at intersections and substantial pedestrian traffic as well. LPI's provide a 3 to 4 second head start at the beginning of each phase for pedestrians to enter the crosswalk and begin crossing before right turns and permissive lefts are given a green light. This allows pedestrians a chance to enter the crosswalk and become visible for drivers before turning traffic can begin. It is recommended that LPIs are implemented throughout the signalized intersections within the core downtown area mapped out in Figure 5. The implementation of the LPI's is prioritized into three tiers:

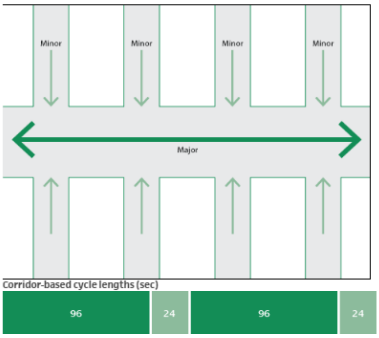
    - **Tier 1:** Signalized intersections within the Downtown Regional Activity Center boundary and on a corridor with a pedestrian modal priority.
    - **Tier 2:** Signalized intersections outside the Downtown Regional Activity Center boundary and on a pedestrian modal priority street.
    - **Tier 3:** All other remaining signals in the downtown area.

- **Implement mid-block crossings.** Frequent and safe opportunities to cross the street is imperative to developing a pedestrian network that is safe and comfortable. Mid-block crossings should be implemented where the block lengths exceed 800 feet or where two pedestrian generators are located mid midblock and across the street from each other. This reduces jay-walking and makes pedestrians more visible when crossing the street between signals.

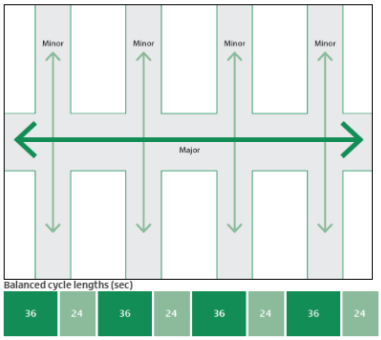
- **Upgrade crosswalks to be a minimum of 10-feet wide with high-visibility zebra striping.** The MUTCD only require 6-foot crosswalks, but in many cases, a 10-foot crosswalk with high-visibility striping enhances pedestrian visibility. As part of projects or routine matrix, the City should move towards adopting a minimum crosswalk width of 10-feet and implementing high visibility crosswalks.

- **Reduce cycle lengths in the core downtown area.** Historically, signal timing along major corridors have been designed to provide substantial green time to the main line, while the side street has a fraction of the green time. This presents less frequent opportunities to cross the street and increases pedestrian delay at intersections. Pedestrians frequently cross the street during a gap out of frustration before receiving the WALK signal. Motorist also have a propensity to avoid the minor streets, increasing congestion on the main street. In the balanced scenario, the signals are re-timed with 60-second cycle lengths. This increased turnover increases pedestrian compliance and improves operations on the minor streets (Urban Streets Design Guide, NACTO). The core downtown area has cycle lengths as high as 120 seconds. Further traffic analysis should be conducted to retime the signals to 60 to 90 second cycle lengths.

CORRIDOR-BASED SIGNAL TIMING WITH LONGER CYCLES

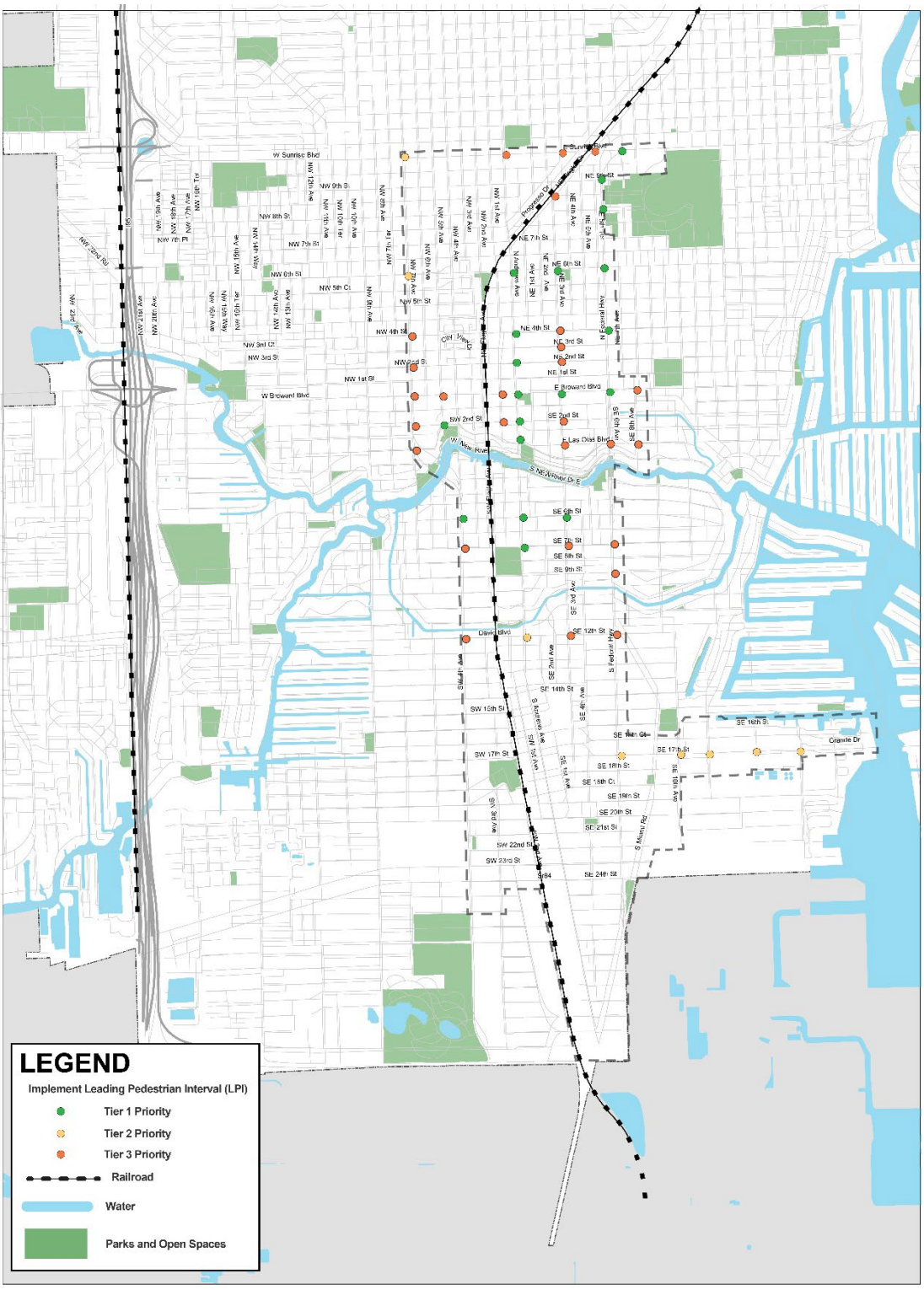


BALANCED SIGNAL TIMING WITH SHORTER CYCLES



Source: NACTO Urban Streets Design Guide

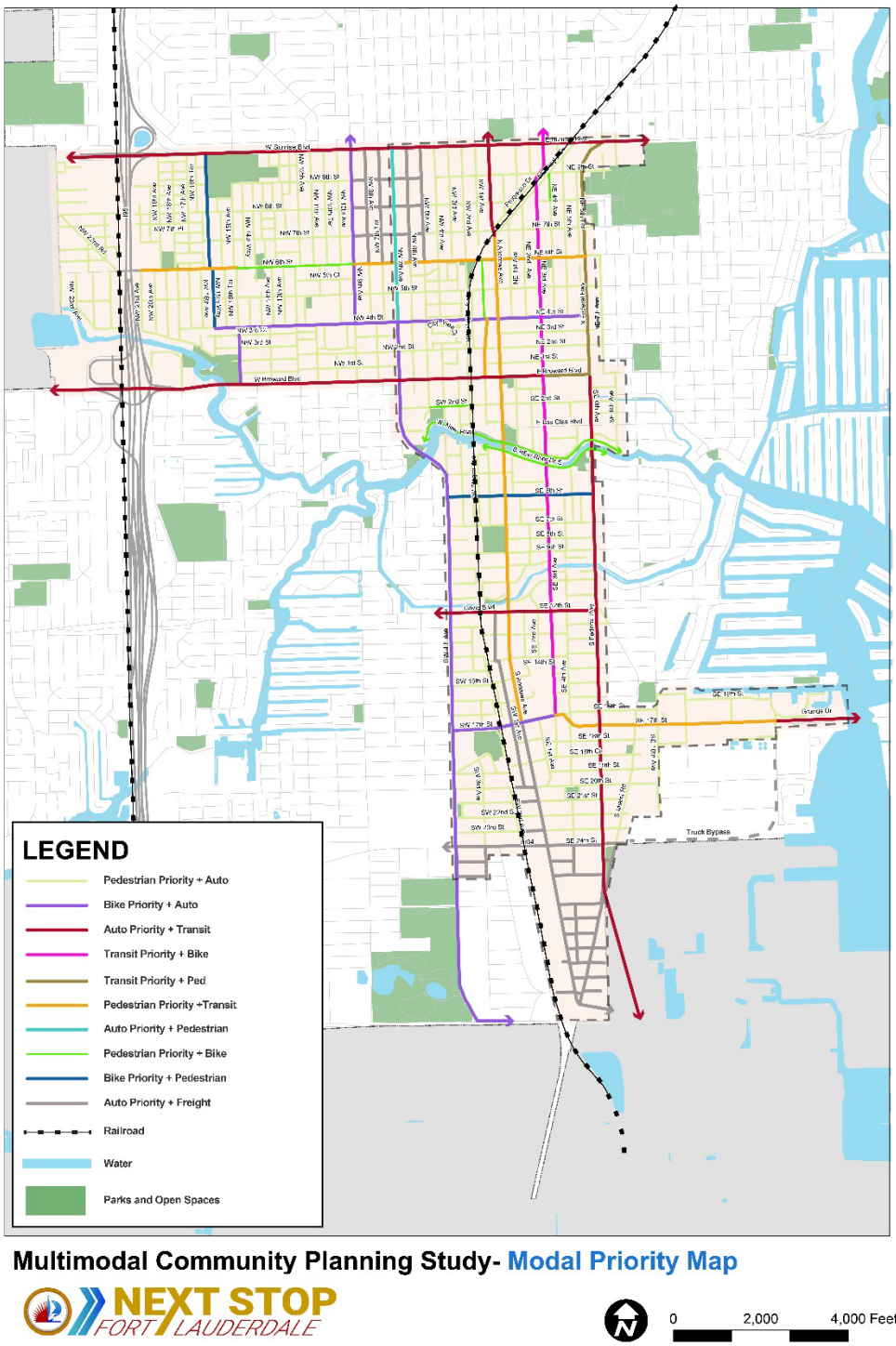
Figure 5. Recommended Intersections for Leading Pedestrian Intervals (LPIs)



Modal Priority Map

Based on the Baseline Network Comfort Assessment and existing planning/transit initiatives, the project team held an internal workshop to develop a Modal Priority Map. In the map, every street within the planning area was assigned a primary mode priority and a secondary mode priority based on the data. The final Modal Priority Map is provided in Figure 6.

Figure 6. Modal Priority Map



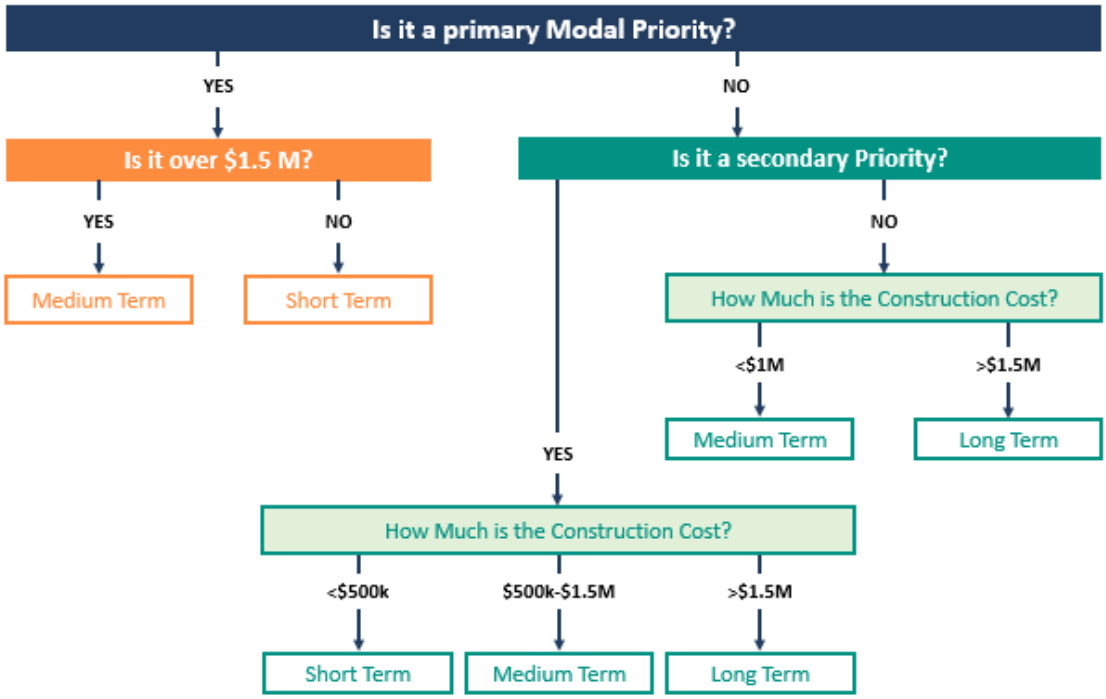
Infrastructure Recommendations

The Modal Priority Map provides a vision for how modes will be prioritized on streets and move around the network. This vision was used to identify existing and programmed infrastructure that could be leveraged as well as identify infrastructure needs to fill deficiencies in the network.

Connecting the Blocks (CTB) Screening

The City had previously conducted a Connecting the Blocks planning study to identify projects that would fill in pedestrian and bicycle gaps. The project team conducted a screening of the built, planned and programmed projects in the CTB that were within the study boundary of the MCPS. Historical City Community Investment Plans (CIPs) was also reviewed to assess the CTB's implementation strategies. The CTB Program is institutionalized throughout the Fiscal Year (FY) 2016 to FY 2020 CIPs, including a Citywide list of 269 projects. Of those projects, 97 are within the MCPS study boundary, including the Jeff Speck Central Mobility Study projects.

The planned and programmed projects were re-prioritized into short, medium, and long-term proposals. The process of prioritization was performed using cost and modal priorities as factors as shown on the graphic below.



CTB Pedestrian, Bicycle & Transit Hub Projects

The following maps prioritize the CTB projects that are consistent with the modal priority maps short, medium- and long-term priorities. Short term projects are high-priority projects that are recommended for implementation in the next 3 to 5 years. Projects with a medium priority are recommended for implementation in the next 5 to 10 years and long-term projects may take more than 10 years for implementation. Figure 6 through Figure 8 provide maps of the projects that are consistent with the

Modal Priority map recommendations. Tables 1 through 8, provide details on the projects and indicate whether the project is a short, medium- or long-term project.

Figure 7. Connecting the Blocks Screening - Pedestrian Projects Map

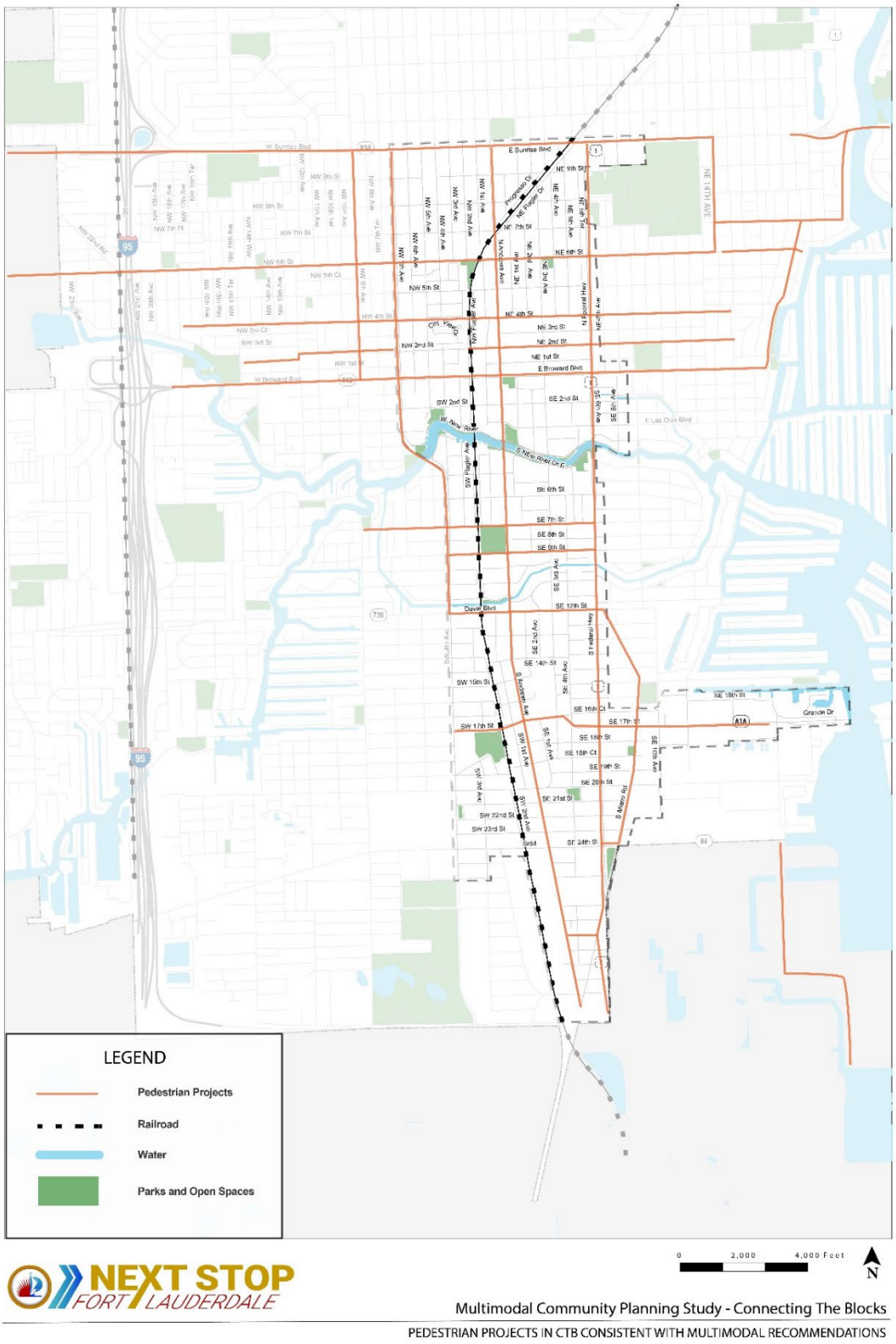


Table 1. CTB Short and Medium Term Pedestrian Projects, 2019

Roadway	From	To	Treatment	Length (Miles)	Construction Cost Estimate	Priority
BROWARD BLVD	SR-5/US-1	NE/SE 15TH AVE	ADD PEDESTRIAN-ORIENTED LIGHTING. ENHANCE EXISTING PEDESTRIAN CROSSING.	0.5	$342,000	Short
MIAMI RD	SE 12TH ST	SE 17TH ST	COMPLETE SIDEWALKS ON 2 SIDES. ADD SIDEWALK BUFFERS, PEDESTRIAN-ORIENTED LIGHTING AND SHADE.	0.5	$365,000	Short
MIAMI RD	SE 17TH ST	SE 24TH ST/ SR 84	COMPLETE SIDEWALKS ON 2 SIDES. ADD SIDEWALK BUFFERS, PEDESTRIAN-ORIENTED LIGHTING AND SHADE.	0.5	$353,000	Short
NW 2ND ST	NW 11TH AVE	NW 15TH AVE	COMPLETE SIDEWALKS ON 2 SIDES. ADD PEDESTRIAN-ORIENTED LIGHTING AND SHADE.	0.4	$299,000	Short
NW 2ND ST	NW 7TH AVE	NW 11TH AVE	COMPLETE SIDEWALKS ON 2 SIDES. ADD PEDESTRIAN-ORIENTED LIGHTING AND SHADE.	0.4	$299,000	Short
NW/NE 2ND ST	US 1/ SR 5/ FEDERAL HIGHWAY	NW 7TH AVE	NARROW AUTO LANES TO CREATE SIDEWALK BUFFERS AND ADD PEDESTRIAN-ORIENTED LIGHTING.	0.8	$613,300	Short
NE 6TH ST	NE 14TH AVE	US 1/ SR 5/ FEDERAL HIGHWAY	COMPLETE SIDEWALKS ON 2 SIDES. ADD PEDESTRIAN-ORIENTED LIGHTING AND SHADE.	0.5	$423,250	Short
NE/NW 6TH ST	NW 7TH AVE	US 1/ SR 5/ FEDERAL HIGHWAY	WEST OF ANDREWS AVE, FILL SIDEWALK GAPS.	0.8	$91,200	Short
NW 7TH AVE	SUNRISE BLVD/SR 838	NW 6TH ST/SISTRUNK	IMPLEMENT LANE DIET TO CREATE SPACE FOR WIDER SIDEWALK BUFFERS AND BUS SHELTER PADS. ADD PEDESTRIAN-ORIENTED LIGHTING AND SHADE.	0.5	$371,250	Short
NW 7TH AVE	NW 6TH ST/SISTRUNK	BROWARD BLVD	IMPLEMENT LANE DIET TO CREATE SPACE FOR WIDER SIDEWALK BUFFERS AND BUS SHELTER PADS. ADD PEDESTRIAN-ORIENTED LIGHTING AND SHADE.	0.5	$315,900	Short

Roadway	From	To	Treatment	Length (Miles)	Construction Cost Estimate	Priority
SE 3RD AVE	DAVIE BLVD	SE 17TH ST	ADD PED-ORIENTED LIGHTING. ADD SHADE. ADD SIDEWALK BUFFER SOUTH OF SE 16TH ST. BY NARROWING SIDEWALK. ENHANCE PED CROSSING.	0.5	$384,100	Short
ANDREWS AVE	SR 84/SW 24TH ST	US 1/ SE 6TH AVE	ADD BUFFER TO SIDEWALK, PEDESTRIAN-ORIENTED LIGHTING AND SHADE. ENHANCE EXISTING PEDESTRIAN CROSSINGS.	0.7	$877,000	Short
NE 6TH ST	NE 3RD AVE	US 1/ SR 5/ FEDERAL HIGHWAY	COMPLETE PEDESTRIAN CONNECTIONS INCLUDING EXISTING CROSSWALKS	0.2	$214,000	Short
SW 7TH ST	US 1	SW 4TH ST	COMPLETE SIDEWALKS ON 2 SIDES. ADD PEDESTRIAN-ORIENTED LIGHTING AND SHADE.	1	$775,000	Short
SW 9TH ST	US 1	SW 4TH AVE	COMPLETE SIDEWALKS ON 2 SIDES. ADD PEDESTRIAN-ORIENTED LIGHTING AND SHADE.	1	$848,000	Short

Table 2. CTB Long Term Pedestrian Projects, 2019

Roadway	From	To	Treatment	Length (Miles)	Construction Cost Estimate	Priority
ANDREWS AVE	SE/SW 9TH ST	SW 17TH STREET	ADD BUFFER TO SIDEWALK. ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE. ENHANCE PEDESTRIAN CROSSINGS.	1.3	$1,562,000	Long
ANDREWS AVE	SUNRISE BLVD	NE 7TH ST	ADD BUFFER TO SIDEWALK. ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE. ENHANCE PEDESTRIAN CROSSINGS.	1.8	$2,057,000	Long
BROWARD BLVD	NW 7TH AVE	SR 5/ US1	IMPLEMENT LANE DIET TO CREATE SIDEWALK BUFFERS. ADD PEDESTRIAN-ORIENTED LIGHTING AND SHADE.	0.8	$638,550	Long
DAVIE BLVD	SW 4TH AVE	US 1/ SR 5/ FEDERAL HIGHWAY	ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE.	0.6	$403,000	Long
NE 3RD/4TH AVE	SR 838/ SUNRISE BLVD	NE 6TH ST / SISTRUNK BLVD	COMPLETE SIDEWALKS ON 2 SIDES. ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE.	0.5	$273,600	Long

Roadway	From	To	Treatment	Length (Miles)	Construction Cost Estimate	Priority
NW/NE 4TH ST	US 1/ SR 5/ FEDERAL HIGHWAY	NW 7TH AVE	COMPLETE SIDEWALKS ON 2 SIDES. ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE.	0.8	$642,000	Long
US 1	SE 24TH ST / SR 84	I-595	NARROW AUTO LANES AND IMPLEMENT LANE/ROAD DIET TO EXTEND SIDEWALK BUFFERS. ADD PEDESTRIAN-ORIENTED LIGHTING. LPIS. ADD SHADE. ENHANCE 1 PEDESTRIAN CROSSING.	0.8	$710,550	Long
SE 30TH ST	US 1	ANDREWS AVE	ADD SIDEWALKS ON 2 SIDES. ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE.	0.2	$116,050	Long
SW 4TH AVE	BROWARD BLVD	DAVIE BLVD	ADD PEDESTRIAN-SCALE LIGHTING. ADD SHADE.	1.1	$733,700	Long
US 1	DAVIE BLVD	SR 84	NARROW AUTO LANES AND IMPLEMENT LANE/ ROAD DIET TO EXTEND SIDEWALK BUFFERS. ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE. LPIS. ENHANCE PEDESTRIAN CROSSINGS.	1	$931,050	Long
US 1	BROWARD BLVD	DAVIE BLVD	NARROW AUTO LANES AND IMPLEMENT LANE/ ROAD DIET TO EXTEND SIDEWALK BUFFERS. ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE. LPIS. ENHANCE PEDESTRIAN CROSSINGS.	1	$931,050	Long
US 1	NE 6TH ST	BROWARD BLVD	NARROW AUTO LANES AND IMPLEMENT LANE/ ROAD DIET TO EXTEND SIDEWALK BUFFERS. ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE. ENHANCE PEDESTRIAN CROSSINGS. ADD LPI SIGNALS.	0.5	$544,950	Long
SUNRISE BLVD	US 1	NW 24TH AVE	NARROW AUTO LANES/MEDIAN AND IMPLEMENT LANE/ ROAD DIET TO CREATE SIDEWALK BUFFERS AND SPACE FOR BUS SHELTER PADS. ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE.	1.9	$2,336,800	Long

Roadway	From	To	Treatment	Length (Miles)	Construction Cost Estimate	Priority
			ENHANCE PEDESTRIAN CROSSINGS.			
US 1	NE 15TH AVE	NE 6TH ST	NARROW AUTO LANES AND IMPLEMENT LANE/ ROAD DIET TO EXTEND SIDEWALK BUFFERS. ADD PEDESTRIAN-ORIENTED LIGHTING. ADD SHADE. LPIS.	0.9	$772,200	Long

Figure 8. Connecting the Blocks Screening – Bicycle Projects Map

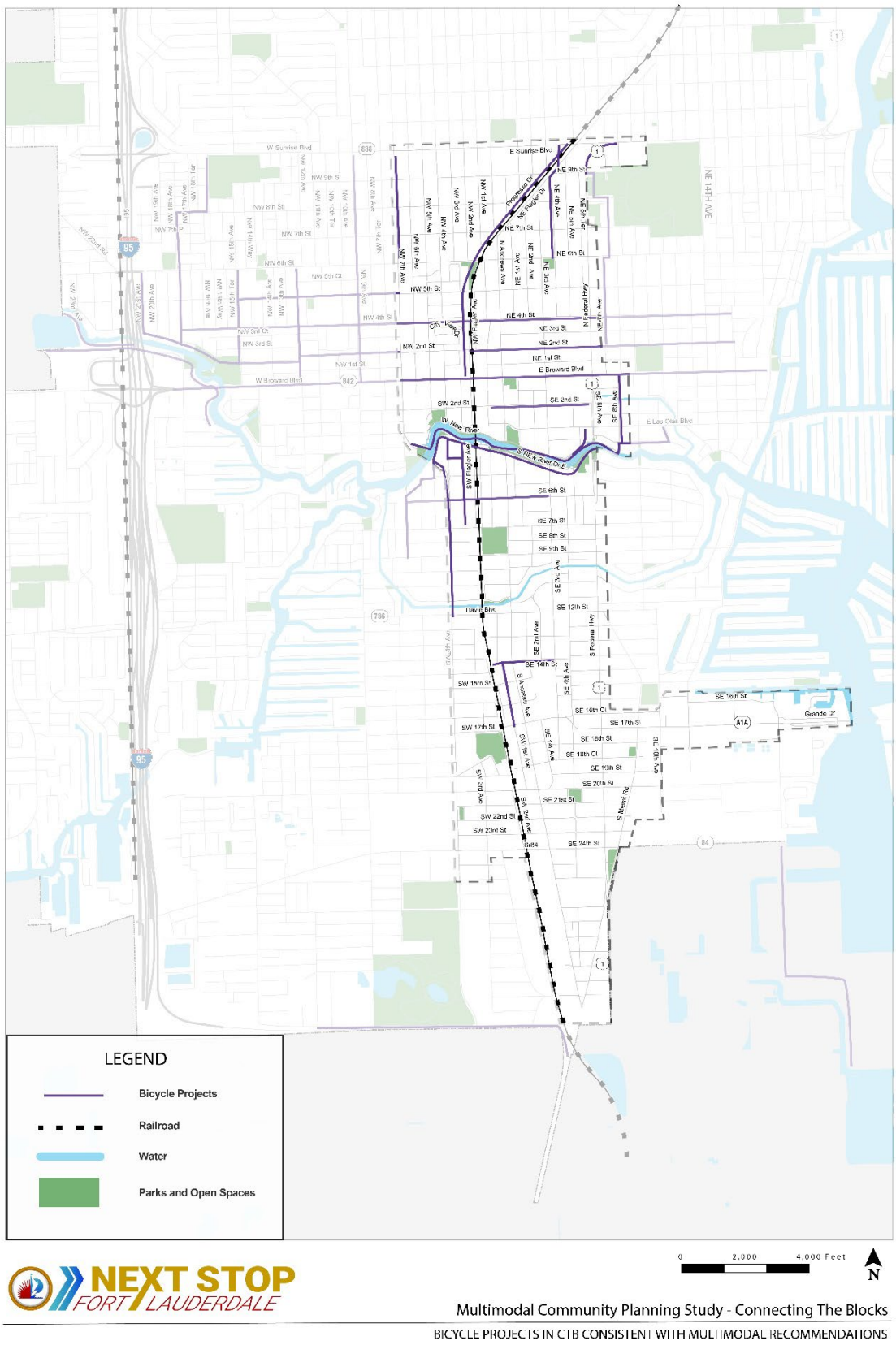


Table 3. Short Term Bicycle Projects, 2019

Roadway	From	To	Treatment	Length (Miles)	Construction Cost Estimate	Priority
BROWARD BLVD	SR-5/US-1	NE/SE 15TH AVE	BIKE ACCOMMODATIONS AS APPROPRIATE	1	$144,000.00	Short
NW/NE 2ND ST	US 1/ SR 5/ FEDERAL HIGHWAY	NW 7TH AVE	ADD SHARROWS AND SHARED LANE SIGNAGE AS PART OF A LANE/ROAD DIET. ADD PARKING WHERE APPROPRIATE	0.8	$483,700.00	Short
NW 7TH AVE	SUNRISE BLVD/SR 838	NW 6TH ST/SISTRUNK	IMPLEMENT LANE/ ROAD DIET TO CREATE 5' BIKE LANES.	0.5	$303,750.00	Short
SW/SE 2ND ST	US 1	BRICKELL AVE	ADD SHARROWS AND SHARED-LANE SIGNAGE.	0.5	$17,000.00	Short
US 1	NE 6TH ST	BROWARD BLVD	CONTINUE MULTI-USE PATH NORTH AND SOUTH WITH FUTURE REDEVELOPMENT.	0.5	$328,050.00	Short
NE 6TH TER	NE 8TH ST	NE 6TH ST	SECONDARY ROAD BIKE ACCOMODATIONS	0.1	$31,680.00	Short
NE 7TH ST	NE FLAGLER DR	NE 7TH ST	SECONDARY ROAD BIKE ACCOMODATIONS	0.8	$253,440.00	Short
SW 6TH ST	SW 7TH AVE	US 1	SECONDARY ROAD BIKE ACCOMODATIONS	0.6	$190,080.00	Short

Table 4. Medium Term Bicycle Projects, 2019

Roadway	From	To	Treatment	Length (Miles)	Construction Cost Estimate	Priority
SW 4TH AVE	BROWARD BLVD	DAVIE BLVD	IMPLEMENT SEPARATED BIKE LANE	1	$750,000	Medium
SE 14TH CT	ANDREWS AVE	SW 14TH ST	SECONDARY ROAD BIKE ACCOMODATIONS	0.5	$95,040.00	Medium
SW 1ST AVE	SW 14TH ST	SE 3RD AVE	SECONDARY ROAD BIKE ACCOMODATIONS	1	$95,040.00	Medium
FLAGLER GREENWAY PHASE 2	ANDREWS BLVD	BROWARD BLVD	EXTEND THE EXISTING FLAGLER GREENWAY	0.6	$2,000,000.00	Medium

Table 5. Long Term Bicycle Projects, 2019

Roadway	From	To	Treatment	Length (Miles)	Construction Cost Estimate	Priority
BROWARD BLVD	NW 7TH AVE	SR 5/ US1	CONVERT BIKE SHOULDERS TO BIKE LANES AS PART OF ROAD DIET.	0.8	$522,450.00	Long
NE 3RD/4TH AVE	SR 838/ SUNRISE BLVD	NE 6TH ST / SISTRUNK BLVD	NARROW AUTO LANES TO CREATE BIKE LANE	0.5	$273,600.00	Long
NW 9TH AVE	SUNRISE BLVD	NW 6TH ST	STRIPE 11' AUTO LANES AND WIDEN PAVED AREA AS NEEDED TO CREATE BIKE LANES.	0.5	$273,600.00	Long
SE 3RD AVE	DAVIE BLVD	SE 17TH ST	REMOVE MEDIAN TO CREATE BIKE LANE	0.5	$252,900.00	Long
SW/SE 17TH ST	US 1/SR 5	US 1/SR 5	IMPLEMENT LANE/ ROAD DIET TO CREATE BUFFERED BIKE LANES.	0.7	$347,400.00	Long
NW 18TH AVE/ST & NW 16TH AVE	W SUNRISE BLVD	NW 9TH AVE	SECONDARY ROAD BIKE ACCOMODATIONS	0.6	$190,080.00	Long
N NEW RIVER PATH	SW 7TH AVE	SE 17TH AVE	CONSTRUCT SEPERATED BIKE LANE	1.4	$ 1,050,000	Long
PROGRESSO DR GREENWAY	NE 4TH ST	SUNRISE BLVD	DESIGN AND CONSTRUCT 12' MULTIUSE GREENWAY ALONG PROGRESSO DR	0.9	$6,000,000.00	Long

Figure 9. Connecting the Blocks Screening – Transit Hub Projects Map

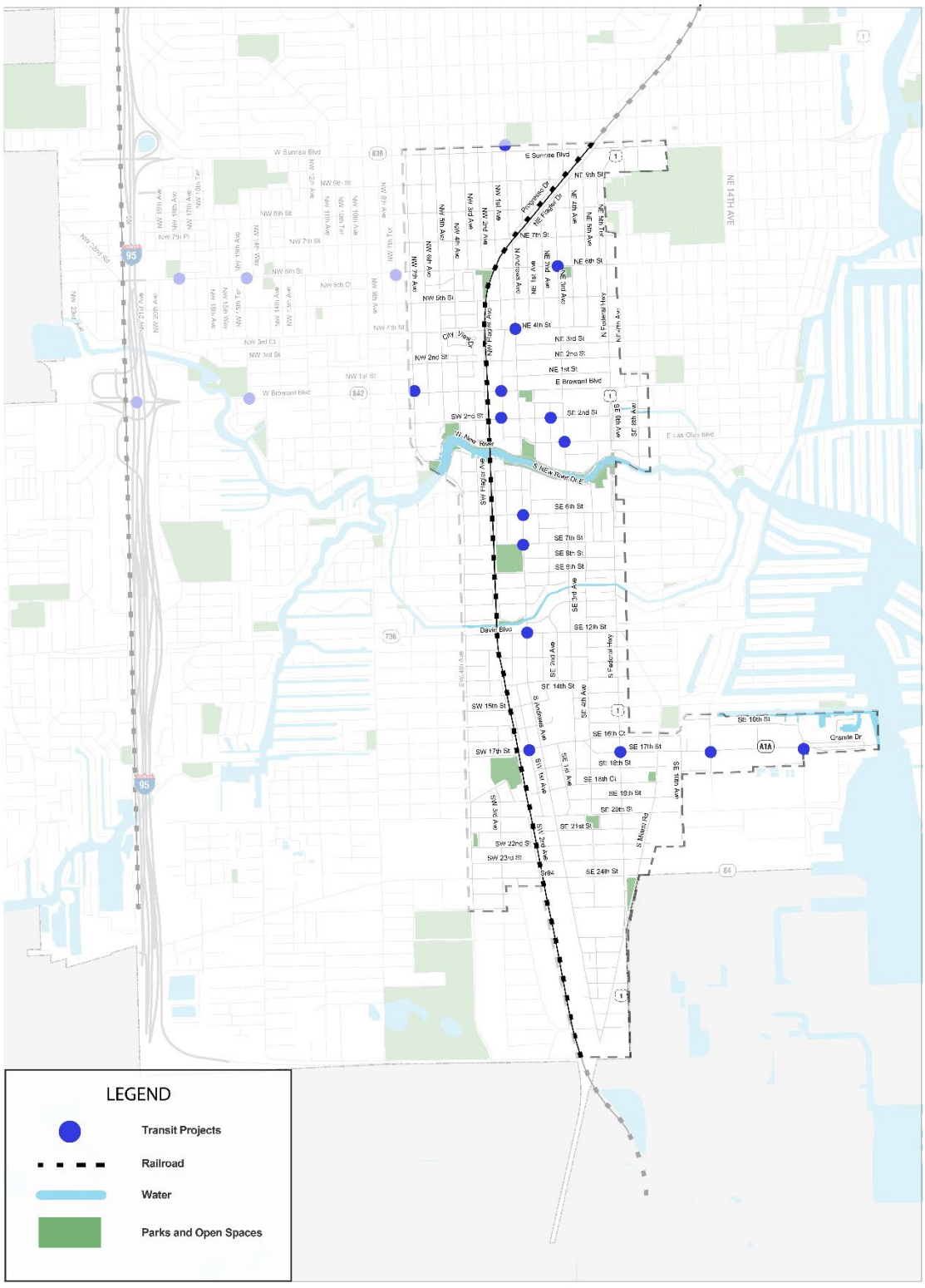


Table 6. Short Term Transit Projects, 2019

Roadway	From	To	Treatment	Construction Cost Estimate	Priority
ANDREWS AVE	SW 6TH ST	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948	Short
ANDREWS AVE	SW 7TH ST	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948	Short
ANDREWS AVE	NE 4TH ST	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948	Short
BROWARD BLVD	NW 7TH AVE	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948	Short
BROWARD BLVD	NW 15TH AVE	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948	Short
NE 3RD ST	NE 3RD AVE	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948	Short
SISTRUNK BLVD	NE 3RD AVE	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948	Short
SISTRUNK BLVD	NW 7TH AVE	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948	Short
SISTRUNK BLVD	NW 19TH AVE	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948	Short
SISTRUNK BLVD	NW 15TH AVE	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948	Short

Table 7. Medium Term Transit Projects, 2019

Roadway	From	To	Treatment	Construction Cost Estimate	Priority
ANDREWS AVE	DAVIE BLVD	ANCHOR HUB	TRANSIT SHELTER WITH REAL-TIME PASSENGER INFORMATION, LIGHTED WAITING AREA, PREBOARD TICKETING, KISS-N-RIDE AND TAXI AREAS	$1,930,844.00	Medium
ANDREWS AVE	FEC &SE 17TH ST	ANCHOR HUB	TRANSIT SHELTER WITH REAL-TIME PASSENGER INFORMATION, LIGHTED WAITING AREA, PREBOARD TICKETING, KISS-N-RIDE AND TAXI AREAS	$1,930,844.00	Medium
LAS OLAS BLVD	SE 3RD AVE	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948.00	Medium
SE 17TH ST	CONVENTION CENTER	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948.00	Medium
SE 17TH ST	CORDOVA DR	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948.00	Medium
SE 17TH ST	SE 15TH AVE	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948.00	Medium
SE 2ND AVE	SE 2ND ST	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948.00	Medium
SW 1ST AVE	SE 2ND ST	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948.00	Medium
SW 3RD AVE	SW 6TH ST	COMMUNITY HUB	BUS SHELTER, LIGHTED WAITING AREA	$56,948.00	Medium

Table 8. Long Term Transit Projects, 2019

Roadway	From	To	Treatment	Construction Cost Estimate	Priority
SUNRISE BLVD	ANDREWS AVE	ANCHOR HUB	TRANSIT SHELTER WITH REAL-TIME PASSENGER INFORMATION, LIGHTED WAITING AREA, PREBOARD TICKETING, KISS-N-RIDE AND TAXI AREAS	$1,930,844.00	Long
BROWARD BLVD	NW/SW 1ST AVE	GATEWAY HUB	ENCLOSED TRANSIT STATION, REAL-TIME PASSENGER INFORMATION, PREBOARD TICKETING, FREQUENT TRANSIT SERVICE, PARK-N-RIDE, CARPOOL PARKING, TAXI BAYS, RESTROOMS AND PARKING	$8,196,178.00	Long

Next Steps

Policy Considerations

The path towards implementation requires careful policy considerations and modifications, as each of the recommendations ultimately need to go through further study, a public process and the identification of a funding or implementation mechanism. Policy considerations include:

- Adopting a Multimodal District Policy that uses the modal priority map to clearly outline when design decisions should favor certain modes. The policy should include new performance measures that consider things like travel time, vehicle miles travel and person-throughput in place of typical traffic LOS. This will guide practitioners to having holistic conversation around design decisions that may not have been previously possible. This policy should also tie into the land development code.
- Identify ways to add incentives for developers to implement non-motorized improvements.
- Identify sidewalk width minimums associated with the pedestrian use map to inform future sidewalk projects.
- Consider funding policies that allocate funding for projects based on crash data. For instance, in Georgia, the State allocates is annual funding for roadway projects by mode based on the percent of severe injury and fatal crashes are associated with that mode (so if 20 percent of the severe injury and fatal crashes are bike-related crashes, 20 percent of the funding would be allocated towards bike projects).
- Consider incorporating building setback requirements based on the modal priority of the street.

These policies are changes cities across the country are making to guide implementation of multi-modal infrastructure and incentivizes developers to embrace multimodal connections.

Funding Opportunities

Developing a funding strategy is critical to implementing projects. There are funding opportunities available at the Federal, State and local level that are available for pedestrian and bicycle projects.

Federal Funding Opportunities

The funding opportunities for pedestrian, bicycle and transit projects has been ever expanding at the federal level. These types of federal funding streams usually comes in the form of grants that are allocated through the State and/or MPO. This funding is typically reserved for larger capital projects and may require a 20 percent cash match from the local community. Table 1 summarizes many of the available federal funding sources and the type of project activity the program can fund.

Table 6. Summary of Federal Funding Opportunities by Project Type*

Project Type	BUILD	IRAG	TIFIA	FTA	ATI	CMAQ	HSIP	NHPP	STBG	MAP-21	RTP	SRTS	FLTTP
Bicycle lanes on road													
Bicycle parking													
Crosswalks (new or retrofit)													
Curb cuts and ramps													
Recreational trails													
Road Diets (pedestrian and bicycle portions)													
Separated bicycle lanes													
Shared use paths / transportation trails													
Sidewalks (new or retrofit)													
Signs / signals / signal improvements													
Signed pedestrian or bicycle routes													
Spot improvement programs													
Traffic calming													

***Table Key:**
BUILD: Better Utilizing Investments to Leverage Development Transportation Discretionary Grants
INFRA: Infrastructure for Rebuilding America Discretionary Grant Program
TIFIA: Transportation Infrastructure Finance and Innovation Act (loans)
FTA: Federal Transit Administration Capital Funds
ATI: Associated Transit Improvement (1% set-aside of FTA)
CMAQ: Congestion Mitigation and Air Quality Improvement Program
HSIP: Highway Safety Improvement Program
NHPP: National Highway Performance Program
STBG: Surface Transportation Block Grant Program
MAP-21: Moving Ahead for Progress in the 21st Century Act (formerly Transportation Alternatives Program)
RTP: Recreational Trails Program
SRTS: Safe Routes to School Program / Activities
FLTTP: Federal Lands and Tribal Transportation Programs (Federal Lands Access Program, Federal Lands Transportation Program, Tribal Transportation Program, Nationally Significant Federal Lands and Tribal Projects)

Additional funding and assistance programs have been set up by federal agencies such as the Environmental Protection Agency (EPA) and Housing and Urban Development (HUD). These opportunities include:

- **EPA's Smart Growth Implementation Assistance –** This program is organized around the Smart Growth Implementation Assistance (SGIA) Program, developed by the EPA in 2005. The program selects communities to work with on an annual basis and provides technical assistance to support the implementation of active transportation projects.
- **HUD's Community Development Block Grant (CDBG) -** The CDBG program is a flexible program that provides communities with resources to address a wide range of unique community development needs.

State Funding Opportunities

Many of the state funding opportunities is restricted to the State Highway System (SHS) that the Florida Department of Transportation (FDOT) is charged with managing. However, several of the roads that run through the study area are state roads and may be eligible for the below funding opportunities to implement pedestrian, bicycle and transit projects:

- **FDOT District VI Maintenance Program:** Extremely short sidewalk gaps (length less than 0.05 miles or 260 feet) could potentially be addressed through coordination with District Maintenance Team. Bike lanes can also be added as part of repaving efforts.
- **FDOT's Work Program:** The Resurfacing, Restoration and Rehabilitation (RRR) provides opportunities to cost-effectively add pedestrian and bicycle facilities to the roadway.
- **State Block Grant Program:** Section 5307 is a formula program that funds capital projects and provides operating assistance in urbanized areas. Section 5339 also provides a grant program for Buses and Bus Facilities.

Local Funding Opportunities

The most flexible, but sometimes limited, source of funding is within local funding pools. The following summarizes opportunities to leverage existing local funding opportunities or add new funding sources at the local level:

- **Developer contributions:** The City of Fort Lauderdale has development occurring in many locations throughout the city but doesn't have a mechanism to require or encourage developers to contribute to building multimodal infrastructure in a meaningful way. Implementing policies, such as the Multimodal District Policy, and tying those policies to developer requirements can be part of a strategy to fund multimodal projects around the City's core.
- **Penny for Transportation**: Broward County voters approved 30-year, one cent surtax for transportation in November 2018. The sales surtax took effect on January 1, 2019. The County is currently working on a collaborative 5-year Plan due July 1, 2020 to the Independent Transportation Surtax Oversight Board and the Broward County Board of County Commissioners for approval.
- **Metropolitian Planning Organization (MPO) Prioritization:** Coordination with the MPO on unfunded priorities and the Long-Range Transportation Plan is perhaps the best route for these projects.

Non-Profit Grants

There are non-profits and private entities that offer grants for projects that support creating healthy and vibrant communities. These grants tend to be smaller in amount but can be used as local match funding for federal grant sources.

- **AARP Community Challenge Grant Program-** This AARP grant program is geared towards funding "quick-action" projects that spark change across the country. Now in its third year, the program is part of AARP's nationwide work on Livable Communities. Grants can range from several hundred dollars for small, short-term activities to several thousand dollars for larger projects.
- **Bluezone's Made to Move-** This grant program is a competitive funding opportunity, sponsored by Degree Deodorant and BlueZones, created to assist communities in advancing active transportation through local project development, implementation and supporting policies. Communities can receive up to $100,000 plus technical assistance.

BICYCLE FACILITY DESIGN GUIDANCE

A key element of effective execution of the bike facilities recommended in this plan is to design and implement comfortable bicycle facilities that is appropriate for the road context. The recommendations have been developed for the primary corridors based on the Level of Traffic Stress scores calculated in the baseline analysis. For high stress streets (LTS 4) a protected bike lane is the only appropriate bicycle facility. For the supporting facilities, a bike lane or a bike boulevard with ample traffic calming is sufficient based on the street width and the presence of parking.

EXAMPLE FACILITIES FOR HIGH STRESS STREETS

One way on-street cycle track separated by planters

EXAMPLE FACILITIES FOR LOW STRESS STREETS

Sharrow on a local low stress street

Two way on street cycle track separated by curb and parking

Bicycle friendly speed hump to calm traffic on a bike boulevard

The design process for each facility is an individual one, but there are key design elements that should be considered when design decisions are being made, especially when it comes to operational trade-offs. The below matrix summarizes the required design elements that should be followed for each bike facility, as well as the recommended and preferred elements that will vary based on the street context and goals of the project.

Table 7. Summary Matrix of Key Design Elements for Bicycle Facilities

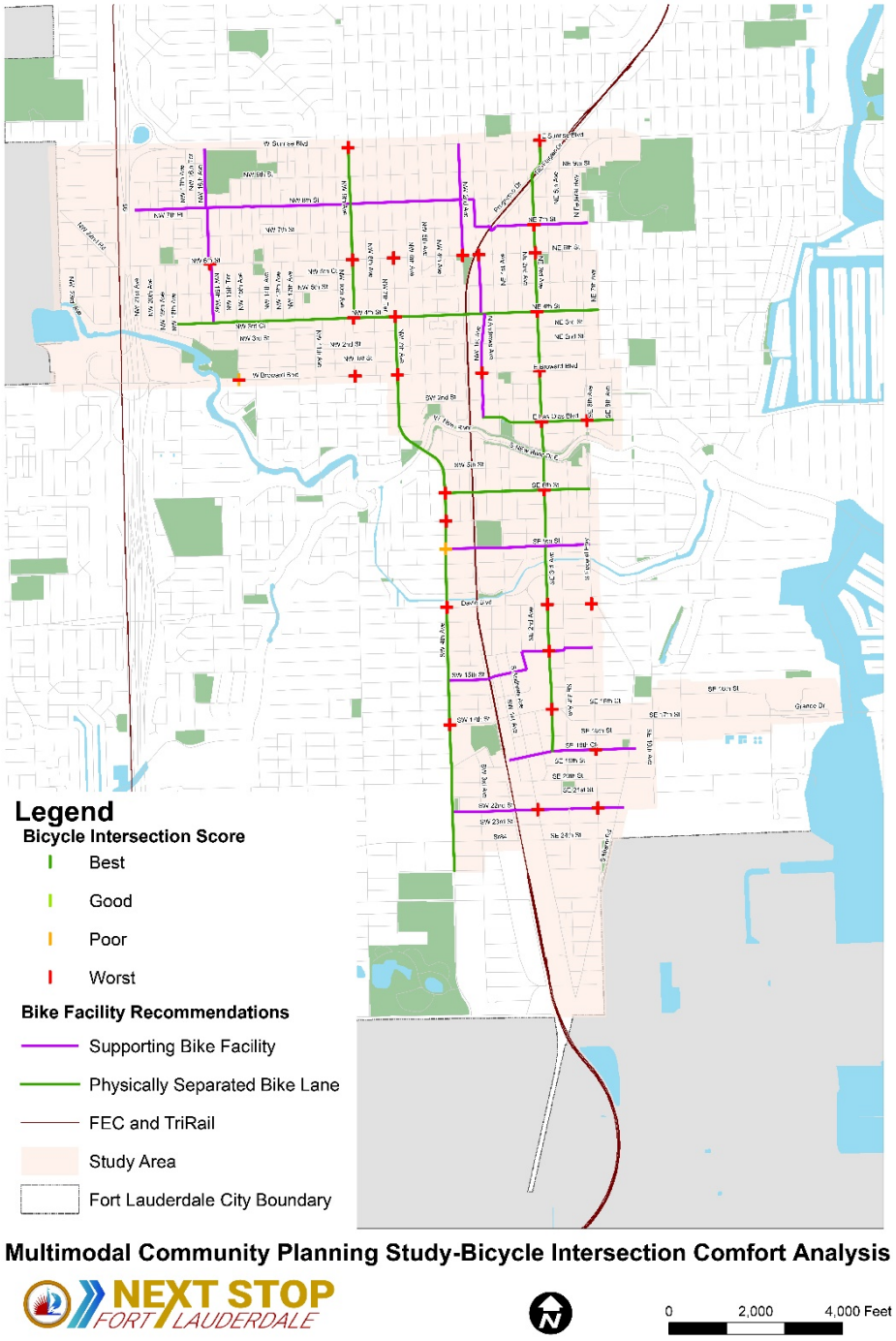
Facilities	Cost	Typical LTS	Required	Recommended	Preferred
Signed routes/Wayfinding 	$	LTS 1	Follow MUTCD Section 9B.01 – Application and Placement of Signs (as per NACTO Urban Bikeway Design Guide pg. 246)	-Design signs should be placed in advance of all turns at the near side of intersection -Include direction, destinations; with closest place on top -See pg. 247 of NACTO	-Periodically place bike route maps on/under signage -Use a routing number system if there is a route map (see MUTCD Section 9B2.1 for more) -See pg. 250 of NACTO
Bicycle Boulevards  **Source: NACTO**	$	LTS 1 LTS 2 or 3 with additional traffic calming	-Use Wayfinding signs (starting on pg. 240) -Indicate how bicyclists can stay on path if boulevard turns onto another road https://nacto.org/publication/urban-bikeway-design-guide/bicycle-boulevards/	-Pavement marking should be standard size (112” x 40”) -If narrow roads, place signs closer - (See link for more)	-Curb heights lower than 6” can be used on diverters and medians for emergency vehicles - (see link for more)
Bike Lanes 	$	LTS 1 or 2	-Desired width is 6’ with a minimum of 4’ along street edge -If next to a parking lane, want parking/bike/buffer width total to be 14.5’ with a minimum of 12’ -Words, symbols to define lane periodically throughout (as per MUTCD Figure 9C-3) -6-8” solid line to mark the difference between motor travel and bike -See page 7 of NACTO Urban Bikeway Design Guide	-Make wider than minimum widths wherever possible -If next to parking lane, solid white line of 4” between parking and bike lanes to avoid encroachment -If there’s space, separation between parking and bike lane – maybe by buffer -If turning vehicles must merge into bike lanes, increase dashed line length from 50 to 200’ -See pg. 9 of NACTO	-Color the lanes to enhance space -Bike lane signs before the beginning of a marked bike lane to designate preferential bike use -Bike lanes adjacent to curbs, make it “No Parking” (see MUTCD R8-3) -See pg. 11 of NACTO
Buffered Bike Lanes 	$$	LTS 1, 2 or 3	-Mark the bike lane with words or symbol/arrow -Buffer marked with 2 solid white lines with diagonal hatching if 3ft or wider -See page 21 of NACTO Urban Bikeway Design Guide	-Next to parking, 5’ minimum width -If high speed, buffer and bike lane should be 7’ -Buffers at least 2’ wide -At intersection, transition to through bike lane -See pg. 22 of NACTO	-Wide (6-8”) solid line to mark the line closest to adjacent traffic -Separation between bike lane striping and parking -Color the beginning of each block -See pg. 23 of NACTO
One-Way Separated Bike Lanes 	$$$	LTS 3 or 4	-Use a cycle track, as outlined by MUTCD -Need the symbol or arrow at the beginning and periodically throughout the track -See page 62 of NACTO Urban Bikeway Design Guide	-Desired is 5’ but if high bicycle volume, want 7’ -At least a 3’ buffer -When using a pavement marker buffer, combined parking and buffer width should be 11’ -See pg. 64 of NACTO	-Cycle tracks can be closer to travel lane as intersections approach, to put bicyclists in clear view of drivers -Color pavement to define bike space -See pg. 68 of NACTO

Two-Way Separated Bike Lanes 	$$$	LTS 3 or 4	-Word, symbol or marking to indicate bike lane periodically throughout length - "Do Not Enter" with "Except Bike" (as per MUTCD R5-1) -Traffic controls along the street oriented towards contra-flow -See page 95 of NACTO Urban Bikeway Design Guide	-8' minimum, want 12' -3' buffer if next to parking lane -Dashed yellow line to separate the directions of flow -Two-stage turn boxes to assist in making turns from the cycle track -See pg. 97 of NACTO	-On minor intersections, can shift track more closely to travel lane -Can configure the track to be raised for better visibility -See pg. 99 of NACTO
Shared Use Path  **Figure 6: FDOT Design Expo, Slide 20**	$$$$	LTS 3 or 4	-Separation between path and road -See FDOT for more http://www.fdot.gov/design/training/DesignExpo/2016/Presentations/Multi-UseTrails-RobinBirdsongAndMaryAnneKoos.pdf	-Want 14' width, 8' minimum -Use a design speed of 18 mph (See AASHTO Guide for Development of Bicycle Facilities, 2012)	-10' Vertical clearance, with 8' minimum -Meet ADA requirements very often -See Ch 8 of FDOT

Bicycle Infrastructure at Intersections

While the bicycle facilities along a corridor are important, bicycle Infrastructure needs at intersections is critical due to the conflict points. In the Baseline Network Comfort Assessment Memo, the bicycle comfort at key intersections was assessed and all of the intersections received a rating of "worst" or "poor". These results are summarized in Figure 10.

Figure 10. Bicycle Level of Comfort Intersection Scores



These results are largely due to the lack of bicycle specific infrastructure accommodations and the right and left turn lane conflicts. Mitigations at intersections should be considered to manage the potential conflicts with bike traffic at driveways and intersections. These mitigations can include:

- **Bicycle signals at the intersections.** This is not necessary at every intersection along the corridor but can be targeted for use at intersections with high turning volumes. The bike signal can be used to provide a leading bicycle interval or can be used to provide a dedicated bike phase when there is a high-volume turning conflict.

- **Bicycle detection with activated warning signs.** Bike detection can be placed in the bike lanes upstream of an intersection or driveway. When a bicyclist rides over the detection, it can trigger an activated warning sign for a driveway or a turning vehicle to alert drivers of on-coming conflicts. This can be used on one-way or two-way protected bike lanes that cross high-turning traffic volumes or nigh volume driveways.

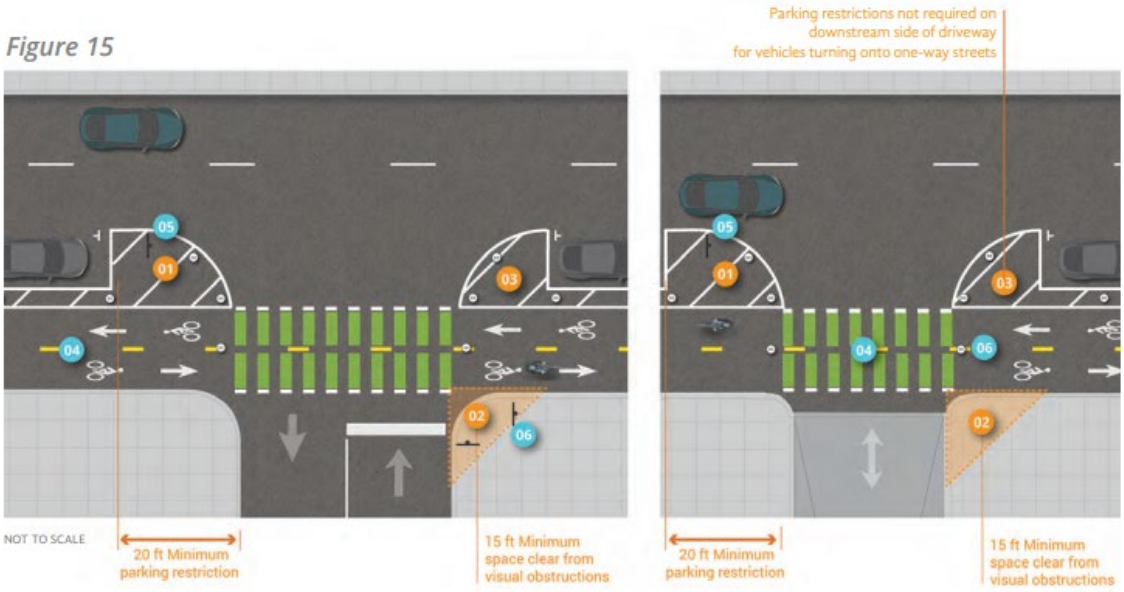
Source: NACTO Urban Bikeway Design Guide (Madison. WI)

NE

Broadway & N Williams Street, Portland, OR. *The bicyclist triggers a detector downstream of the*

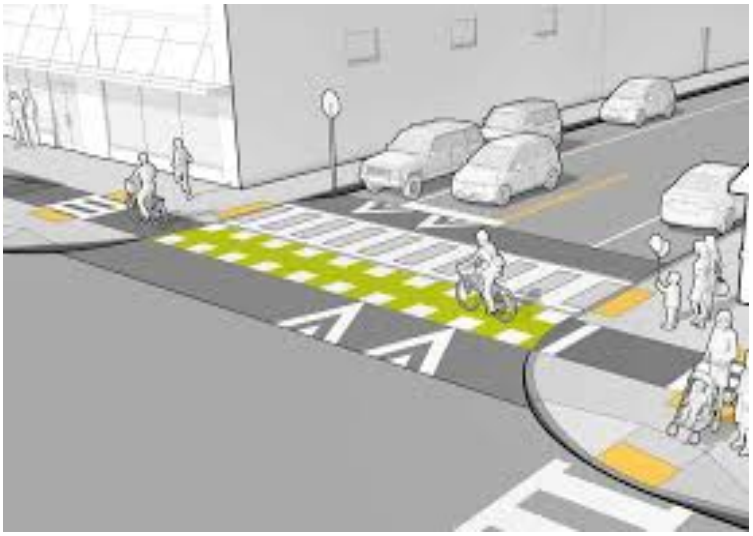
intersection where an activated warning sign is triggered and illuminated to warn right-turning drivers that a bicyclist is approaching the intersection.

- **Restrict parking on driveway approaches.** To provide adequate site distance for drivers as they make a turn into the driveway, parking should be restricted a minimum of 20-foot from driveways where adjacent travel lanes may be turning into the driveway. It also reduces the need for drivers to "inch out" into the bike lane in order to see on-coming traffic.



Source: FHWA Separated Bike Lane Guide

- **Raised bike lanes.** Elevated bike lanes at intersections and driveways brings bicyclist up to driver eye level. The raised nature of the bike lane at the intersection also forces drivers to slow down as they anticipate going over the braised bike lane.
- **Green Paint at conflict points.** Green paint has been historically used to highlight potential conflict points between bicyclist and drivers at driveways and intersections. This provides an indication to drivers to expect bicyclist and to use extra caution when crossing the bike path.



Source: MassDOT Separated Bike Lane Design Guide

Table 8. Summary Matrix of Key Design Elements for Intersection Treatments

Treatment	Cost	Typical LTS	Required	Recommended	Preferred
Intersection Treatments-Bike Lane (Through Bike Lanes, Median Refuge Island)  		*Median Refuge Island:* -Bikeway crosses high volume/speed street -At signalized or unsignalized intersections *Through Bike Lanes:* -On streets with right-turn only lanes -Where the bike lane merges into turning lane or parking lane	*Median Refuge Island:* -Want 10' or wider, absolute minimum is 6' See section 3I.02 MUTCD for pavement markings -Outline median in retroreflective white or yellow -See page 157 of NACTO Urban Bikeway Design Guide *Through Bike Lanes:* -See page 172 on NACTO Urban Bikeway Design Guide, Case study on St. Petersburg, FL (Evaluation of a Green Bike Lane Weaving Area)	*Median Refuge Island:* -Length should be greater than 6' -Height of island should be curb level (6") -Wide enough for 2-way -Angled cut-through so bicyclists can face oncoming traffic -See pg. 159 of NACTO *Through Bike Lanes:* -Dashed white lines 6" wide, 2' long -Right-turn only lanes should be as short as possible -Color/add signage to enforce bike right of way -See pg. 173 of NACTO	*Median Refuge Island:* -Can provide landscaping if it doesn't compromise visibility -Install lighting for night -Can carry the median refuge across entire street to act as diverter -See pg. 160 of NACTO *Through Bike Lane:* -Use a bike box instead to designated through turn lane (See pg. -Bike warning signs or "share the road" signs in advance of transition -See pg. 175 of NACTO
Intersection Treatments-Bike Box 	$$	-Signalized intersection with high volumes of motorists or bicyclists -Frequent motorist right turns or bicycle left turns	-10 – 16' deep transverse lines to create the box -Use a stop line to show where motorists must wait -Center a pavement marking of a bike rider with a helmet between crosswalk and stop line -see Page 110 of NACTO	-Place a "Stop here on red" sign at the stop line for cars -Color the pavement green to encourage compliance -Define potential areas of conflict across the intersection with green paint -See pg. 112 of NACTO	-Stop lines can be placed up to 7' in advance of bike box -Bike box can extend across multiple travel lanes -Can combine with exclusive bike signal phase I high volume of bicyclists -See pg. 115 of NACTO

Intersection Treatments/Crossings-Shared Use Path  A bicycle signal in use in San Luis Obispo separates motor vehicle and bicycle movements	$$$	*Conventional Bike Lanes* -See above in table *Bicycle Signal* -Intersections with bicycle-only movements	*Conventional Bike Lanes* -See above in table *Bicycle Signal* - Clear standards are not defined, consider MUTCD general guidance	*Conventional Bike Lanes* -See above in table *Bicycle Signal* - Signal head should be clearly visible to oncoming bicycles -Bicycle phase should provide adequate clearance time and actuation/ detection (if not pretimed)	*Conventional Bike Lanes* -See above in table *Bicycle Signal* -Clear standards are not defined, consider MUTCD general guidance
Intersection Treatments-Two Stage Queue Box	$$$	-Areas with high left turning volume -Works best for green lights, in contrast with bike box at red lights	-A designated area to hold queuing bicyclists -Include a bicycle stencil and turn arrow to indicate proper bicycle positioning -Place bike box in protected area -See Page 146 of NACTO	-Color the pavement green to further define the space -Using markings throughout the intersection -See pg. 147 of NACTO	-Position the queue box laterally in cross street parking, instead of in front of the travel lane -Can use bike signals in conjunction with two-stage queue box -See pg. 148 of NACTO