US-1 Multimodal Corridor Study

CONNECTING COMMUNITIES

In Palm Beach County

TRANSIT ASSESSMENT

PALM BEACH
Transportation
Planning Agency

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INTRODUCTION

EXECUTIVE SUMMARY

Conceptual alignments were developed for different aspects of the proposed US-1 premium transit service, designated the Palm Tran Express (PTX) for the purposes of the US-1 Multimodal Corridor Study. The PTX service is envisioned to be mixed-traffic corridor-based premium transit service that supplements the existing Route 1 with modified headways and is planned to operate in place of The Bolt, the current limited stop service.

The travel market for the PTX service is expected to attract both reliant and choice transit riders with more efficient and reliable travel times due to focus on the high demand US-1 Corridor location and transit priority operating conditions proposed in cooperation with Palm Tran and the Florida Department of Transportation. The service is also intended to align more closely with the transit dependent populations along the US-1 Corridor and, along with the proposed pedestrian and bicycling improvements, provide better access to and from each proposed PTX stop (station).

The new branded service is planned to include additional rider amenities that will further attract ridership. The following summarizes the existing conditions, the planning direction, and the conceptual planning and design outcomes.

TRANSIT CONTEXT

The US-1 Corridor supports north-south travel between 14 municipalities in Palm Beach County and approximately 100,000 jobs and over 250,000 residents. This represents nearly 19% of all jobs in Palm Beach County. The Corridor is served by Palm Tran's highest ridership bus route, Route 1.

Of the 7,200+ daily riders on this existing local bus route, **50% are dependent** on this service.

50%

ARE Transit Dependent

WALKING AND BICYCLING SAFETY

The history of crashes (University of Florida's SignalFour Analytics, 2011-2016) in the US-1 Corridor involving people who were walking and bicycling revealed that there were **321 crashes** involving non-motorist on the Corridor, with 15 resulting in fatalities. All of the fatalities occurred during dusk or at night. 110 of the 135 bicycle crashes (82%) occurred on segments of US-1 with no bicycle facilities.

90%

of Route 1 riders WALK to their Stop

VULNERABLE POPULATIONS

This overall lack of multimodal options isolates many disadvantaged residents within a community from jobs and educational opportunities. As defined in the US-1 Multimodal Corridor Health Impact Assessment Study (HIA), those disadvantaged groups were clarified as vulnerable populations defined as those who live in households with no access to personal automobiles, are in poverty, are aged 65 or older, or are disabled. The areas within the US-1 Corridor with the highest vulnerable populations are Boynton Beach, Lake Worth, West Palm Beach, and Riviera Beach. The PTX alignments proposed are focused on serving these areas.

*Vulnerable populations are **far more dependent** on transit services and **far more affected** by the lack of pedestrian and bicycle connectivity, the spacing of stops or stations, and the overall availability and reliability of a transit service*

RECOMMENDATIONS

Based on stakeholder discussions with Palm Tran and the TPA, as well as recommendations from the US-1 Multimodal Corridor HIA, this assessment recommends that Palm Tran move forward with the alignment "PTX Yellow - Alternative 2" as a first phase of premium transit on US-1, followed by "PTX Blue - Alternative 1" and "PTX Green" as future phase expansions of the premium transit service (**Table 12** and **Figure 23** on the following pages). This assessment provides the building blocks to assist Palm Tran in future studies advancing the PTX Yellow alignment with the goal of applying for the FTA's Small Starts Program in early 2020.

PHASE 1

PTX YELLOW

- **Transit Ridership -** The PTX Yellow from Boynton Beach to Riviera Beach focuses transit services on the section of the corridor that has the highest existing ridership and contains the greatest concentration of vulnerable households. This service is estimated to add 75,000 additional riders per year over the current Bolt service.
- **Transit Coverage -** The proposed PTX Yellow stations, roughly space 1-mile apart afford a 17% increase in transit access for households and job locations over the existing Bolt.
- **Increased Transit Frequency -** The improved location of PTX stations allows the new service to access more critical locations, like schools and healthcare facilities, as compared to the current limited stop express service The Bolt.

FUTURE PHASES

PTX BLUE AND GREEN

- **Transit Ridership -** The PTX Blue extends the PTX Yellow to capture an additional high concentration of households and jobs within the southern portion of the corridor. Combined with the future phase of PTX Green, it is estimated an additional 229,000 riders per year would use this service compared to the existing Bolt.
- **Transit Coverage -** The future PTX Blue and PTX Green stations continue to average the 1-mile spacing and this would result in a 138% increase in transit access for households and job locations over the existing Bolt.

PTX SERVICE - ALL PHASES

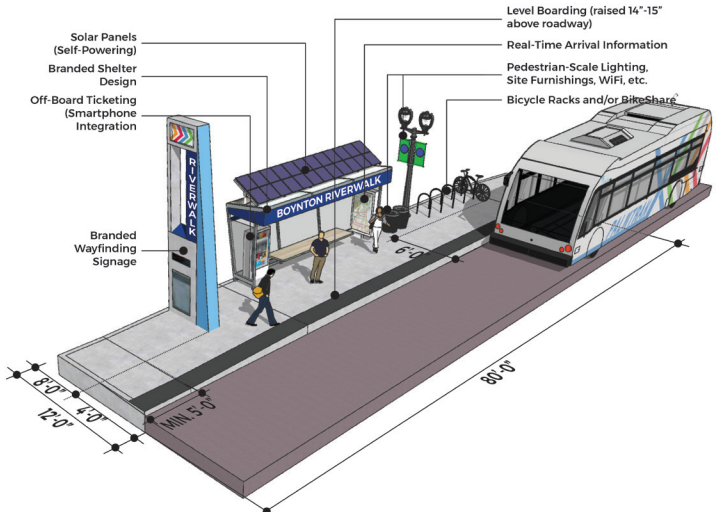
STATION AMENITIES

During the US-1 Multimodal Corridor Workshops, attendees were asked their preference for various transit characteristics. The highest preference was for the ability to bicycle or walk safely and comfortably to a given transit location.

Attendees felt strongly that stations need to be well-lit and clean with seating and shade. The dependability and speed of the transit service was also a high priority.

Lastly, attendees felt they would be more likely to use transit if the service was well branded and included technological aspects like real time tracking and payment methods available through their smartphone. Based on this input, a typical station module was generated.

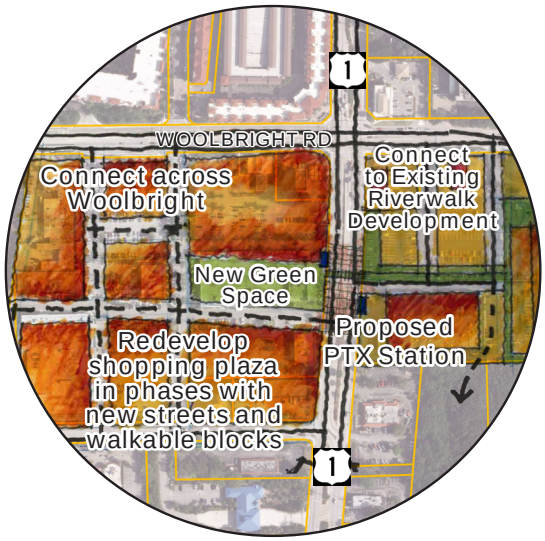
TYPICAL PTX STATION MODULE



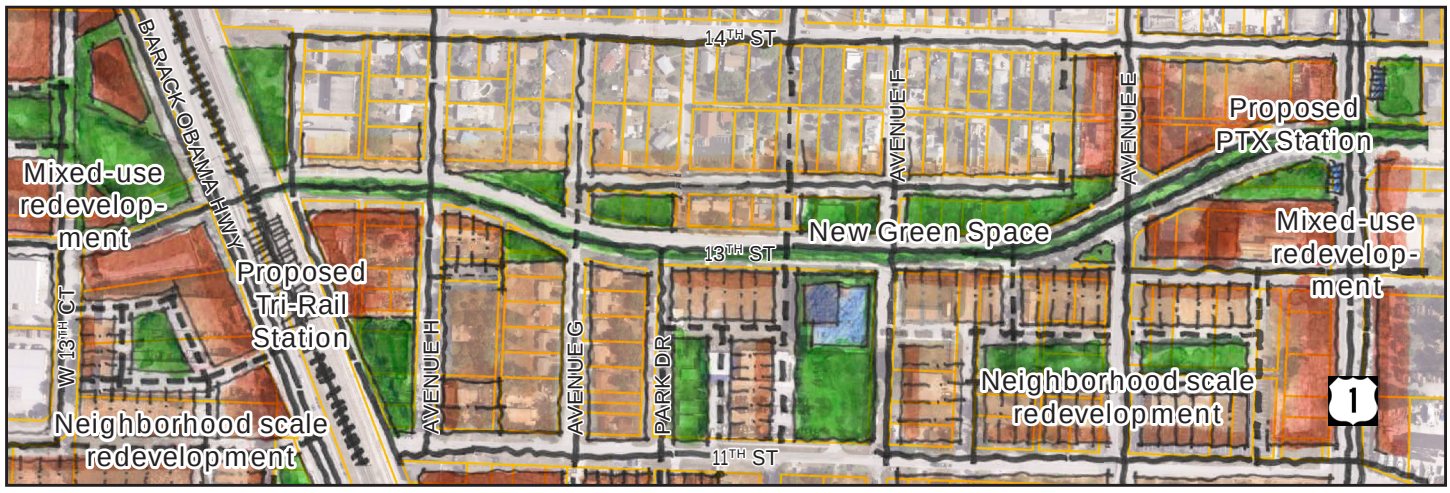
OPPORTUNITY SITES

The transit analysis also analyzed the potential for transit-oriented development (TOD) at the PTX station in all the service phases. TODs generally provide a mix of residential and commercial uses and are designed to make public transit successful, enhance the convenience and safety of walking and bicycling, and provide for a vibrant, livable community.

Conceptual-level TOD scenarios were generated for each PTX station location. These scenarios are not meant to indicate any approved or proposed plans, rather illustrate a possible and hypothetical development scenario and how transit (both existing service and proposed service) and transit-supportive development could interact with urban design and the Complete Streets investments.

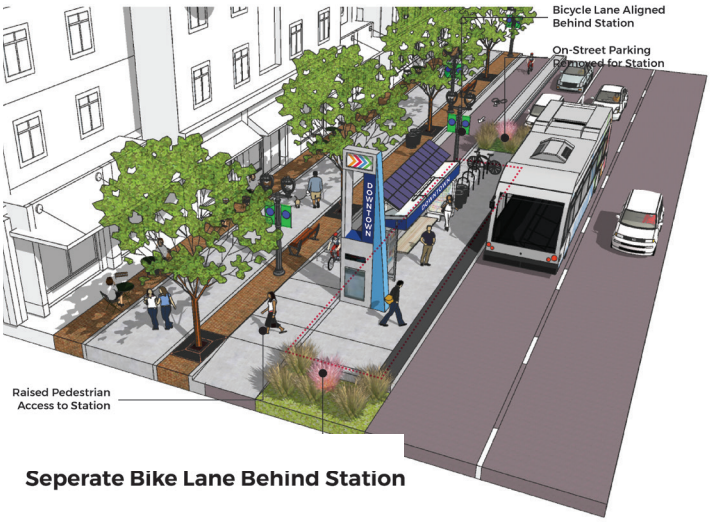


WOOLBRIGHT STATION IN BOYNTON BEACH



13TH STREET STATION IN RIVIERA BEACH

URBAN STATION AREA WITH SEPARATED BIKE LANE



Seperate Bike Lane Behind Station

STATION AREA TYPES

Station types were organized based on the specific context area types unique to the US-1 Corridor and formed four (4) typical site conditions:

Urban Section (curb/gutter) 10' or 12' wide PTX stations completely within the existing US-1 ROW.

Urban Section (curb/gutter) 10' wide PTX stations partially within the US-1 ROW and partially requiring an easement from the adjacent property owner.

Rural Section (no curb/gutter) - 12' wide PTX stations completely within the existing US-1 ROW.

Off-Street Stations - PTX stations internal to a given public or private property. (i.e. Okeechobee Boulevard (aka "Tent Site"), Harbourside Place, etc.)

IMPLEMENTATION PROCESS

Implementing a premium transit system, like the proposed PTX, is a large and complex project that requires extensive coordination at all levels of government and a concerted effort over many years to implement. Premium transit project implementation occurs in several primary development stages based on available and appropriate sources of funding.

PHASING

There are two potential ways to implement PTX, (1) pursue a large-scale funding program such as **FTA Small Starts** to complete all elements at once or (2) **phase-in improvements** as local, non-federal funding becomes available**.**

A key assumption in the implementation of express bus service is the reduction in frequency of Route 1 local service from 20 minutes to 30 minutes. This focuses limited transit funding where it can serve the most people and allows for introduction of PTX Yellow service at a nearly cost-neutral level. Implementation of this service **requires Palm Tran** to further study this assumption, along with frequency and span of service for the PTX service, in order to refine the service to a supportable outcome and subsequently pursue capital funding for implementation.

NEXT STEPS

It is recommended that **Palm Tran pursue the FTA Small Starts** for Phase 1 "PTX Yellow." The appropriate timeline (based on an “expedited process,” due to the work already completed) would follow the steps shown below:

1. Complete environmental review process including developing and reviewing alternatives, selecting locally preferred alternative (LPA), and adopting it into fiscally constrained long-range transportation plan
2. Gain commitments of all non-5309 funding
3. Complete sufficient engineering and design
4. FTA evaluation, rating, and approval: Construction Grant Agreement
5. Construction

Orange Line - Los Angeles, CA; *Photo: Mariana Gill/EMBRAQ Brasil*

THE CHALLENGE

THE CONTEXT FOR TRANSIT

The US-1 Corridor supports north-south travel through and to Palm Beach County's 14 most populated cities and approximately 100,000 jobs and over 250,000 residents. This represents nearly 19% of all jobs in Palm Beach County. The Corridor is served by **Palm Tran's highest ridership bus route: Route 1.** This route provides access to regional employment, education and retail/entertainment destinations such as Downtown West Palm Beach, Florida Atlantic University, and Downtown Delray Beach. The residential population is diverse, with both very low and very high income concentrations located in the various urban and suburban neighborhoods along its 42 miles between Boca Raton and Jupiter. Significant redevelopment occurring all along the corridor reflects and contributes to changing needs and desires of both existing users and those occupying these new places.

VEHICLE ACCESS AND COMMUTING

Having largely developed after the advent of the personal automobile, much of South Florida has developed in an auto-centric pattern. This pattern is reflective of sparsely spaced land uses and destinations with roadways connecting these long distances. As such, limited multimodal facilities were included beyond narrow sidewalks and few bicycle facilities. This history is reflected in the current transportation behavior. As shown in the **Figure 1**, 74% of commuting trips within the US-1 Corridor occur by a single individual in a motorized vehicle. Of those trips, 35% of those motorists travel for longer than 30 minutes.[1] However, it is also important to note that within the US-1 Corridor, non-single occupant trips occur with higher frequency generating over 7% of the commuting trips.

WALKING AND BICYCLING SAFETY

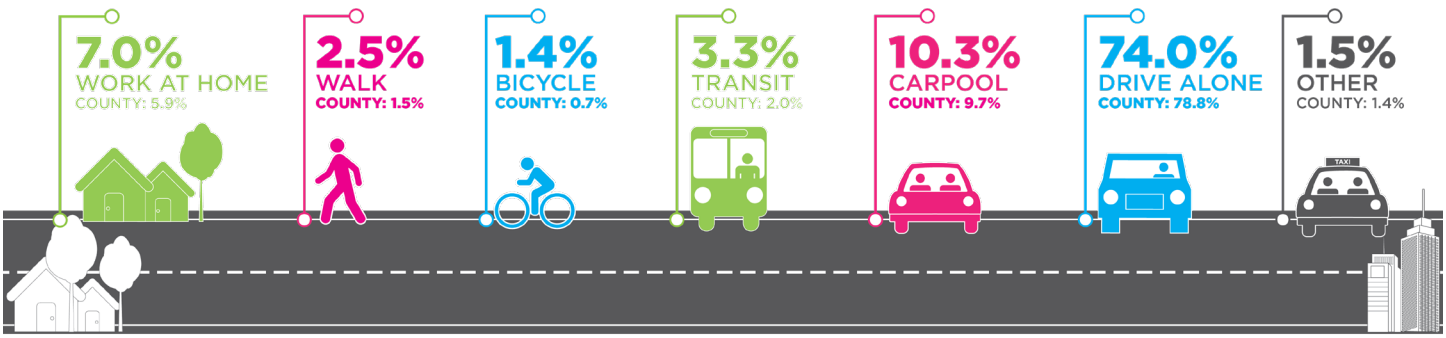
South Florida is consistently ranked as one of the most dangerous metropolitan areas for pedestrians and bicyclists. Therefore, safety for those who are walking and bicycling to a transit facility is an important consideration. The history of crashes (University of Florida's SignalFour Analytics, 2011-2016) involving people who were walking and bicycling revealed that there were **321 crashes** involving non-motorist on the Corridor, with 15 resulting in fatalities. All of the fatalities occurred during dusk or at night. 110 of the 135 bicycle crashes (82%) occurred on segments of US-1 with no bicycle facilities.

321 **Pedestrian and Bicycle Crashes**

58% **Pedestrian Crashes**

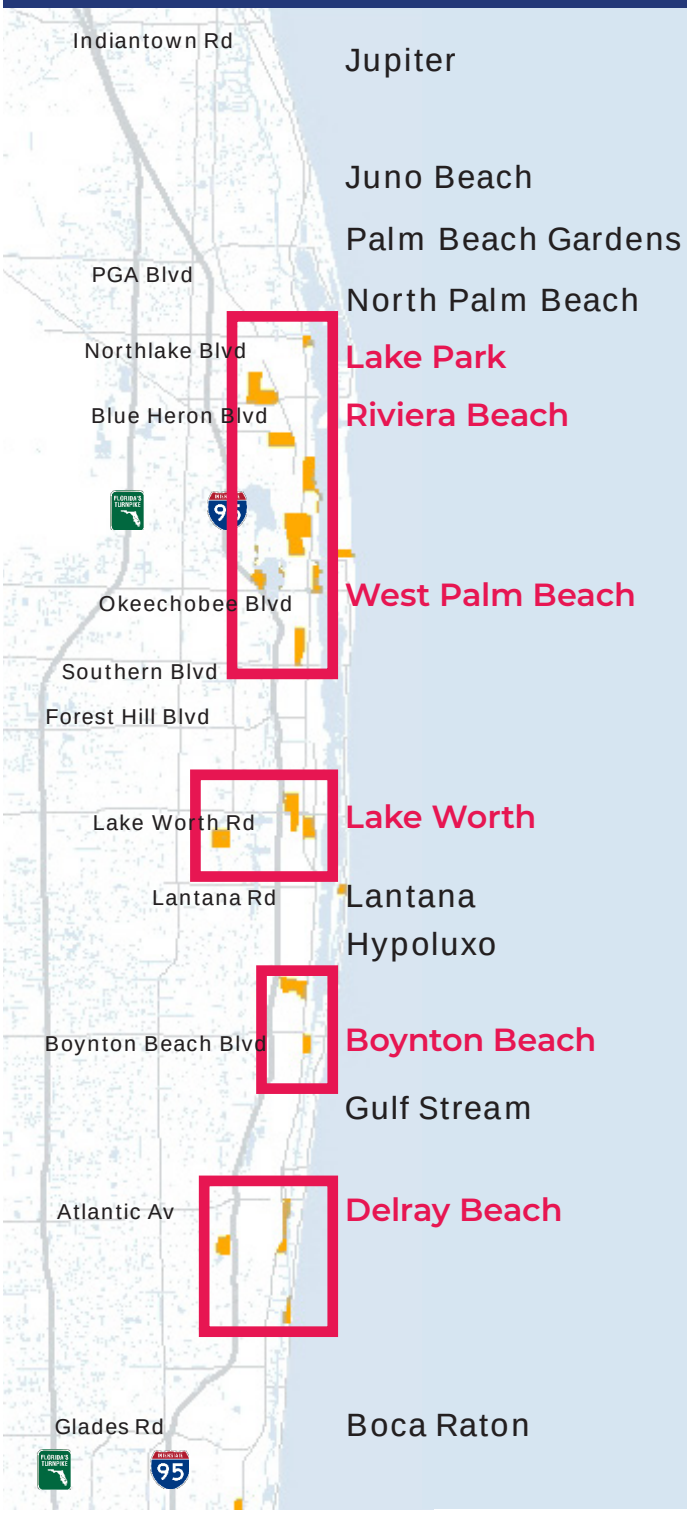
42% **Bicyclist Crashes**

FIGURE 1: MULTIMODAL TRIPS ON THE US-1 CORRIDOR STUDY AREA



[1] Robert Wood Johnson Foundation, "County Health Rankings & Roadmaps," 2018.

FIGURE 2: VULNERABLE POPULATIONS



VULNERABLE POPULATIONS

This overall lack of multimodal options isolate many disadvantaged residents within a community from jobs and educational opportunities. The increased distances between housing and jobs, as well as educational opportunities, has created barriers for those disadvantaged groups. As defined in the US-1 Multimodal Corridor Health Impact Assessment Study, those disadvantaged groups were clarified as vulnerable populations (**Figure 2**) defined as those who:

- **Live in Households without Access to Automobiles**
- **Are in Poverty**
- **Are Age 65 or Older**
- **Are Disabled**

*Vulnerable populations are **far more dependent** on transit services and **far more affected** by the lack of pedestrian and bicycle connectivity, the spacing of stops or stations, and the overall availability and reliability of a transit service*

EXISTING TRANSIT CONDITIONS

EXISTING SERVICE TYPES

The US-1 Corridor has local, regional, and national transit service. Palm Tran currently serves US-1 with local bus Route 1 and a limited-stop bus service designated as "The Bolt." The service characteristics are summarized in **Table 1**.

Route 1 runs 42 miles from Camino Real in Boca Raton to the Gardens Mall Terminal in Palm Beach Gardens. The Bolt overlay service runs 28 miles between Camino Real in Boca Raton to the West Palm Beach Intermodal Transfer Center (WPB ITC). The two services provide access to many employment centers and residential areas. There is direct service or connection to major institutional uses including Florida Atlantic University, Palm Beach Atlantic University, Palm Beach State College, Good Samaritan Medical Center, St. Mary's Hospital, and numerous city government centers. The distribution of boardings and alightings throughout the US-1 Corridor is shown graphically in **Figure 3** and summarized in **Table 2**.

Local municipalities operate a series of transit services including the Boca Raton Shuttles, the Delray Beach Trolley, and the Downtown West Palm Beach Trolley the last two of which offer direct access to US-1.

Palm Tran Connection provides paratransit services along the entire US-1 Corridor. While this study did not analyze paratransit service, extension of service north of the Gardens Mall could require extensions of complementary paratransit services.

In addition to Route 1, 19 other Palm Tran routes travel along or across some portion of US-1 Corridor. Of note, Route 1 connects to the Broward County Transit (BCT) Route 10 at Camino Real in southern Palm Beach County, and the Martin County Public Transit (MCPT) Route 20X, a limited stop express service, at the Garden Mall Terminal in northern Palm Beach County.

Rail in the study area includes the existing Tri-Rail Commuter Rail Service and the South Florida Regional Brightline Station in Downtown West Palm Beach. The proposed Tri-Rail Coastal Link would also have stations along the US-1 Study Corridor. National transit connectivity includes direct access to the private Amtrak Train and Greyhound Bus service.

50%
ARE Transit Dependent[2]

65%

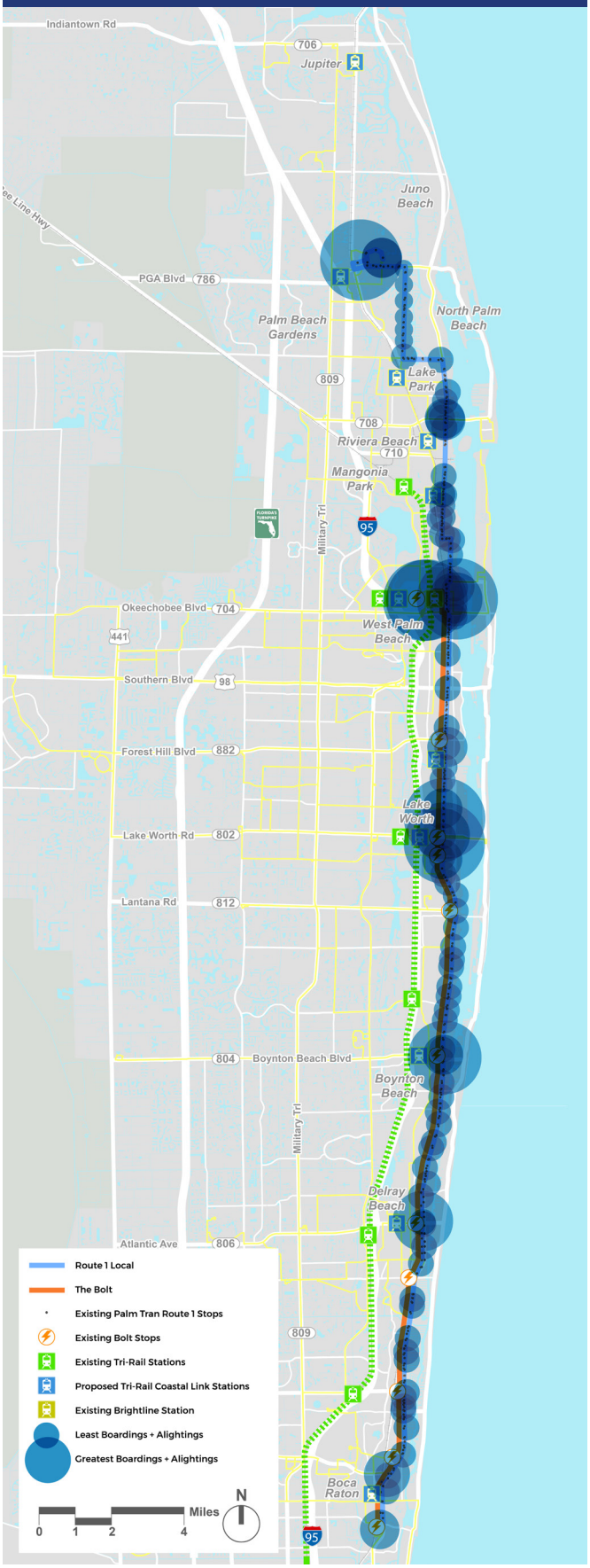
of Route 1 riders do NOT transfer buses[2]

TABLE 1: US-1 STUDY AREA TRANSIT SERVICE CHARACTERISTICS

	ROUTE 1	THE BOLT	TRI-RAIL
Hours of Operation	5:20 AM - 10:00 PM (Weekday) 6:20 AM - 10:00 PM (Saturday) 8:20 AM - 6:30 PM (Sunday)	7:00 AM - 9:00 AM (Weekday Morning) 3:00 PM - 5:00 PM (Weekday Afternoon) NO WEEKEND SERVICE	4:00 AM - 11:30 PM (Weekday) 5:30 AM - 11:45 PM (Weekend)
End Points	Boca Raton to Palm Beach Gardens	Boca Raton to West Palm Beach	Boca Raton Station to Mangonia Park Station
No. of Stops	443 Stops (5.5 Stops/Mile)	22 Stops (0.4 Stops/Mile)	6 Stations
Frequency	20 Minutes (Weekdays/Saturday) 30 Minutes (Sunday)	10 Minutes* *Includes Route 1 Overlap Service	20-60 Minutes (Weekday) 60 Minutes (Weekend)

[2] FDOT & Palm Tran, "Origin-Destination Survey," 2015.

FIGURE 3: EXISTING TRANSIT CONDITIONS



90%

of Route 1 riders WALK to their Stop[2]

TABLE 2: TOP TEN ROUTE 1 STOPS

	HIGHEST RIDERSHIP STOPS	AVERAGE WEEKDAY BOARDINGS
1	West Palm Beach Intermodal Transfer Center	885
2	Downtown Lake Worth *(Dixie Hwy @ Lucerne Ave)*	236
3	Downtown Lake Worth *(Dixie Hwy @ 2nd Avenue N)*	219
4	Downtown Boynton Beach *(Federal Hwy @ Boynton Beach Blvd)*	173
5	Downtown West Palm Beach *(Quadrille Blvd @ Evernia St)*	163
6	Downtown Boca Raton *(Dixie Hwy @ E Camino Real)*	151
7	The Gardens Mall	137
8	Riviera Beach @ Blue Heron	126
9	Downtown West Palm Beach *(Quadrille Blvd @ Banyan Blvd)*	98
10	Downtown Delray Beach *(Federal Hwy @ SE 1st St)*	91

ORIGIN AND DESTINATIONS

In 2015, FDOT conducted an on-board survey on behalf of Palm Tran. Part of this included an Origin Destination (OD) Survey where participants where asked for the addresses of the locations they were coming from and going to. Using the zip codes provided, the Study Team identified origin destination pairs, as shown in **Figure 7**. Based on the survey participants, the top origin-destination pairs were:

1. West Palm Beach – Lake Worth
2. West Palm Beach – West Palm Beach (internal)
3. West Palm Beach – Palm Beach Gardens
4. West Palm Beach – Riviera Beach
5. Boca Raton - Delray Beach

From the OD study, the Study Team was able to determine the length of transit trips on Route 1, shown in **Figure 4**. Based on survey responses, most trips on Route 1 are 15 miles or less, indicating very few users are traveling from end to end on Route 1.

RIDERSHIP & PASSENGER LOAD FACTORS

Route 1, including The Bolt, carries the most passengers in the Palm Tran system. According to Palm Tran's recently adopted Transit Development Plan (TDP) for Fiscal Years (FY) 2017 – 2026, ridership on Route 1 accounts for 24% of the total system users. Route 1 also connects to five of the other top ten routes in the system.

Palm Tran provided Automated Passenger Counter (APC) data for March 2017. From that dataset (**Figure 5**), ridership was shown to be stable and Route 1 averaged more than 7,400 boardings per weekday and The Bolt averaged 90 boardings per weekday.

The data also suggested that ridership is similar during the weekdays and the weekends as shown in **Figure 6.**

FIGURE 4: AVG TRIP LENGTH

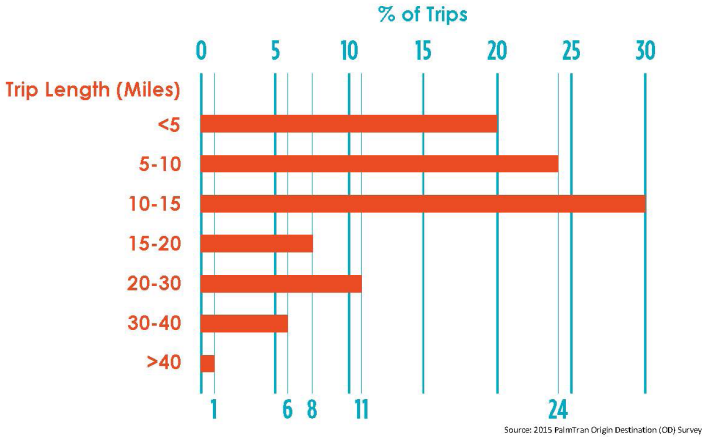


FIGURE 5: WEEKDAY RIDERSHIP MARCH 2017

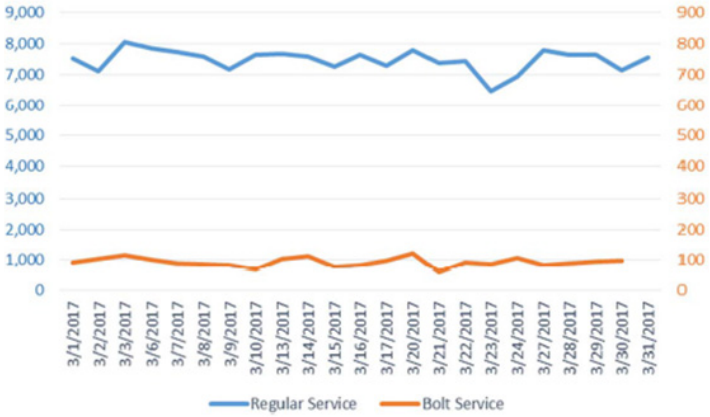


FIGURE 6: AVERAGE BOARDINGS BY HOUR - WEEKDAY VS. WEEKEND

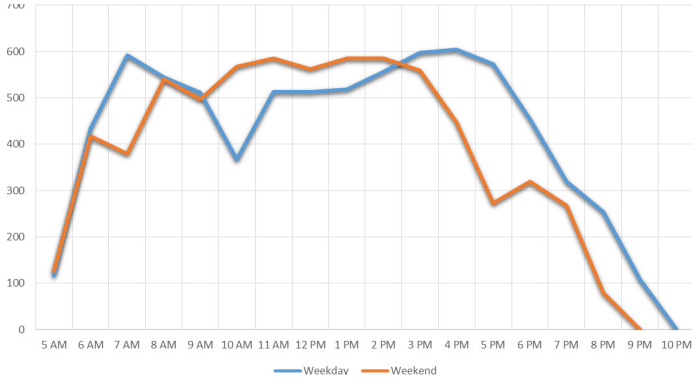
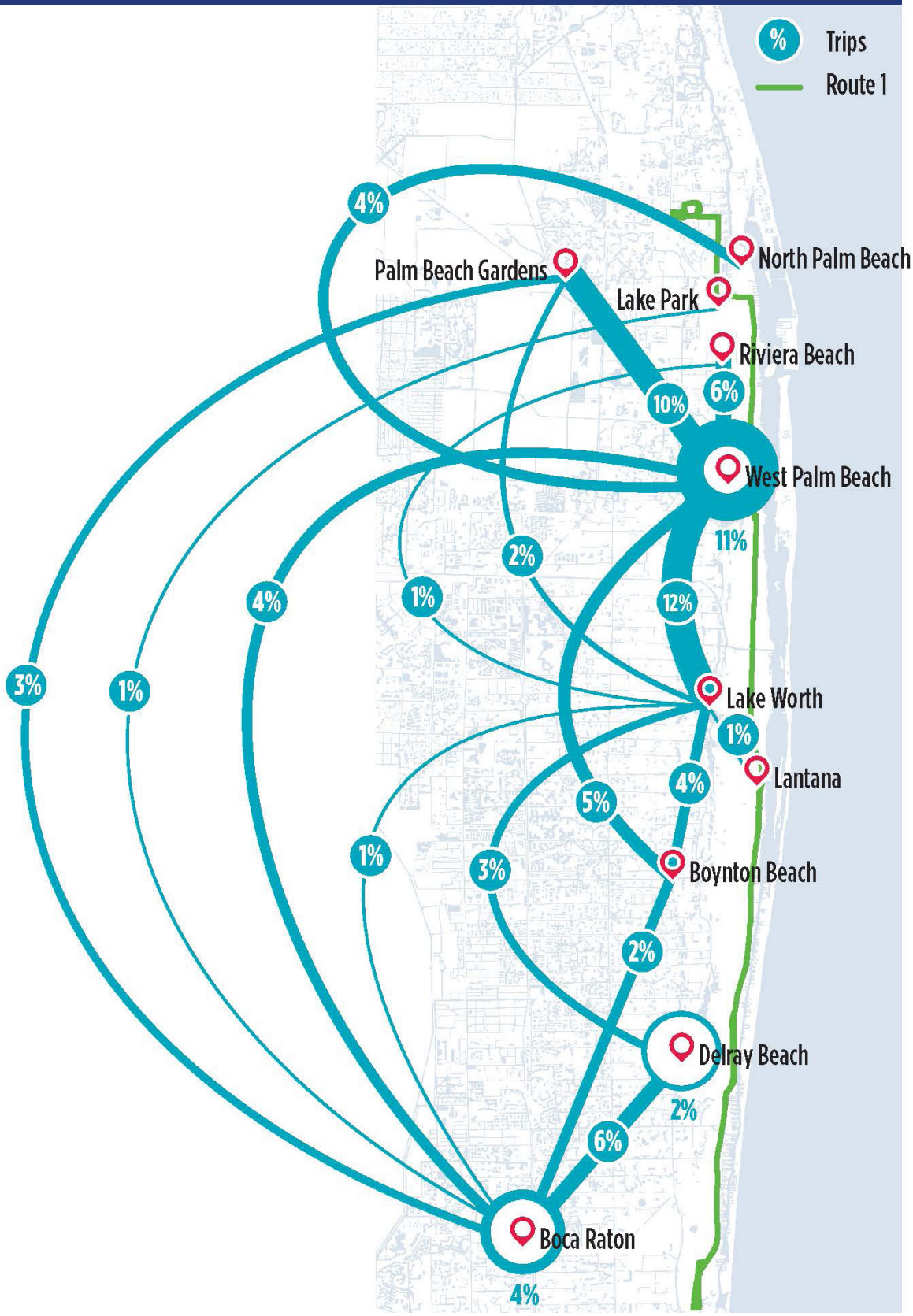


FIGURE 7: ORIGIN-DESTINATION PAIRS FROM 2015 PALM TRAN SURVEY



THE PROCESS

TRANSIT MODEL METHODOLOGY

The Study Team used the Florida Department of Transportation's (FDOT) Transit Boardings Estimation and Simulation Tool (TBEST) to evaluate the ridership impacts of the existing and PTX transit alternatives. TBEST accounts for various elements when producing ridership estimates including the number of transfers, the service frequency and distance between stops; time-of-day variations (i.e., peak travel patterns have greater service utilization forecasts), competition between routes, and the benefit of synchronized route relationships.

It is important to note that TBEST is a conservative ridership forecast tool. While TBEST uses GIS-based data to forecast future ridership, that data used does not account for increased ridership due to improve in passenger experience, enhancements in bicycle and pedestrian connections, future redevelopment projects, or future transit-related density policies. However, TBEST is appropriate for forecasting ridership in high-leveling, County-wide transit planning studies.

Palm Tran's 2017 validated TBEST model, which reflects existing conditions, was used for alternatives testing.

Data inputs include:

1. Palm Tran bus schedules with time points and route map
2. Broward County Transit (BCT) and South Florida Regional Transportation Authority (SFRTA) Tri-Rail bus and rail schedules with time points and route map
3. Operating characteristics for transit routes, including route type, headways, route length, days of service, service span, and fares
4. Observed average daily ridership by route
5. Socio-economic data (2010 census population, 2010 Info USA employment, and 2011 Florida Department of Revenue (FDOR) parcel-level land use)

SENSITIVITY TESTING

The Study Team tested several variations of The Bolt service in the Study Corridor to understand the sensitivity of the TBEST model to the following service elements: span of service, station density, station location, and operating segment.

The resulting scenarios were tested:

- **Existing Bolt from Boca Raton to West Palm Beach (2017 No-Build) –** Assumes 20-minute service for two hours a day and one hour during each peak period
- **Bolt 4-Hr Boca Raton to West Palm Beach –** Increased service to four hours a day and two hours during each peak period
- **Bolt 8-Hr Boca Raton to West Palm Beach –** Increased service to eight hours a day and four hours during each peak period
- **Bolt 8-Hr Boca Raton to West Palm Beach New Stop Locations –** Increased service to eight hours a day and four hours during each peak period. Used the proposed station locations for this segment of the corridor (Note: Travel time was not updated in the model to account for the increase in stops)
- **Bolt 2-Hr Boca Raton to Jupiter –** extended service for The Bolt to Jupiter. Used existing stop locations, span of service, and headways Assumed one mile stop spacing north of West Palm Beach

The results of the sensitivity testing are shown in **Table 3**. Ridership on The Bolt increased with corresponding increases to the span of service and the extension to Jupiter. The new station locations, combined with the increases to the span of service, resulted in significantly increased ridership – nearly nine times the base condition. In each case, improvements to The Bolt service maintained or increased ridership on the complementary local service. The model did not evaluate the travel times for the associated changes/additions to stop locations. However, empirical evidence suggests that model ridership will decrease as travel time increases.

TABLE 3: TBEST SENSITIVITY TESTING

	DAILY BOARDINGS				
	EXISTING BOLT 2-HR BOCA TO WPB (2017 NO-BUILD)	BOLT 4-HR BOCA TO WPB	BOLT 8-HR BOCA TO WPB	BOLT 8-HR BOCA TO WPB NEW STOP LOCATIONS	BOLT 2-HR BOCA TO JUPITER
The Bolt	93	108	257	712	195
Route 1 - Local	7,475	7,495	7,614	7,634	7,493

ANALYSIS METHODOLOGY

Conceptual alignments were developed for different aspects of the proposed US-1 premium transit service, designated the **Palm Tran Express (PTX)** for the purposes of the US-1 Multimodal Corridor Study. The PTX service is envisioned to be mixed-traffic corridor-based premium transit service that supplements the existing Route 1 with modified headways and is planned to operate in place of The Bolt, the current limited stop service. The Bolt currently serves 12 stop pairs with three runs during each of the weekday peak travel periods.

The travel market for the PTX service is expected to attract both reliant and choice transit riders with more efficient and reliable travel times due to focus on the high demand US-1 Corridor location (which is not currently served by Tri-Rail) and transit priority operating conditions proposed in cooperation with Palm Tran and Florida Department of Transportation. This new branded service is planned to include additional rider amenities (such as on-board WiFi, real time tracking, etc.) that will further attract ridership.

For the purposes of estimating service demand, this planning level alternatives analysis included:

- **Station Locations**
- **Route Alignments:** Connections between stations
- **Service Plans:** Frequency, span of service, time of day, days of week, adjustments to local service
- **Operating Segment** – alignment sub-segment(s) that benefit the most from premium transit

The alternatives screening took a three-tiered approach, each with a more detailed analysis. The analysis tiers are summarized in **Table 4** and explained in the subsequent memorandum sections.

TABLE 4: ANALYSIS METHODOLOGY

	TIER 0	TIER 1	TIER 2
Stations	Identify preliminary station locations based on: major cross streets, major transfers, high ridership locations, existing The Bolt stations, and proximity to existing/ proposed rail stations and major destinations	Refine station locations based on: underutilized/ vacant properties, area access, stakeholder input, stop spacing (1/4 – 1 mile), and agency input related to destination access and operating conditions	Refine station location based on pedestrian and bicycle accessibility to concentrations of employment and 0-car households
Alignments	Identify potential connections between station locations and existing transfer nodes based on current ridership levels, surveyed origin-destination pairs, and US-1 corridor trip generators	Route-level ridership of alternative alignments	
Operating Plan		Test alignments with 8-hour service, existing Bolt headways, revised travel time including additional stations	Model different headways and service hours; select preferred operating plan based on route-level ridership and operating cost
Operating Segment			Review stop level ridership to determine most productive combination of local and premium segments

STATION LOCATIONS

Based on FTA's ideal spacing characteristics[3] for bus rapid transit, the Study Team identified stop pairs along the Study Corridor with the goal of a stop every mile to one and a half miles. Stops were located on the far side of the intersection to improve operating conditions.

Preliminary station locations were identified based on the following criteria:

- Major cross streets
- Major bus transfer locations
- Existing Route 1 stops with more than 60 boardings per day in a single direction
- Existing stops for The Bolt service
- Connections to rail including the existing Tri-Rail, Brightline, and the proposed Tri-Rail Coastal Link
- Proximity/connection to major destinations (e.g. beaches, colleges, universities, medical centers, and major employers)

The preliminary station locations were developed in consultation with Palm Tran staff and discussed with participants attending six public charrettes held along the US-1 corridor between May and October 2017. Locations were refined based on additional information received including improved proximity and station spacing related to destination access, walking and waiting conditions, proximity to near term redevelopment and a proposed relocation of transfer activity in West Palm Beach.

Based on the input received, all proposed station locations were located within the Study Corridor, except where Route 1 deviates to serve the West Palm Beach Intermodal Transfer Center and The Gardens Mall and where an additional route deviation was proposed to serve the Bethesda Hospital East (at 26th Ave & South Seacrest Blvd), a major employer and health care provider adjacent to the Study Corridor.

The proposed station locations are shown in **Table 5** with the relevant Tier 0 analysis. The physical locations of the proposed stations are shown in **Figure 8**.

[3] Federal Transit Administration (FTA), "Planning for Transit-Supportive Development: A Practitioner's Guide," 2014.

TABLE 5: STATION LOCATION IDENTIFICATION

CITY	NORTH/SOUTH STREET	EAST/WEST STREET	MAJOR CROSS STREET	BUS TRANSFER	>60 BUS RIDERS/ DAY	EXISTING BOLT STOP	POTENTIAL CONNECTION TO RAIL	PROXIMITY TO DESTINATION
BOCA RATON	US-1 (Federal Hwy)	E Camino Real	√	√	√	√		√
	US-1 (Federal Hwy)	NE 2nd St	√	√			√	√
	US-1 (Federal Hwy)	E Glades Rd	√	√				√
	US-1 (Federal Hwy)	NE 20th St	√	√		√		√
	US-1 (Federal Hwy)	Spanish River Blvd	√			√	√	
Delray/ BOYNTON BEACH	US-1 (Federal Hwy)	Lindell Blvd	√	√				
	US-1 (Federal Hwy)	Linton Blvd	√	√		√	√	
	US-1 (Federal Hwy)	Atlantic Ave	√	√	√	√	√	√
	US-1 (Federal Hwy)	Gulfstream Blvd	√					
	S Seacrest Blvd*	26th Ave		√				√
	US-1 (Federal Hwy)	Woolbright Rd	√		√			
	US-1 (Federal Hwy)	Boynton Beach Blvd	√	√	√	√	√	√
	US-1 (Federal Hwy)	Gateway Blvd	√		√		√	
HYPOLUXO/ Lantana/ LAKE WORTH	US-1 (Federal Hwy)	Miner Rd			√			
	US-1 (Dixie Hwy)	Hypoluxo Rd	√	√	√			
	US-1 (Dixie Hwy)	W Lantana Rd	√	√	√			√
	US-1 (Dixie Hwy)	6th Ave S	√	√	√	√		
	US-1 (Dixie Hwy)	Lake/Lucerne Ave	√	√	√	√	√	√
	US-1 (Dixie Hwy)	10th Ave N	√	√	√			
WEST PALM BEACH	US-1 (Dixie Hwy)	Gregory Rd			√		√	
	US-1 (Dixie Hwy)	Forest Hill Blvd	√	√		√		
	US-1 (Dixie Hwy)	SR-80	√	√				
	US-1 (Dixie Hwy)	Belvedere Rd	√	√				
	US-1 (Dixie Hwy)	Okeechobee Blvd (Tent Site)	√	√			√	√
	US-1 (Quadrille Blvd)	Clematis St		√	√		√	√
	US-1 (Dixie Hwy)	Palm Beach Lakes Blvd	√					√
	US-1 (Dixie Hwy)	Northwood Rd	√		√			√
	US-1 (Broadway)	45th St	√		√		√	√
RIVIERA/ LAKE PARK/ NORTH PALM BEACH	US-1 (Broadway)	W 13th St	√				√	√
	US-1 (Broadway)	W Blue Heron Blvd	√	√	√			
	US-1 (Federal Hwy)	Park Ave	√	√				√
	US-1 (Federal Hwy)	Northlake Blvd	√	√				
	Alt A1A*	Northlake Blvd	√	√				
	Alt A1A*	Burns Rd	√	√				
	Alt A1A*	Lake Victoria Gardens Ave	√	√			√	√
PALM BEACH GARDENS/ JUNO BEACH/ JUPITER	The Gardens Mall Transfer Hub*			√	√		√	√
	Minsk Gardens Blvd*	PGA Blvd		√			√	√
	US-1	PGA Blvd	√	√			√	√
	US-1	Seminole Blvd						√
	US-1	Donald Ross Rd	√					
	US-1	Harbourside Place	√					√

* Station location is off the US-1 Corridor

FIGURE 8: STATION LOCATIONS

CONCEPTUAL ALIGNMENTS

The Study Team tested three initial alignments for the proposed PTX service (**Figure 9**). All three alignments followed the same route from Boca Raton to West Palm Beach. Each alignment assumed the proposed PTX service *would not travel* to the West Palm Beach Intermodal Transfer Center (ITC) and instead connect to other routes via the proposed "Tent Site" at Okeechobee Blvd and US-1 (Dixie Highway/Quadrille Blvd). This aspect was incorporated into the TBEST model by eliminating the time associated with Route 1's diversion off the US-1 Corridor to serve the ITC.[1] Local service connections that occur at the ITC were not adjusted in the model and were assumed to continue at the proposed transfer site.

From West Palm Beach to Jupiter, three options were considered:

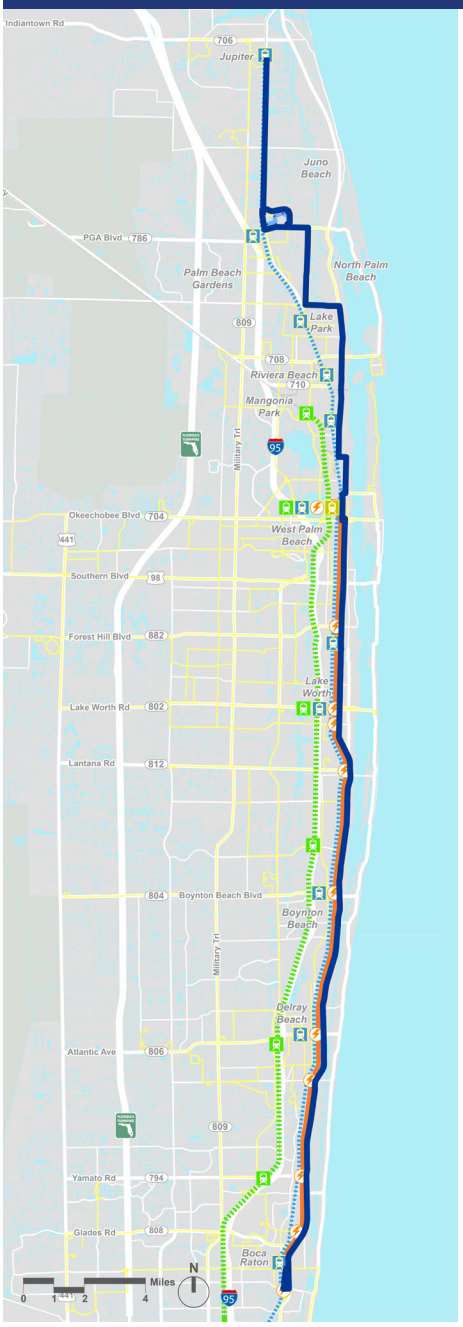
- **Alignment 1** – Follows the existing Route 1 to The Gardens Mall via Northlake Blvd and Prosperity Farms Rd from The Gardens Mall, the route follows SR 811 (Alternative A1A) to Jupiter where it terminates at the proposed Tri-Rail Coastal Link station at Toney Penna Dr.
- **Alignment 2** – Follows the existing Route 1 to Northlake Blvd, bypasses the deviation to The Gardens Mall, and continues on US-1 to SR 706 (Indiantown Rd) where the route terminates at the proposed Tri-Rail Coastal Link station at Toney Penna Dr.
- **Alignment 3** – With the exception of a deviation to serve the Bethesda Hospital, the alignment follows the existing Route 1 to The Gardens Mall via Northlake Blvd and Alternative A1A. From The Gardens Mall, the route continues on PGA Blvd back to the US-1 Corridor onto Jupiter where the route terminates at Harbourside Place.

Alignment 3 was chosen because it serves the Gardens Mall, Palm Beach State College, and Harbourside Place. While this alignment does not connect to Tri-Rail in Indiantown, it does provide a connection to Tri-Rail at Lake Victoria Gardens Ave.

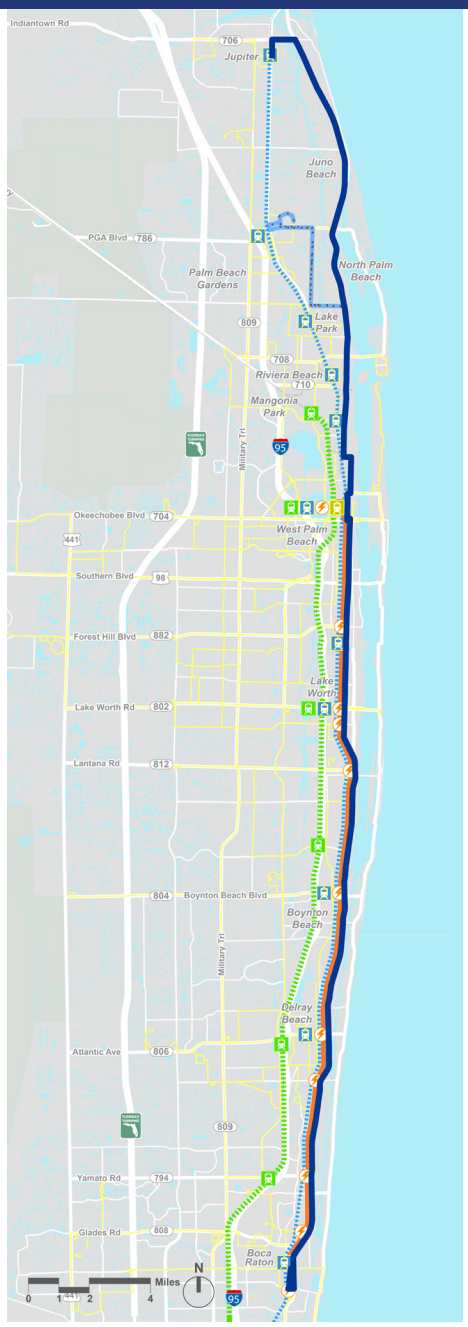
The travel time for PTX was estimated by interpolating the travel time between the local service and The Bolt, based on the number of stops. The travel speed for PTX was shown to be faster than the local service and slightly slower than the existing Bolt service based on the increased number of stop locations.

[1] In the absence of the Tent Site Transfer Center, a mid-route transfer could be introduced where buses leave and reenter US-1 for the West Palm Beach Intermodal Transfer Center eliminating a forced layover for passengers continuing on US-1. This is occurring informally today and could be built into the schedule for trips north of the ITC. This mid-route transfer on the PTX was not tested in TBEST but assumed buses would travel through West Palm Beach.

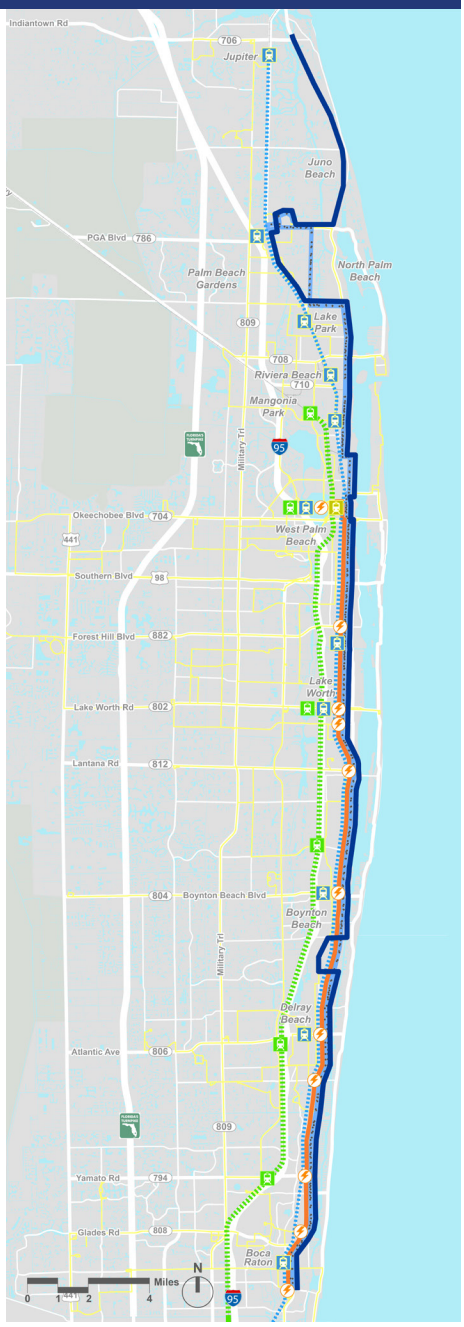
FIGURE 9: ALIGNMENTS



ALIGNMENT 1



ALIGNMENT 2



ALIGNMENT 3

OPERATING SEGMENT PLANS

The Study Team identified the minimum operating segment (MOS) to determine the portion of the Study Corridor that would most benefit from premium transit relative to the operating cost of providing service over various distances. Based on a review of existing Route 1 ridership, origin, and destination information, the MOS from Boynton Beach to Riviera Beach would benefit the most from premium transit.

Three operating segments were created to serve the US-1 Corridor (**Figure 10**):

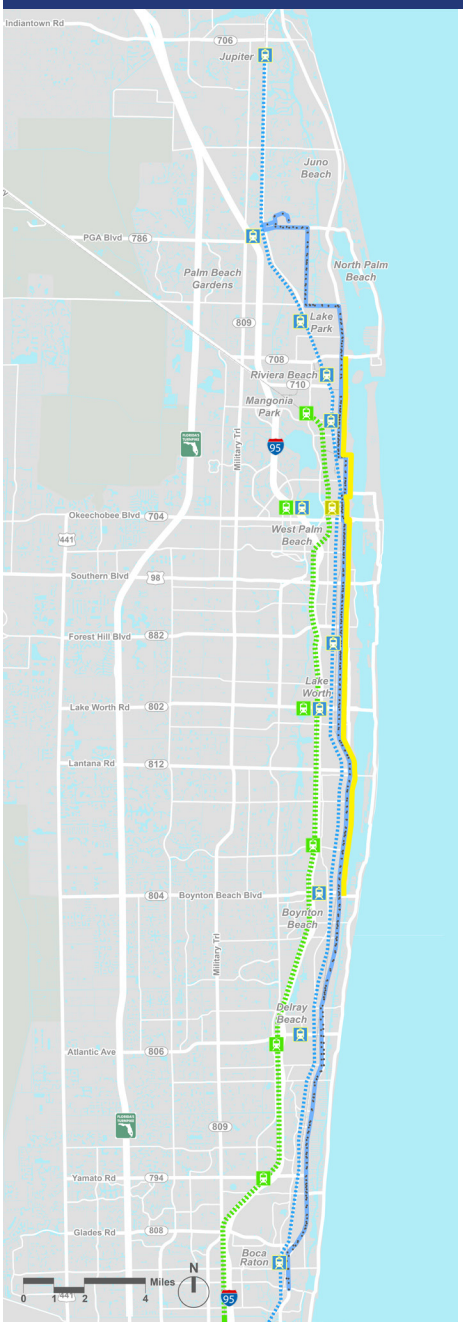
- **Yellow Line** – Boynton Beach to Riviera Beach (no mid-route layover)
- **Blue Line** – Boca Raton to Riviera Beach with a mid-route layover in Boynton Beach
- **Green Line** – Boynton Beach to Jupiter with a mid-route layover in Riviera Beach

A series of alternatives were created by combining these operating segments with different service plans. The alternatives are summarized in **Table 6** and graphically shown in **Figures 11 and 12**.

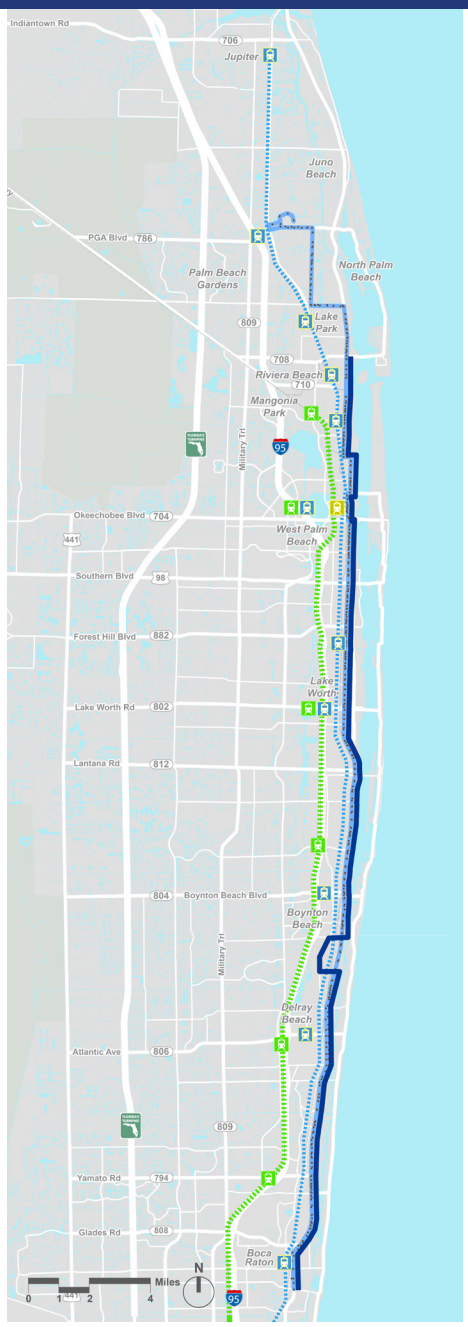
In each alternative, the current local Route 1 service continues between Boca Raton and The Gardens Mall.

The Study Team explored increasing the Route 1 headway from 20-minutes to 30-minutes to provide a budgetary portion of the service hours/operating cost to operate the proposed PTX service.

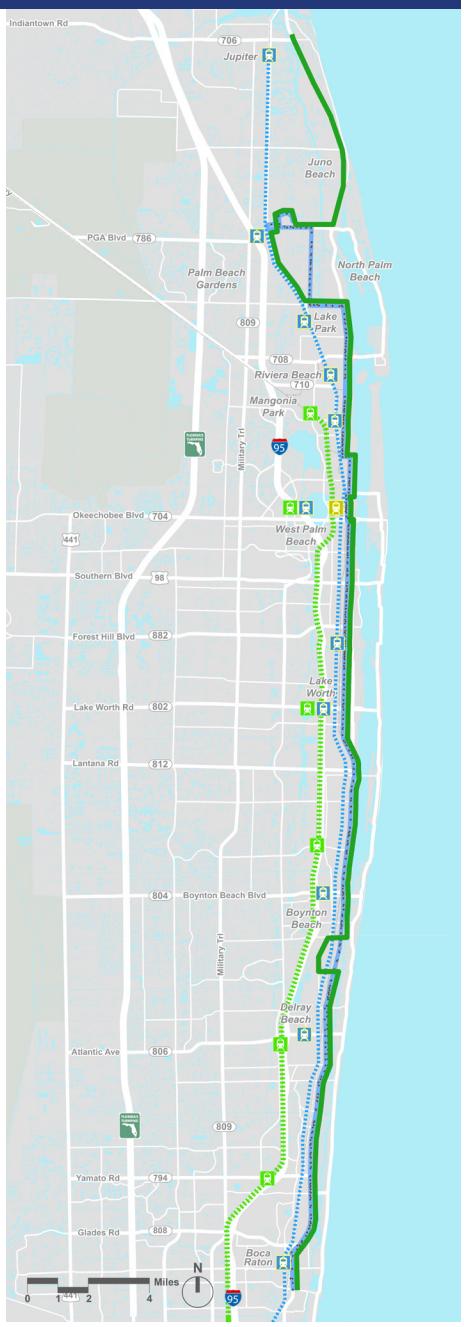
FIGURE 10: OPERATING SEGMENT ALTERNATIVES



PTX YELLOW LINE



PTX BLUE LINE



PTX GREEN LINE

TABLE 6: PTX ALIGNMENTS

	EXISTING		PTX YELLOW (ALT 1)		PTX YELLOW (ALT 2)		PTX YELLOW (ALT 3)	
	ROUTE 1	THE BOLT	ROUTE 1	"PTX"	ROUTE 1	"PTX"	ROUTE 1	"PTX"
ROUTE ASSUMPTIONS								
ALIGNMENT	Boca Raton to Gardens Mall	Boca Raton to WPB ITC	-	Boynton Beach to Riviera Beach[A]	-	Boynton Beach to Riviera Beach[A]	-	Boynton Beach to Riviera Beach[A]
ROUTE LENGTH	42 mi	28 mi	-	19 mi[B]	-	19 mi[B]	-	19 mi[B]
STOP PAIRS	172 stops	12 stops	-	19 stops[C]	-	19 stops[C]	-	19 stops[C]
HEADWAY	20 min	20 min	30 min[D]	20 min[E]	30 min[D]	10 min[F]	30 min[D]	20 min[E]
SPAN OF SERVICE (AM/PM/ NIGHT)	17 hrs	2 hrs (1/1/0)	-	9 hrs (4/4/1)[G]	-	9 hrs (4/4/1)[G]	-	17 hrs[H]
SERVICE OUTCOMES								
DAILY BOARDINGS	7,560		+ 111 Riders per Day		+ 304 Riders per Day		+ 505 Riders per Day	
ANNUAL BOARDINGS	1,922,272		+ 26,162 Riders per Year		+ 75,184 Riders per Year		+ 126,238 Riders per Year	
ANNUAL OPERATING COST	$5,478,018		- $881,634		+ $287,274		+ $663,702	
SUMMARY OF CHANGES			[A]New Premium Transit Route Alignment					
			[B]Lower Premium Transit Route Length					
			[C]Additional Premium Transit Stop Pairs					
			[D]Reduced Headways on Route 1					
			[E]Same Headway on Premium Transit					
			[F]More Frequent Headway on Premium Transit					
			[G]7 hour increase to Span of Service					
			[H]15 hour increase to Span of Service					

FIGURE 11: PTX YELLOW WITH STOP LOCATIONS

TABLE 6: PTX ALIGNMENTS

	EXISTING		PTX BLUE (ALT 1)		PTX BLUE (ALT 2)		PTX GREEN	
	ROUTE 1	THE BOLT	ROUTE 1	"PTX"	ROUTE 1	"PTX"	ROUTE 1	"PTX"
ROUTE ASSUMPTIONS								
ALIGNMENT	Boca Raton to Gardens Mall	Boca Raton to WPB ITC	-	Boca Raton to Riviera Beach[A]	-	Boca Raton to Riviera Beach[A]	-	Boca Raton to Jupiter[A]
ROUTE LENGTH	42 mi	28 mi	-	33 mi[B]	-	33 mi[B]	-	42 mi[B]
STOP PAIRS	172 stops	12 stops	-	30 stops[C]	-	30 stops[C]	-	41 stops[C]
HEADWAY	20 min	20 min	30 min[D]	20 min[E]	30 min[D]	20 min[E]	30 min[D]	20 min[E]
SPAN OF SERVICE (AM/PM/ NIGHT)	17 hrs	2 hrs (1/1/0)	-	9 hrs (4/4/1)[E]	-	13 hrs[F]	-	9 hrs (4/4/1)[E]
SERVICE OUTCOMES								
DAILY BOARDINGS	7,560		+ 559 Riders per Day		+ 807 Riders per Day		+ 1,205 Riders per Day	
ANNUAL BOARDINGS	1,922,272		+ 140,501 Riders per Year		+ 202,946 Riders per Year		+ 304,038 Riders per Year	
ANNUAL OPERATING COST	$5,478,018		+ $678,942		+ $980,694		+ $1,872,234	
SUMMARY OF CHANGES			[A]New Premium Transit Route Alignment					
			[B]Increased Premium Transit Route Length					
			[C]Additional Premium Transit Stop Pairs					
			[D]Reduced Headways on Route 1					
			[E]Same Headway on Premium Transit, 10-Minute Headways on PTX Yellow Alignment					
			[E]7-hour increase to Span of Service					
			[F]11-hour increase to Span of Service					

FIGURE 12: PTX BLUE AND GREEN ALIGNMENTS

STATION AREAS

STATION AMENITIES

TRANSIT CHARACTERISTICS

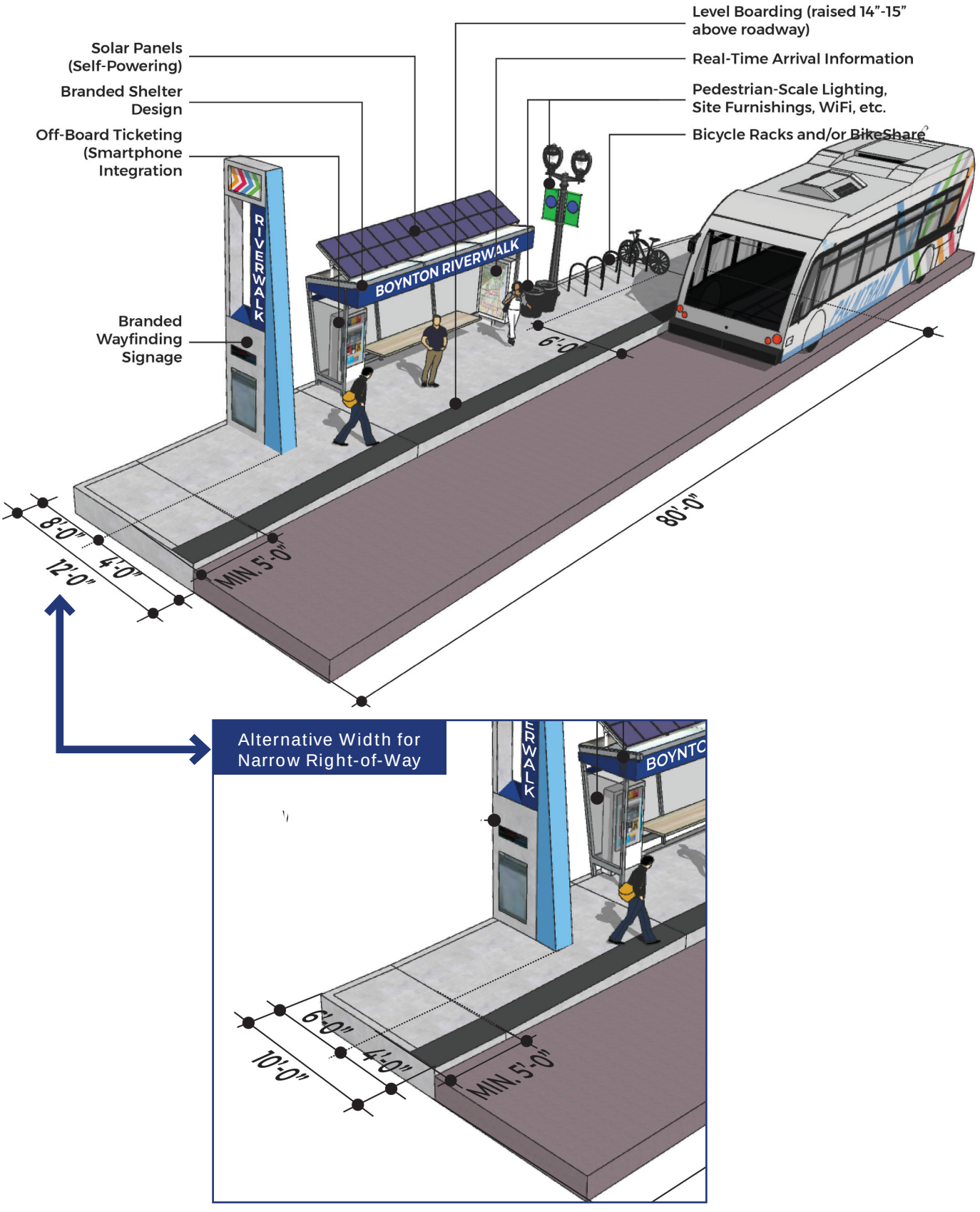
During the US-1 Multimodal Corridor Workshops, attendees were asked to rank their preference for various transit characteristics. As shown in **Table 7**, the highest preference was for the ability to bicycle or walk safely and comfortably to a given transit location. Attendees felt strongly that a station need to be well-lit and clean with seating and shade. The dependability and speed of the transit service was also preferred. Finally, attendees felt they would be more likely to use transit if the service was well branded and included technologic aspects like real time tracking and payment methods available through their smartphone.

Based on this input, **Figure 13** was generated to reflect the typical PTX Station Module and the "narrow" PTX Station Module.

TABLE 7: TRANSIT CHARACTERISTIC PREFERENCES

CHARACTERISTICS	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	TOTAL
WALKING/BIKING TO TRANSIT STOP	23	6	9	9	4	5	56
SAFE, WELL-LIT TRANSIT STOP	11	10	8	15	4	2	50
CONSISTENT ARRIVAL TIME	10	12	5	15	2	1	45
TIME/SPEED OF SERVICE	10	9	4	15	3	3	44
BRANDED BUS AND STATIONS	8	5	8	5	4	3	33
REAL-TIME TRACKING	4	5	4	12	4	3	32
APP-BASED PAYMENT METHOD	8	5	2	8	2	1	24
NUMBER OF TRANSFERS	6	7	1	5	2	0	21
VEHICLE BOARDING AND SEATING	1	3	0	4	2	0	10
STOP LOCATIONS	1	5	2	0	1	0	9

FIGURE 13: TYPICAL PTX TRANSIT STATION MODULE



STATION TYPOLOGIES

TYPICAL SITE CONDITIONS

Throughout the US-1 Corridor there are four typical site conditions for station areas:

1. **Urban Section (curb/gutter)** - 10' or 12' wide PTX stations *completely* within the existing US-1 right-of-way.
2. **Urban Section (curb/gutter)** - 10' wide PTX stations *partially* within US-1 right-of-way and *partially* requiring an easement from the adjacent property owner. (**Figure 14**)
3. **Rural Section (no curb/gutter)** - 12' wide PTX station *completely* within the existing US-1 right-of-way.
4. **Off-Street Stations** - PTX stations internal to a given public or private property. These stations are:

    1. NB/SB Camino Real
    2. NB/SB Okeechobee Boulevard (aka, "Tent Site")
    3. WB/EB Transfer Center at The Gardens Mall
    4. NB/SB Harbourside Place

STATION AREA TYPES

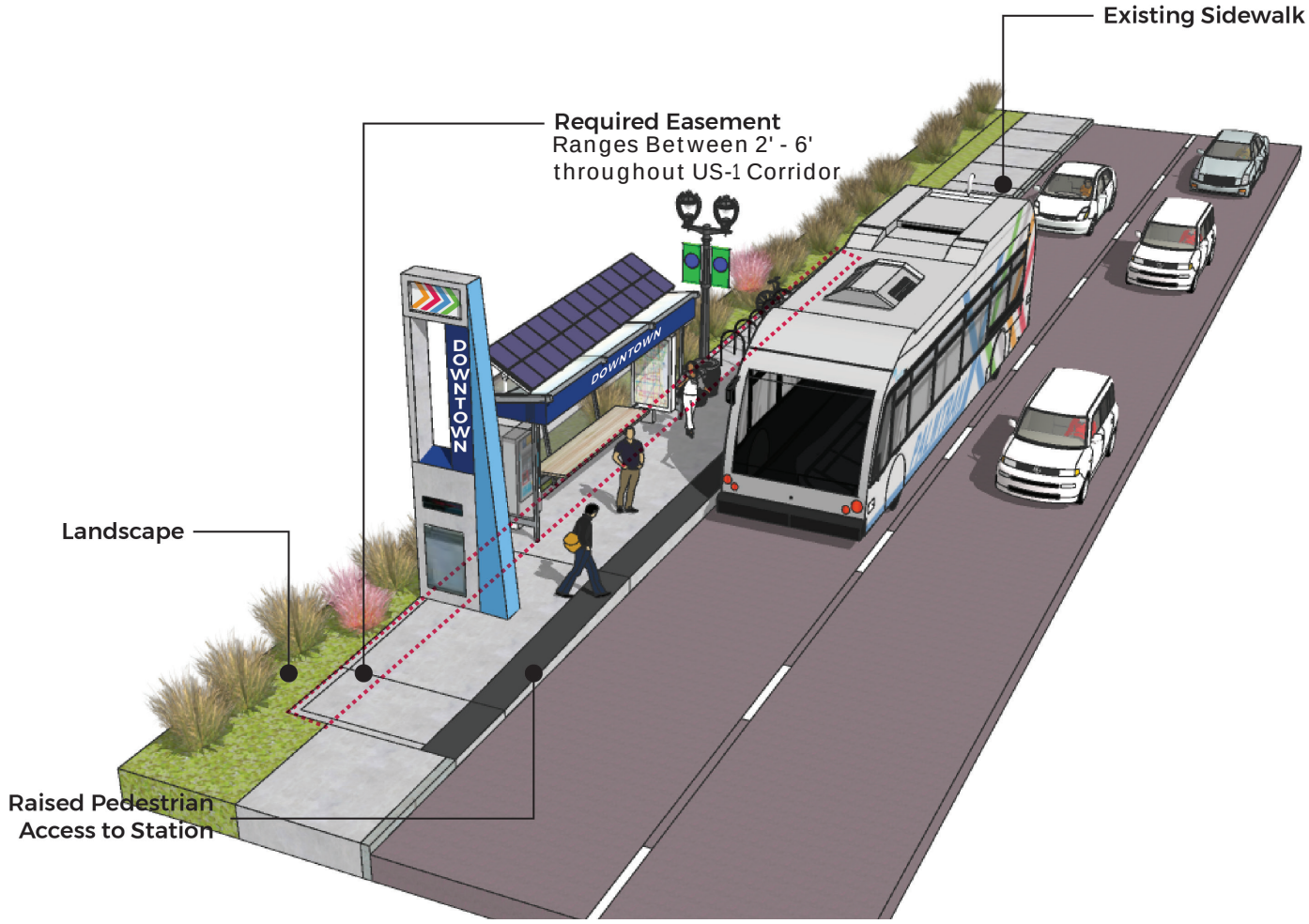
There are also two types of bicycle facility configurations along the US-1 Corridor - a protected facility separated from the roadway (Separated Bicycle Lane) and an on-street, buffered facility (Buffered Bicycle Lane). The typical site conditions were aligned with the bicycle configurations and a series of typical station typologies were generated. The distribution of these station types are shown in **Table 8**, organized by each proposed PTX alignment. The PTX Stations that do not require easements are shown in each station area type and bicycle facility configuration on the following pages in **Figures 15 - 17**.

TABLE 8: NORTHBOUND AND SOUTHBOUND PTX STATION TYPES

TYPE	URBAN SECTION STATIONS			RURAL SECTION STATIONS	OFF-STREET STATIONS	TOTAL STATION PAIRS
BICYCLE FACILITY LOCATION	BEHIND STATION	ON-STREET	ON-STREET REQUIRES EASEMENT	BEHIND STATION		
PTX YELLOW ALIGNMENT	0	26	10	0	2*	38
PTX BLUE ALIGNMENT	9	4	5	2	2**	22
PTX GREEN ALIGNMENT	2	6	6	4	4***	22
TOTAL	**11**	**36**	**21**	**6**	**8**	**82**

* NB/SB Okeechobee Boulevard (aka, "Tent Site")
** NB/SB Camino Real
*** WB/EB Transfer Center at The Gardens Mall and NB/SB Harbourside Place

FIGURE 14: TYPICAL PTX STATION AREA - URBAN SECTION REQUIRING EASEMENT



STATIONS (21) WITH THIS CONTEXT

1. SB NE 2nd Street
2. NB/SB Bethesda Hospital
3. NB/SB Boynton Riverwalk[1]
4. SB Downtown Boynton Beach[1]
5. NB Gateway[1]
6. SB Gateway[2]
7. NB/SB Miner[2]
8. SB Downtown Lantana[2]
9. NB 13th Street
10. SB 13th Street[3]
11. NB/SB Blue Heron
12. NB Lake Park[4]
13. SB Lake Park
14. EB Northlake
15. NB/SB Alt A1A
16. WB PGA

1 The City of Boynton Beach requires all new development to provide an easement from US-1 for public infrastructure, including transit uses, which would negate the need for additional ROW in these locations.

2 These stations are partially located within the existing railroad ROW. The overall transit station would be incorporated into both the railroad ROW and existing US-1 ROW to ensure space for sidewalks.

3 The required easement area is partially owned by the City of Riviera Beach CRA and within the public street ROW of old 13th Street.

4 The required easement area is owned by the Town of Lake Park as a part of Kelsey Park.

FIGURE 15: TYPICAL PTX STATION AREA - URBAN SECTION WITH SEPARATED BICYCLE LANE CONDITION

STATIONS (11) WITH THIS CONTEXT

1. NB/SB Glades
2. NB/SB NE 20th
3. NB/SB Spanish River
4. NB/SB Lindell
5. SB Linton
6. NB PGA
7. NB Seminole

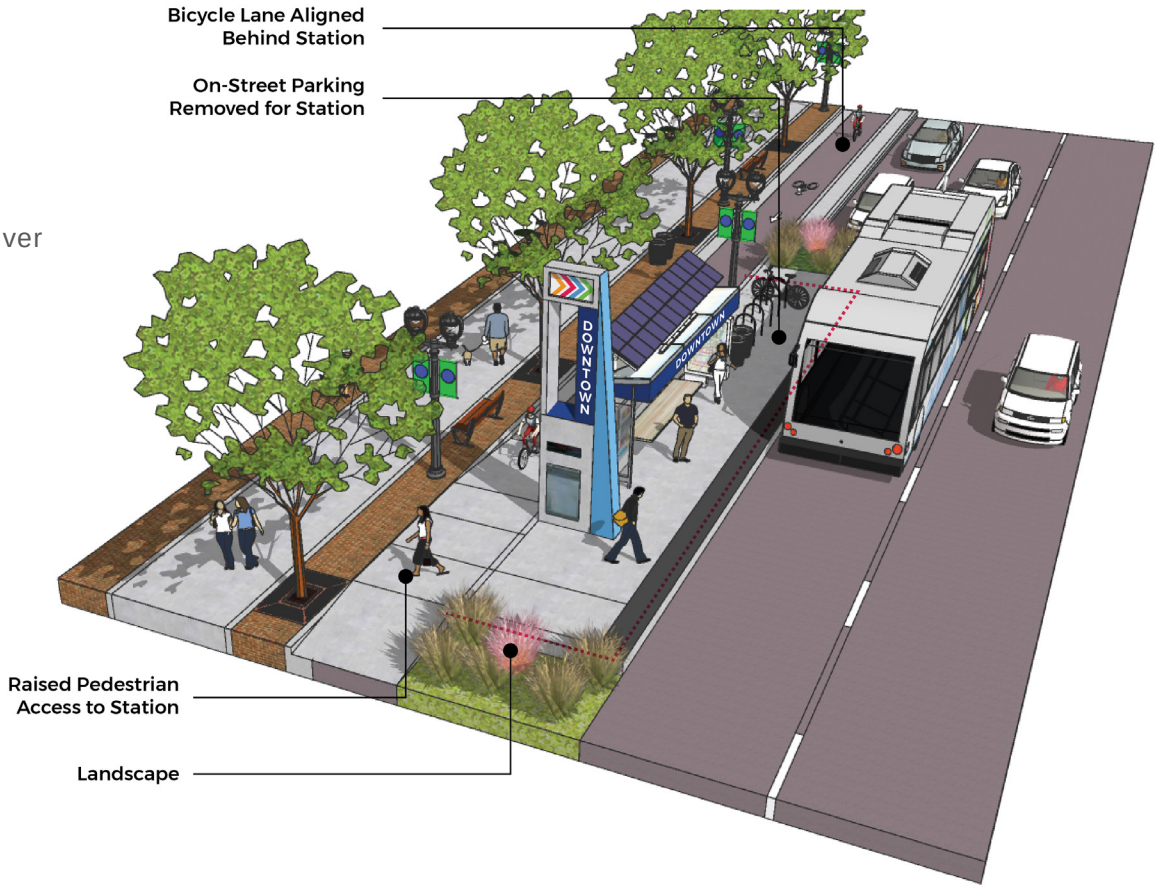


FIGURE 16: TYPICAL PTX STATION AREA - RURAL SECTION WITH SEPARATED BICYCLE LANE CONDITION

STATIONS (6) WITH THIS CONTEXT

1. NB/SB Gulfstream
2. SB Seminole
3. WB Palm Beach College
4. NB/SB Donald Ross

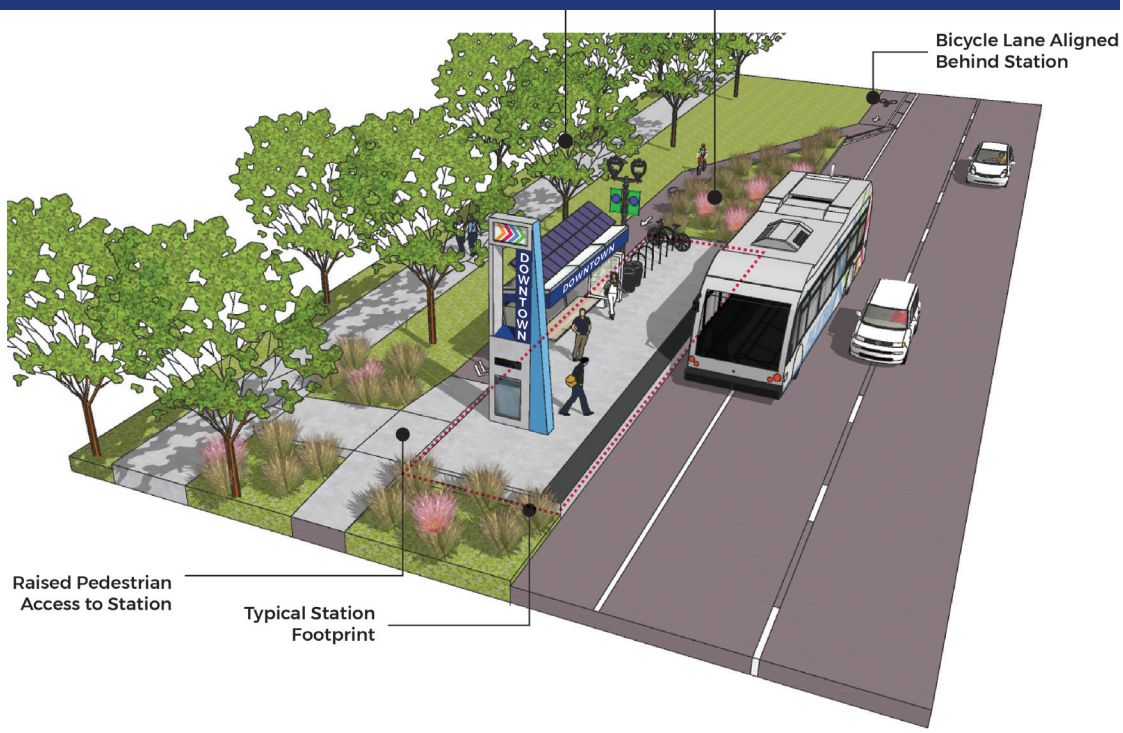
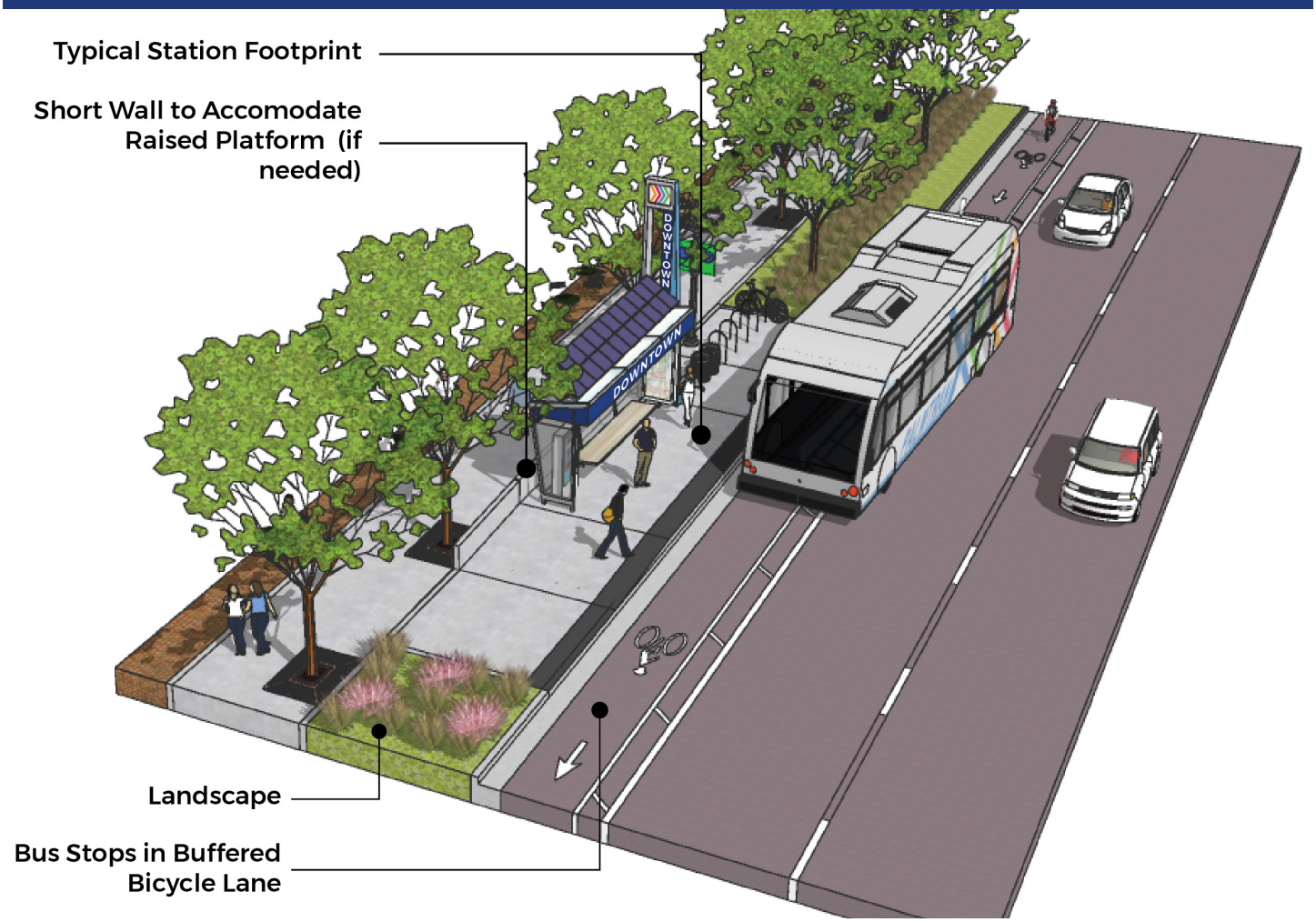


FIGURE 17: TYPICAL PTX STATION AREA - URBAN SECTION WITH BUFFERED BICYCLE LANE CONDITION



STATIONS (36) WITH THIS CONTEXT

1. NB NE 2nd Street
2. NB Linton
3. NB/SB Downtown Delray Beach
4. NB Downtown Boynton Beach
5. NB Downtown Lantana
6. NB/SB Lantana
7. NB/SB 6th Avenue
8. NB/SB Downtown Lake Worth
9. NB/SB 10th Avenue
10. NB/SB Gregory
11. NB/SB Forest Hill
12. NB/SB Southern
13. NB/SB Belvedere
14. NB/SB Downtown WPB
15. NB/SB Good Samaritan Hospital
16. NB/SB Northwood Village
17. NB/SB 45th Street
18. NB Northlake
19. NB/SB Burns
20. NB/SB Lake Victoria
21. EB Palm Beach College

BRANDING CONCEPTS

WORKSHOP BRAINSTORMING

During the six charrettes, participants, especially younger participants, were asked to envision concepts (**Figure 18**)for the design of the PTX vehicles as well as concepts for the PTX station facilities. Many designs were submitted and three (3) designs (**Figures 19 - 21**) were selected as potential branding options for the PTX service.

FIGURE 18: CONCEPTUAL BRANDING CONCEPTS

FIGURE 19: BUS BRANDING OPTION 1

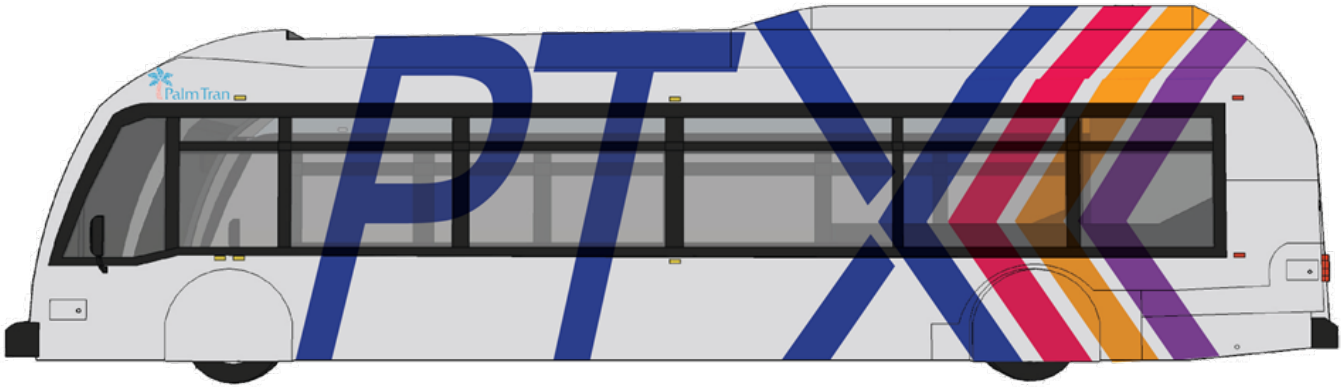


FIGURE 20: BUS BRANDING OPTION 2

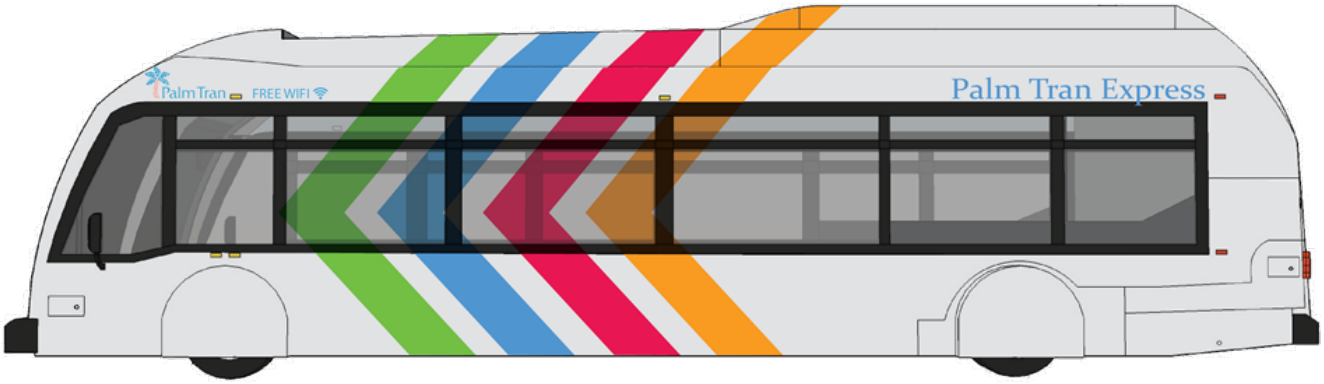
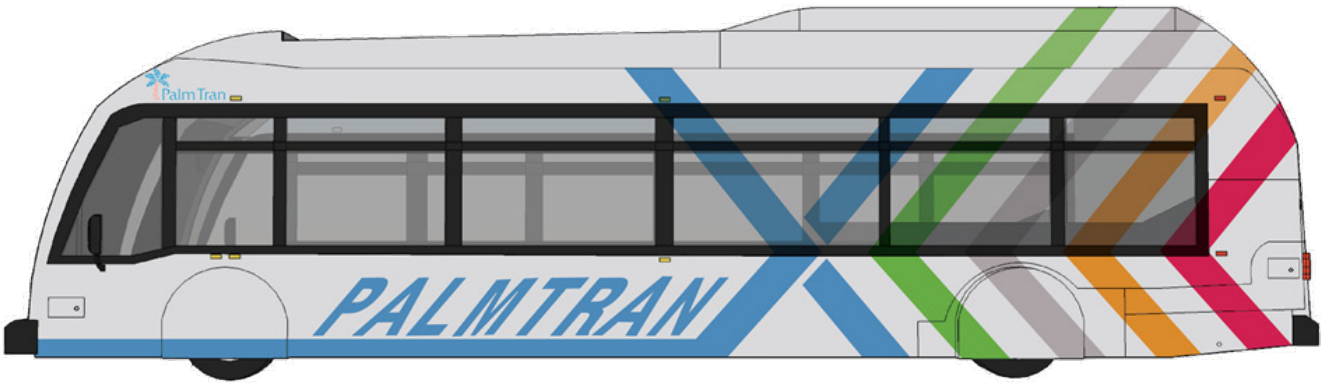


FIGURE 21: BUS BRANDING OPTION 3



TRANSIT-ORIENTED DEVELOPMENT

Transit-oriented development (TOD) is defined as "walkable, compact, mixed-use, higher-density development within walking distance of a transit facility." TOD's generally provides a mix of residential and commercial uses and is designed to make public transit successful, enhance the convenience and safety of walking and bicycling, and provide for a vibrant, livable community (**See Figure 22**). Zoning and land use policies can help support or inhibit the potential for a given TOD site. As part of US-1 Health Impact Assessment, the Study Team researched the industry best practices for supportive TOD uses. The research revealed a consistent approach for the following regulatory standards:

- **LAND USES:** A mix of uses in an area provides for an environment that promotes walking and allows for a variety of activities to occur without the need to use an automobile
- **ROADWAY SETBACKS:** How and where buildings are sited on a parcel provide the greatest site design opportunity to support the pedestrian network. The farther a building is setback from the roadway, the more challenging it is for a pedestrian and transit rider, in terms of general walkability and access, to surrounding land uses.
- **PARKING REQUIREMENTS:** In establishing maximum parking ratios, a development will not exceed typical "minimum" standards. High minimum parking standards are typically associated with more auto-oriented uses and does not encourage the use of other modes.
- **VEHICULAR STANDARDS:** Regulating block size creates a walkable area that provides for safe pedestrian access and linkages to and from transit areas. Cross access between parcels can create a connected network of vehicular and pedestrian access that will allow for movement internal to adjacent sites without needing to access US-1.
- **PEDESTRIAN STANDARDS:** Continuous pedestrian networks within a development or connections to adjacent developments are important to access a transit stop. Walkways should be well-lit and landscape plantings along pedestrian walkways can offer a sense of security and safety from vehicles in addition to share and comfort.
- **BUILDING FEATURES:** Entryways that face the street, and or the pedestrian connections contribute to higher walkability. Increased building transparency make connections with the inside of the building (seeing people, various activities, window shop) with the pedestrians walking on the sidewalk. Providing "eyes" on the street and contributes to the walking environment of an area.

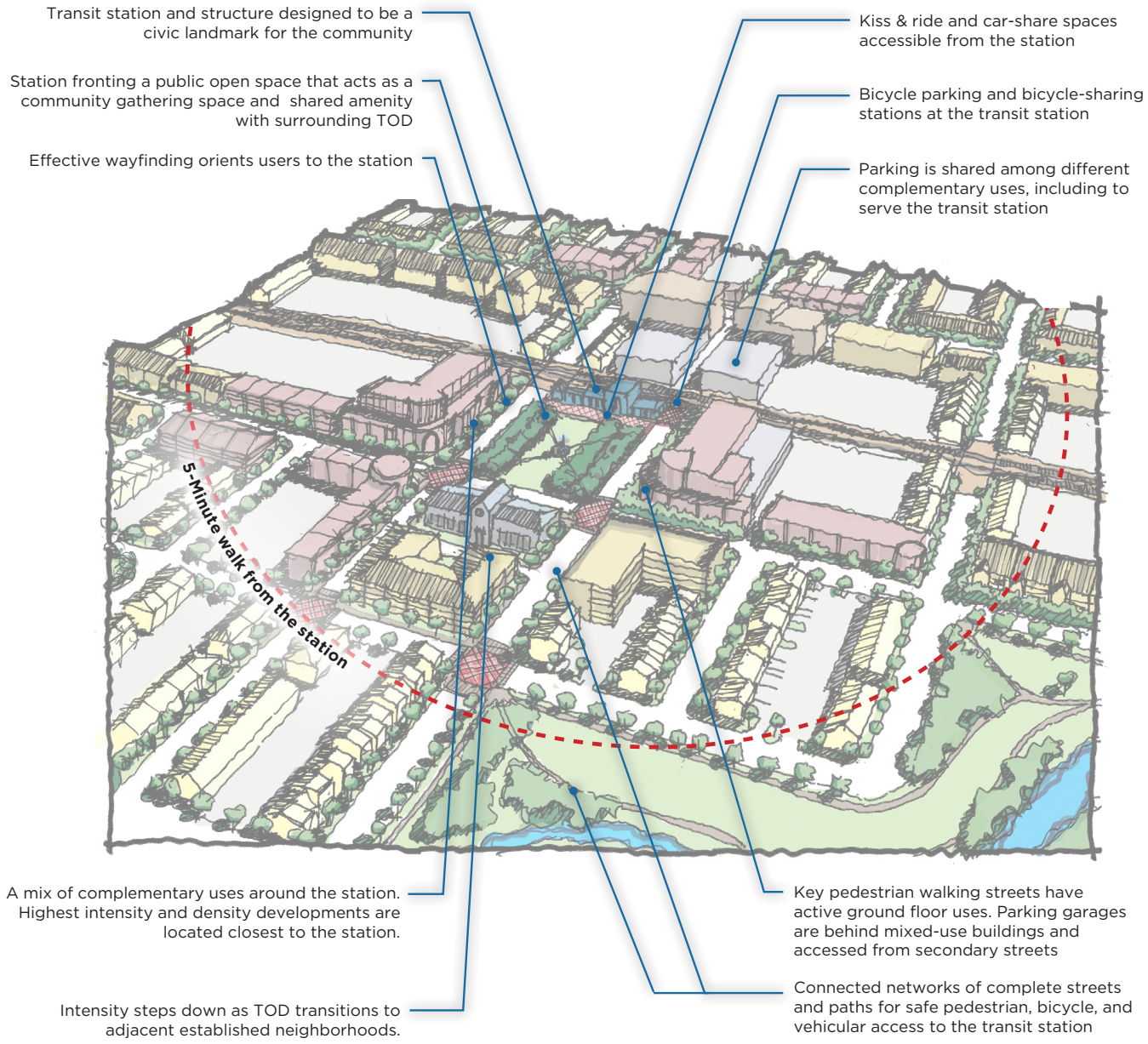
During each US-1 Multimodal Corridor Section Charrette, conceptual "opportunity sites" were generated for each opportunity area in a given section that was also identified as potential "PTX" station location. For each opportunity area, the Study Team conducted a review of existing land use conditions, along with transit and demographic makeup. Local agency partners were interviewed and provided general input on the direction of each plan. The final concept drawings developed illustrative urban design concepts of potential future land use scenarios within roughly a half-mile area of the potential station and were presented to the public at the closing meeting.

On the following pages, conceptual-level TOD scenarios were generated for each PTX station location along US-1. These scenarios are not meant to indicate any approved or proposed plans but to illustrate a possible and hypothetical development scenario and to understand how transit (both existing service and proposed service) and transit-supportive development interacts with land use planning and the Complete Streets investment. The scenarios are organize by municipality and include a bulleted highlight of the TOD intention for each PTX station.

FIGURE 22: FEATURES OF A SUCCESSFUL TOD

A transit-oriented development, at its best, is place that fully leverages the presence of transit to become a vibrant community node. As illustrated in the graphic below, a true TOD:

- Capitalizes on the synergy that occurs by locating the highest intensity of development in close proximity to transit;
- Utilizes street, site, and building design that prioritizes the pedestrian;
- Introduces a diversity of land uses and elements that contributes to a vibrant sense of place.



CITY OF BOCA RATON

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

SPANISH RIVER

- Town Center redevelopment with new, pedestrian-scaled streets, street-fronting buildings, and a mix of land uses including higher density residential
- Green/Park space as focus of redevelopment, green space should also function for stormwater management

GLADES

- Realign intersection for pedestrian safety
- Celebrate adjacent historic neighborhood
- A mix of land uses including higher density residential with new street-fronting buildings

DOWNTOWN BOCA

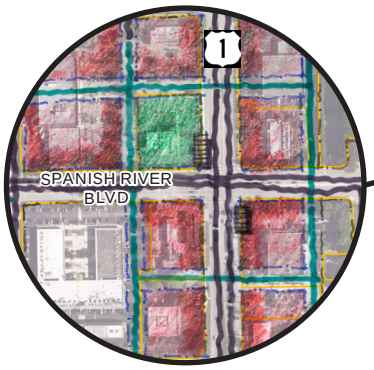
- A mix of land uses including higher density residential with street-fronting buildings
- Green/Park space as focus of redevelopment, green space should also function for stormwater management
- Connect to future rail with pedestrian bridge over railroad and Dixie Hwy

CAMINO REAL HUB

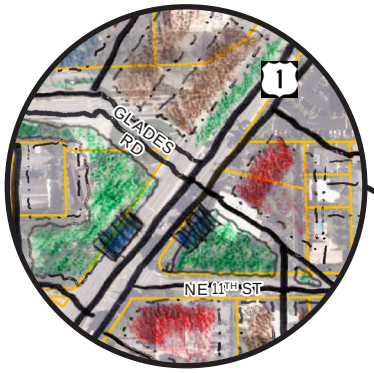
- Convert surface parking area to parking garage and new park space - parking to serve the City needs and a Southern Hub for PTX.
- Street-fronting, mixed-use new buildings
- Pedestrian connection to Boca Raton Train Station along Dixie Highway
- Focus on intersection crossing improvements

LEGEND

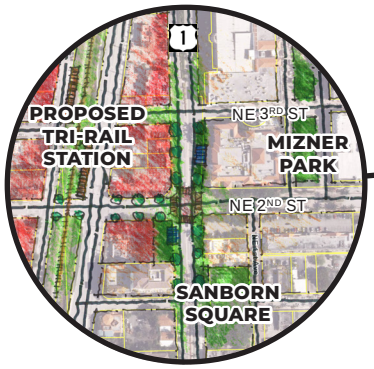
- New Street
- Pedestrian Connection
- Proposed PTX Location
- New Park Space
- New Mixed-Use
- New Residential
- New Parking Garage



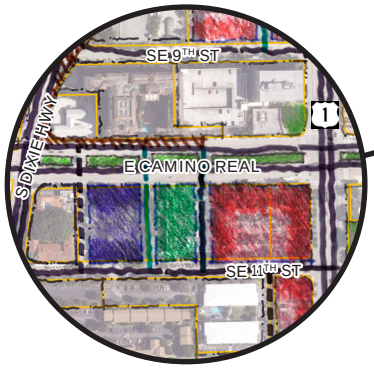
SPANISH RIVER



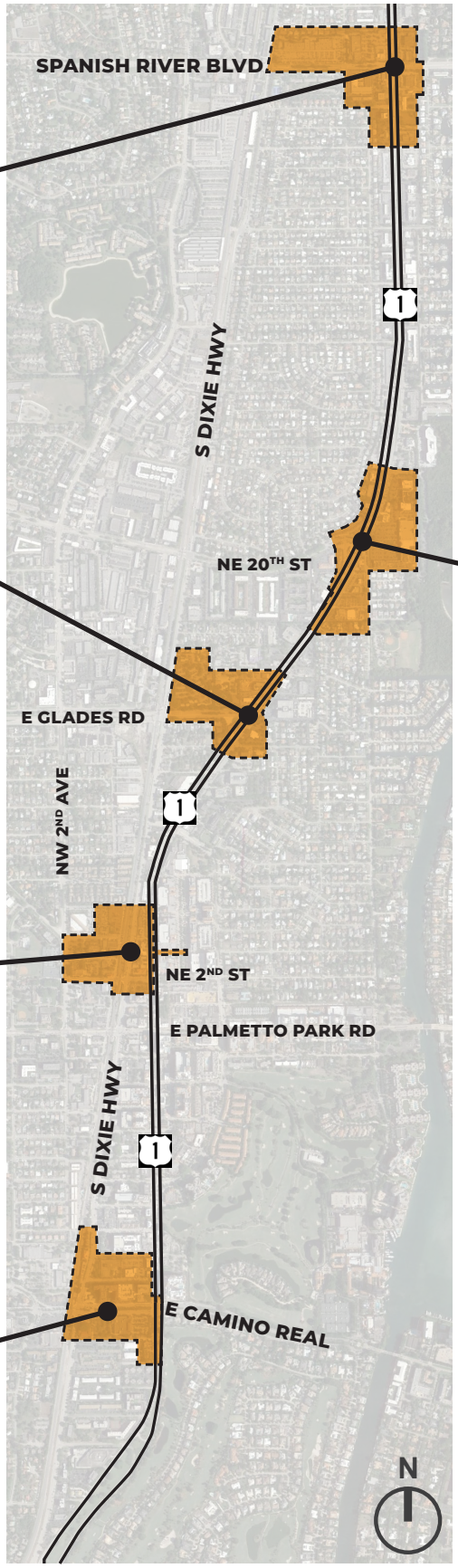
GLADES

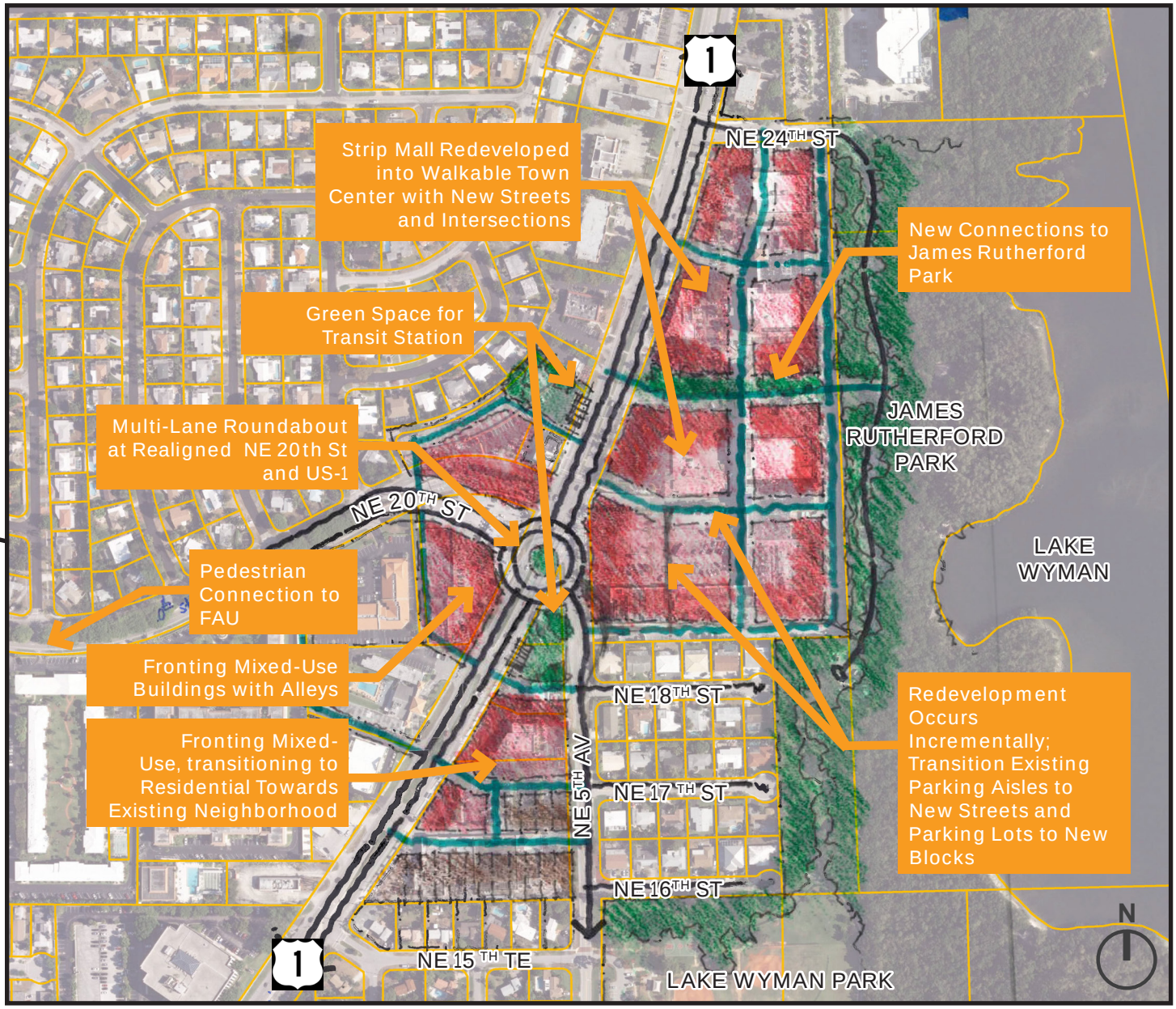


DOWNTOWN BOCA



CAMINO REAL HUB





NE 20TH STREET (FLORIDA ATLANTIC UNIVERSITY)

CITY OF DELRAY BEACH

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

DOWNTOWN DELRAY

- New PTX stations located within US-1 ROW on each direction
- Convert existing parking lot into “pocket park” to facilitate connections between stations and context-sensitive design for Downtown Delray Beach
- Green space should also function for stormwater management
- Examine potential for mid-block crossings at PTX station locations

LINTON

- Focus on intersection crossings
- Align crosswalks perpendicular to crossing street where appropriate
- Add street trees and landscape for pedestrian comfort

LINDELL

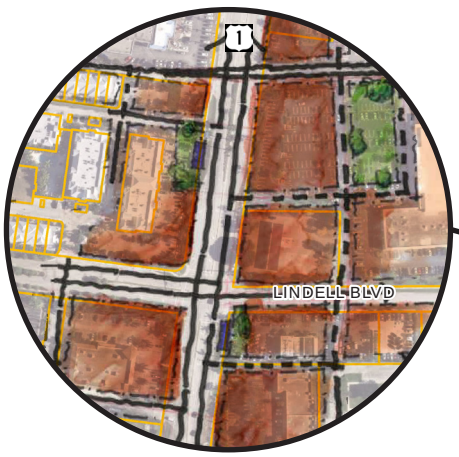
- Town Center redevelopment with new, pedestrian-scaled streets with a mix of land uses including higher density residential and street fronting buildings.
- Green/Park space as focus of PTX stations, green space should also function for stormwater management

LEGEND

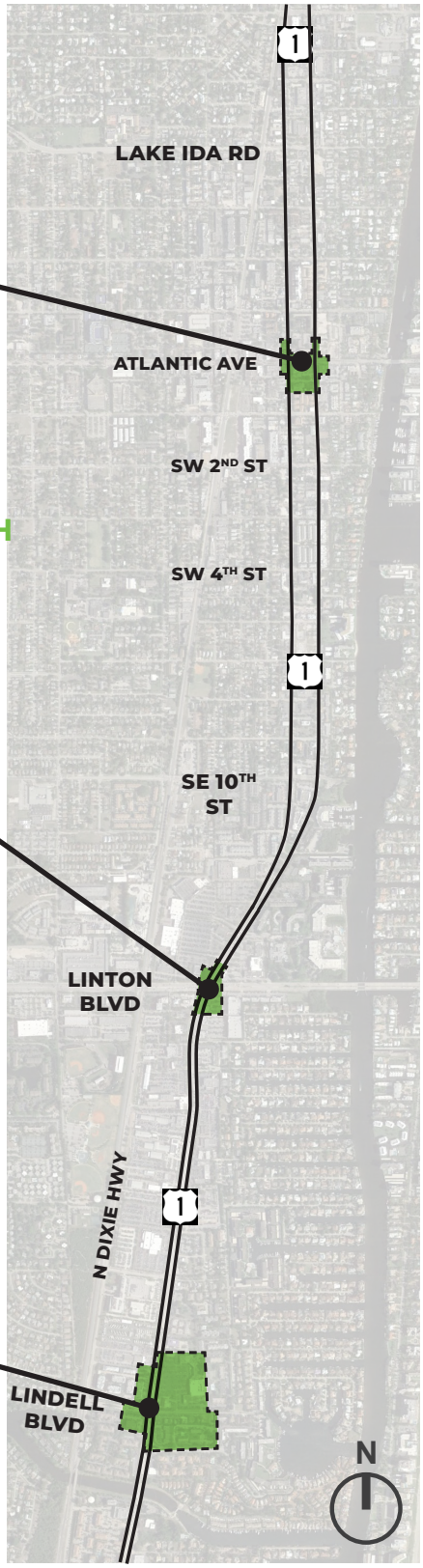
- New Street
- Pedestrian Connection
- Proposed PTX Location
- New Park Space
- New Mixed-Use
- New Residential

DOWNTOWN DELRAY BEACH

LINTON



LINDELL



TOWN OF GULF STREAM

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

GULF STREAM

- New PTX station located on Gulfstream Boulevard (PTX shift here to serve Bethesda Hospital on Seacrest Boulevard)
- PTX should connect to existing pedestrian walk from Walmart Super Center to Gulfstream Boulevard
- Enhance intersection crossings at Gulfstream Boulevard and US-1

GULF STREAM

CITY OF BOYNTON BEACH

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

GATEWAY

- Utilize portion of Intracoastal Park for new affordable housing
- Connect a new street parallel to US-1 on the east side
- Enhance crossing at Gateway Boulevard to facilitate pedestrians from retail area to park and PTX stations

BOYNTON RIVERWALK

- Continue to breakup large parcels into walkable block sizes
- Enhance existing pedestrian crossing on US-1 (just south of Woolbright Rd)
- Redevelop shopping center as new Town Center mixed-use project with higher density residential units and street-fronting buildings
- Connect new park space across US-1 to Boynton Riverwalk

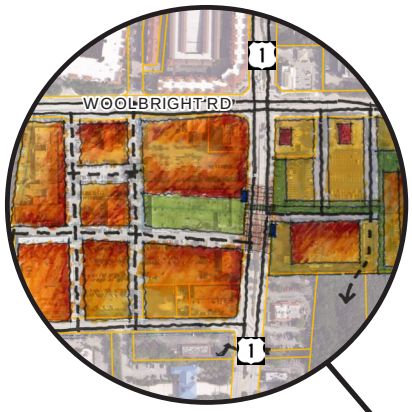
BETHESDA HOSPITAL

- Leverage existing hospital surface parking areas for new mixed-use (inc. medical with garage parking adjacent to PTX station
- Enhance pedestrian crossing at SE 26th Avenue and S Seacrest Boulevard
- Green/Park space as focus of PTX stations, green space should also function for stormwater management

LEGEND

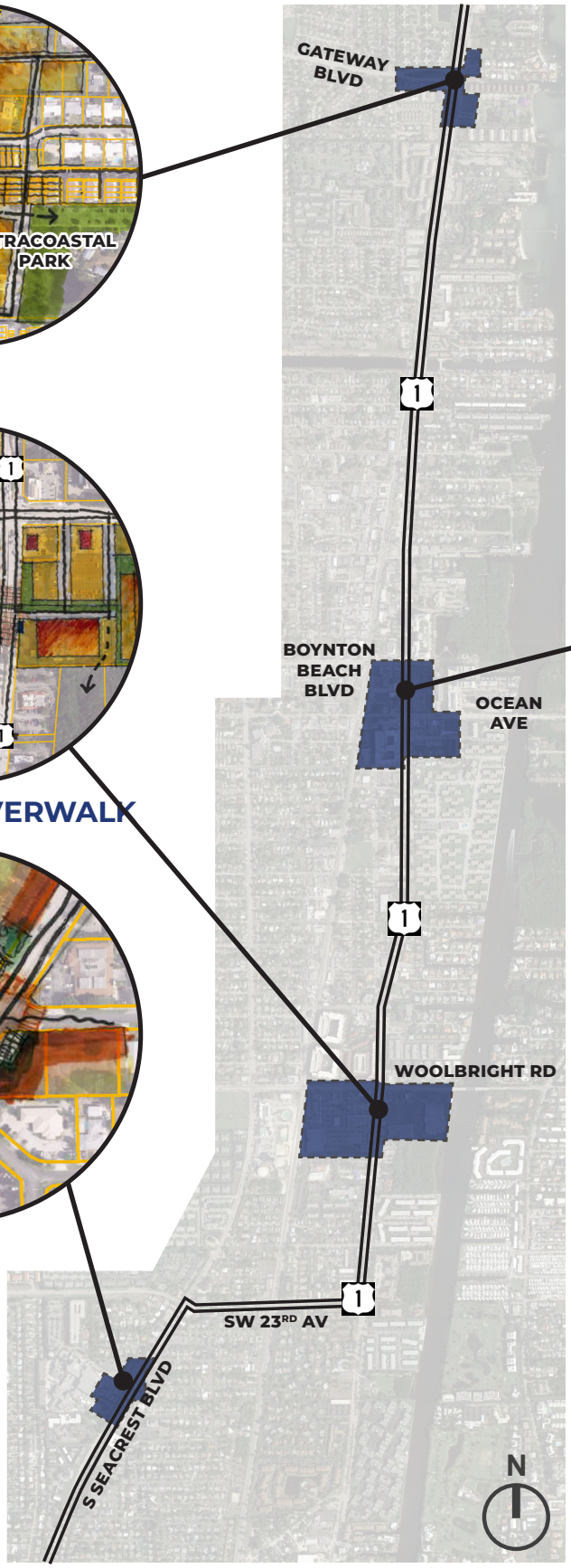
- New Street
- Pedestrian Connection
- Proposed PTX Location
- New Park Space
- New Mixed-Use
- New Residential

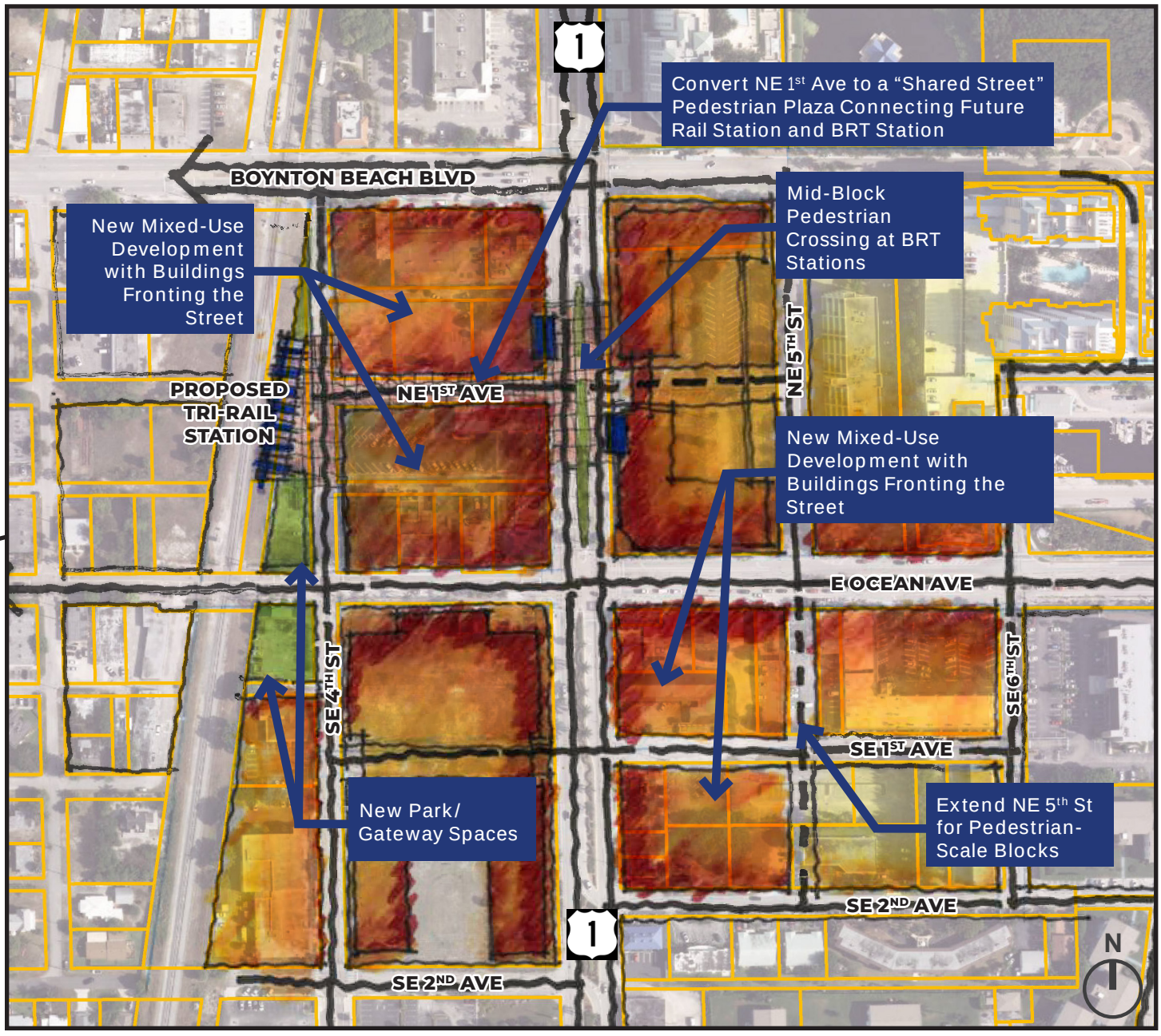
GATEWAY



BOYNTON RIVERWALK

BETHESDA HOSPITAL





DOWNTOWN BOYNTON

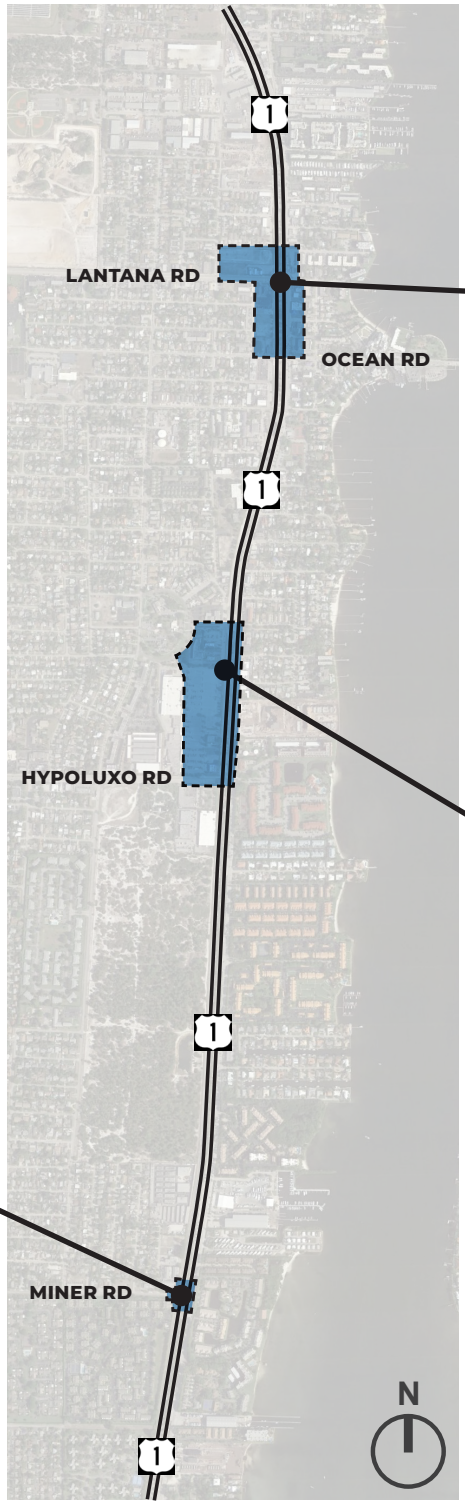
TOWN OF HYPOLUXO

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

MINER ROAD

- Enhance pedestrian crossings at Miner Road
- Connect to local grocery and residential areas

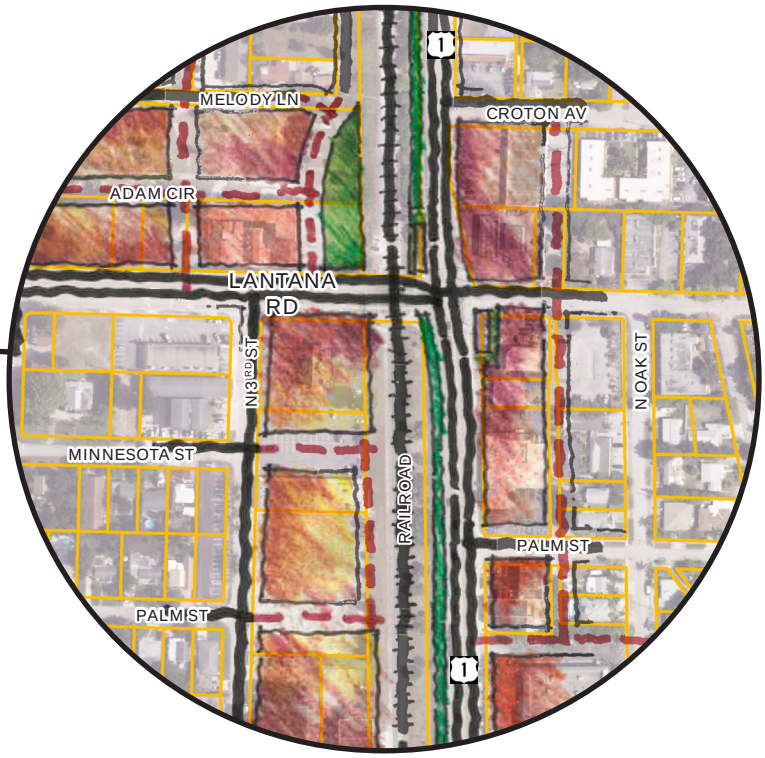
MINER ROAD



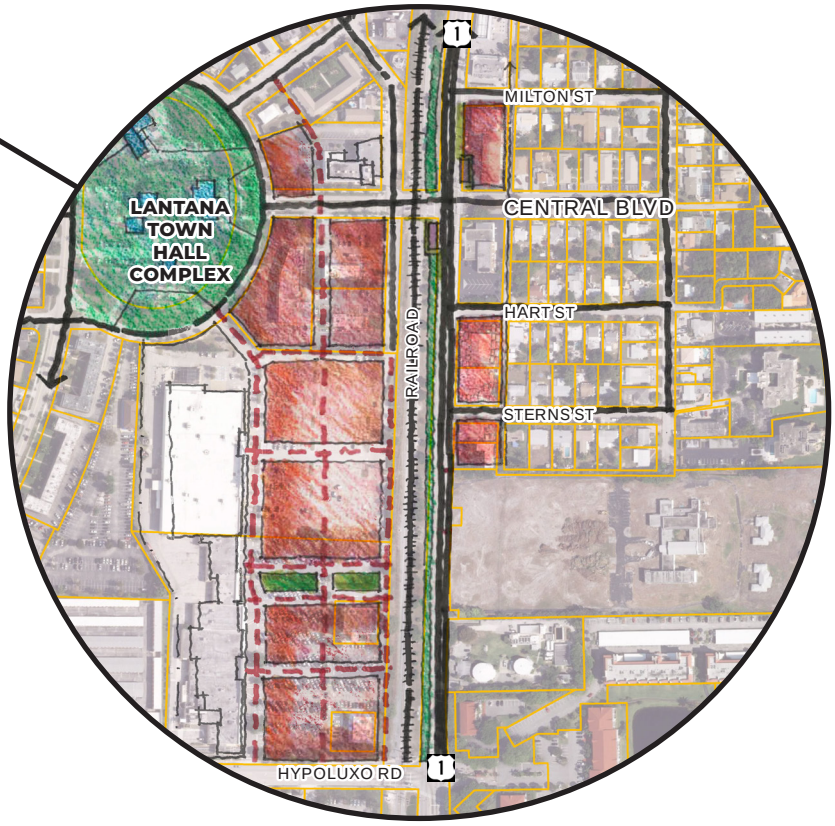
LEGEND

- New Street
- Pedestrian Connection
- Proposed PTX Location
- New Park Space
- New Mixed-Use
- New Residential

TOWN OF LANTANA



LANTANA ROAD



DOWNTOWN LANTANA

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

LANTANA

- Connect and add new streets and alleys to support redevelopment of existing sites and vacant properties
- Create new park spaces adjacent to PTX stations and along buffer between railroad and US-1
- New redevelopment should be a mix of uses, including higher density residential with street-facing buildings

DOWNTOWN LANTANA

- Redevelop large surface parking lots incrementally as mixed-use, residential buildings with pedestrian-scale block network
- Connect PTX station to Lantana Town Hall Complex
- Incorporate green space as park and stormwater

CITY OF LAKE WORTH

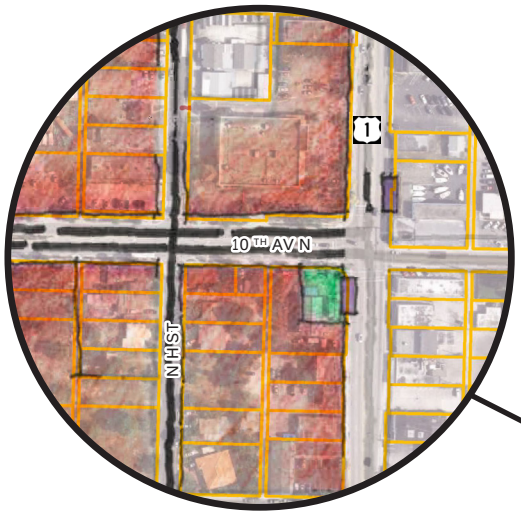
CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

10TH AVENUE

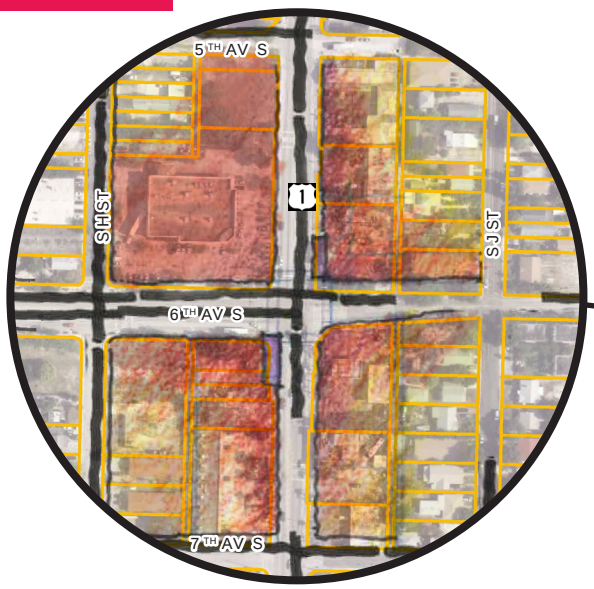
- Enhance pedestrian crossings at 10th Avenue North
- Create park space adjacent to southbound PTX station
- Maintain existing street network

6TH AVENUE

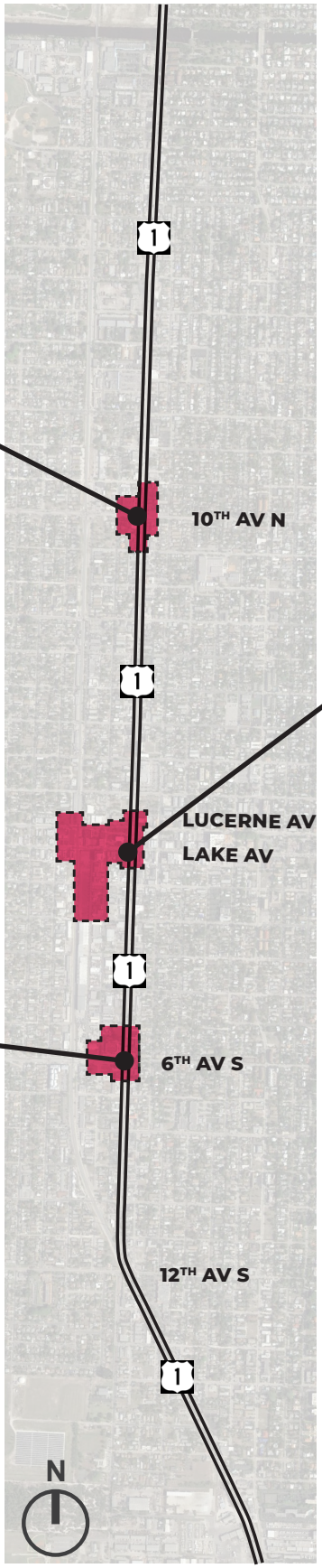
- Enhance pedestrian crossings at 6th Avenue South
- Maintain existing street network
- Focus any new redevelopment towards PTX station areas



10TH AVENUE

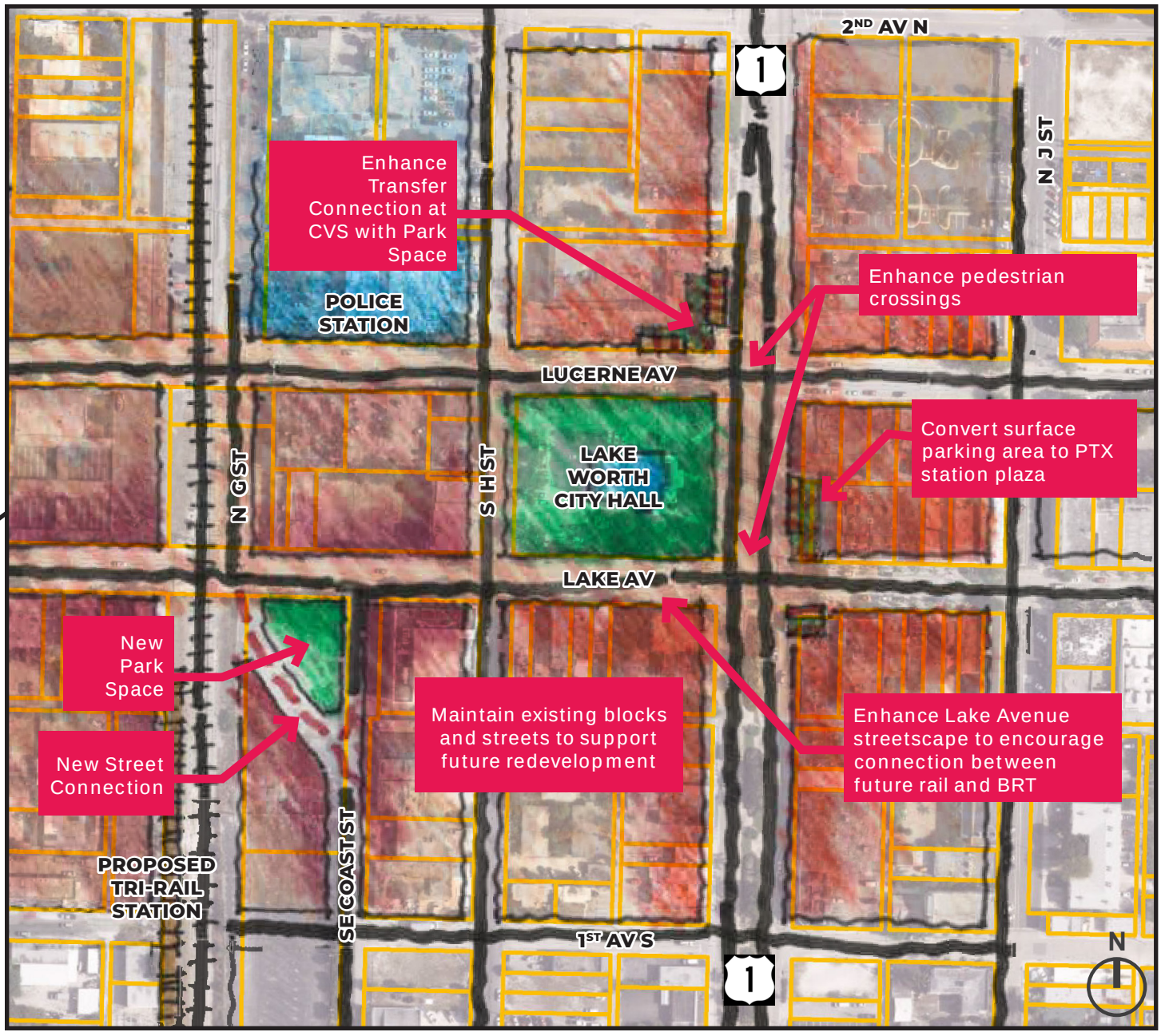


6TH AVENUE SOUTH



LEGEND

- New Street
- Proposed PTX Location
- New Park Space
- New Mixed-Use
- New Residential



DOWNTOWN LAKE WORTH

CITY OF WEST PALM BEACH

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

BELVEDERE

- Town Center redevelopment with pedestrian-scaled streets with mix of land uses including higher density residential with street-facing buildings
- Green/Park space at US-1 and Belvedere as gateway into local neighborhoods, green space should also function for stormwater management

SOUTHERN

- Green/Park space as focus of PTX stations and areas for stormwater management
- Encourage a mix of land uses including higher density residential with street-fronting buildings
- Incorporate alleys to offset access from US-1

FOREST HILL

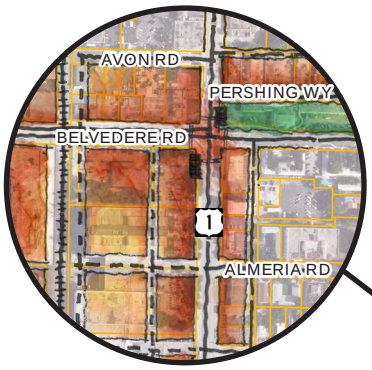
- Focus on pedestrian crossing improvements at Forest Hill Boulevard and US-1
- Connect PTX stations to school with a shared-use trail on Brevard Avenue

GREGORY/ALHAMBRA

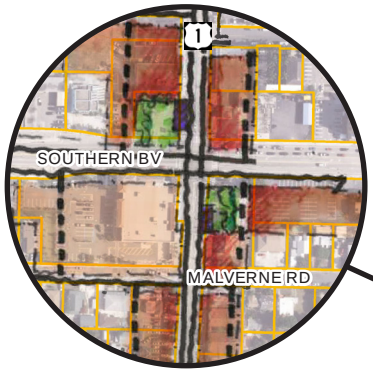
- Town Center redevelopment with new, pedestrian-scaled streets with mix of land uses including higher density residential and street-fronting buildings
- Green/Park space as focus of BRT station
- Connect to future rail through "greenways" in the Town Center redevelopment

LEGEND

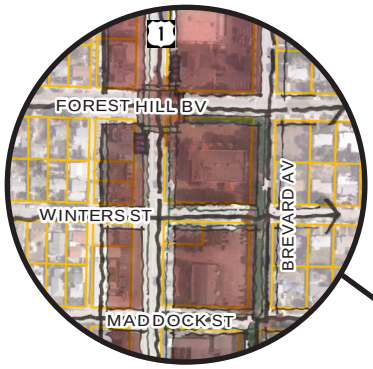
- New Street
- Pedestrian Connection
- Proposed PTX Location
- New Park Space
- New Mixed-Use
- New Residential



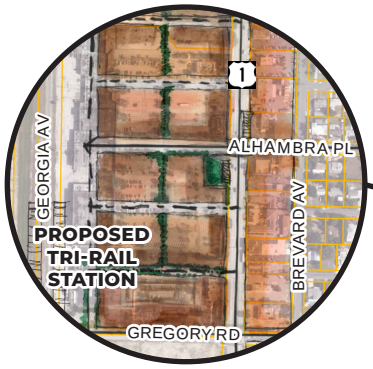
BELVEDERE



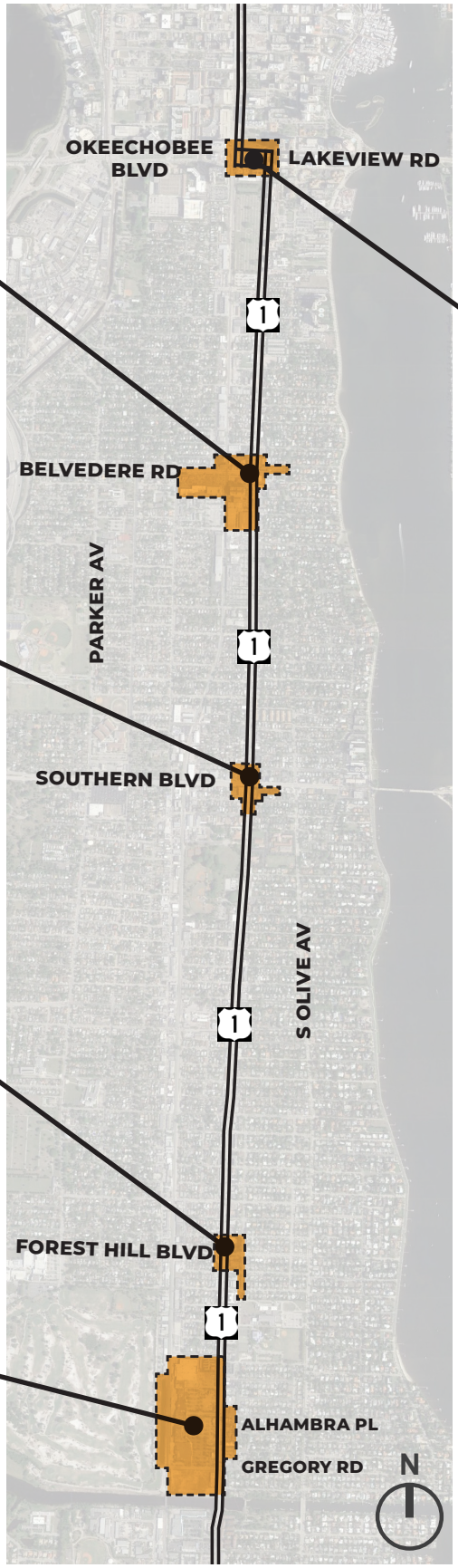
SOUTHERN

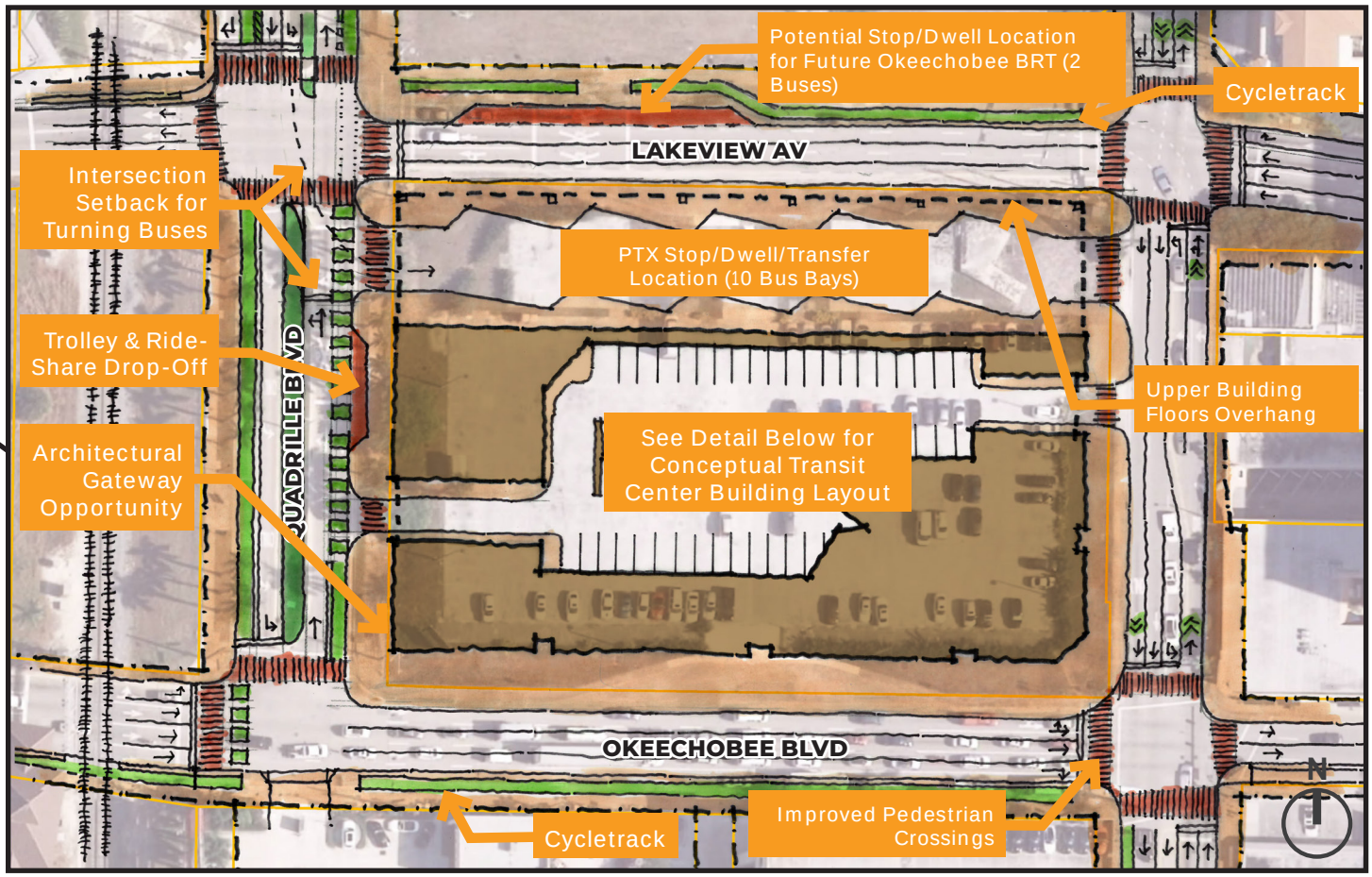


FOREST HILL

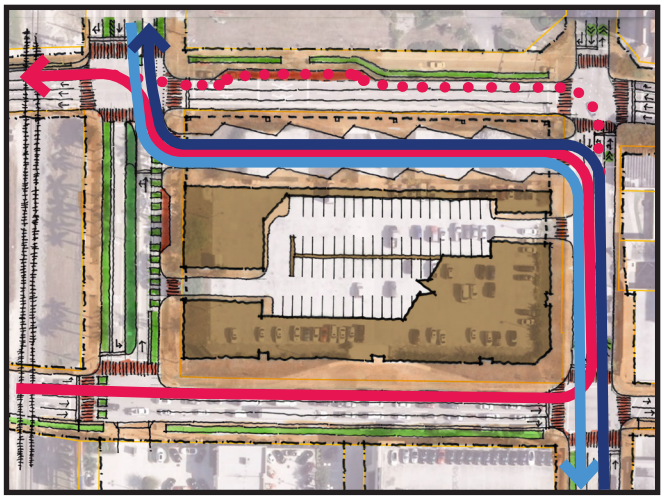


GREGORY/ALHAMBRA



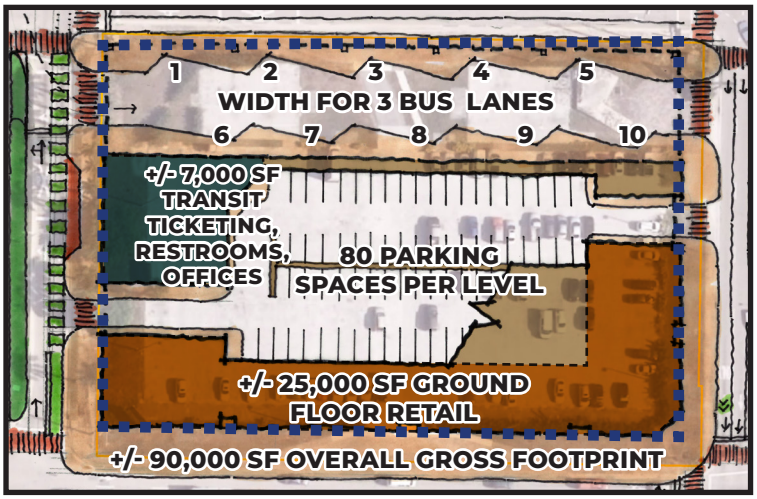


OKEECHOBEE BLVD, US-1, LAKEVIEW AVE, AND QUADRILLE BLVD: THE "TENT SITE"



PROPOSED ROUTING OPTIONS

- NORTHBOUND PTX ROUTE
- SOUTHBOUND PTX ROUTE
- WEST/EASTBOUND FUTURE OKEECHOBEE BRT
- ALTERNATE OKEECHOBEE BRT DWELL/STOP



TRANSIT CENTER + MIXED-USE/HOTEL CONCEPTUAL LAYOUT

CITY OF WEST PALM BEACH

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

45TH STREET

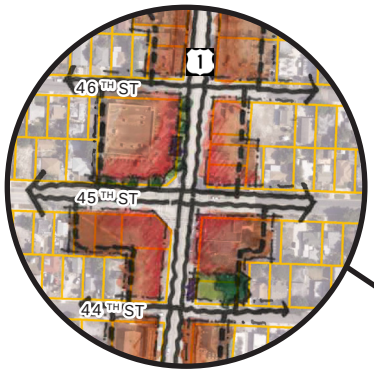
- New mixed-use on vacant corner including higher density residential and street-fronting buildings
- Green/Park space adjacent to PTX station
- Pedestrian improvements at crosswalk to connect both PTX stations

NORTHWOOD

- Existing park space as focus of PTX stations
- Maintain existing redevelopment efforts - buildings fronting the street
- Examine 24th Street and/or Northwood Rd extension east of US-1

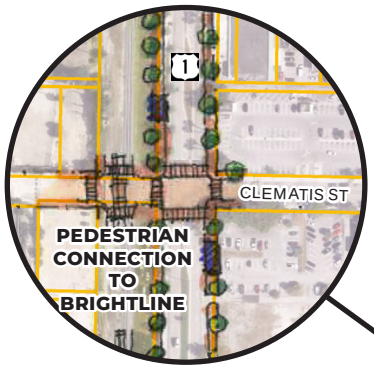
DOWNTOWN WEST PALM BEACH

- Well-designed (considering safety and urban art/ design) intersection crossings at Clematis Street and Railroad Crossing *AND* Clematis St and Quadrille Blvd
- Pedestrian and bicycle connections from PTX stations to Brightline Station

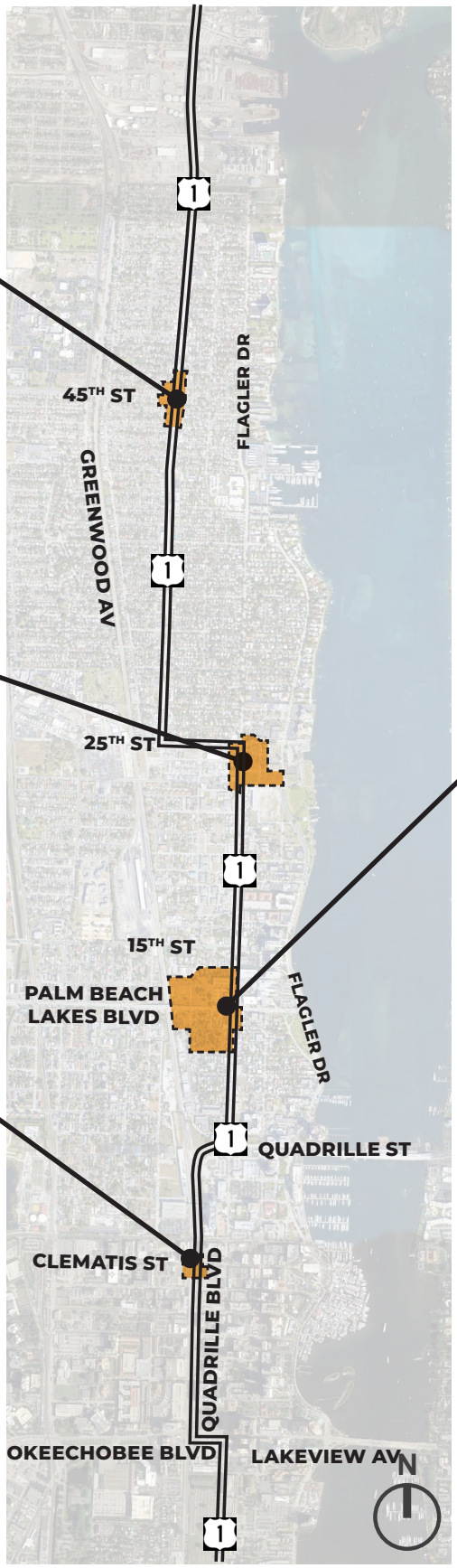


45TH STREET

NORTHWOOD

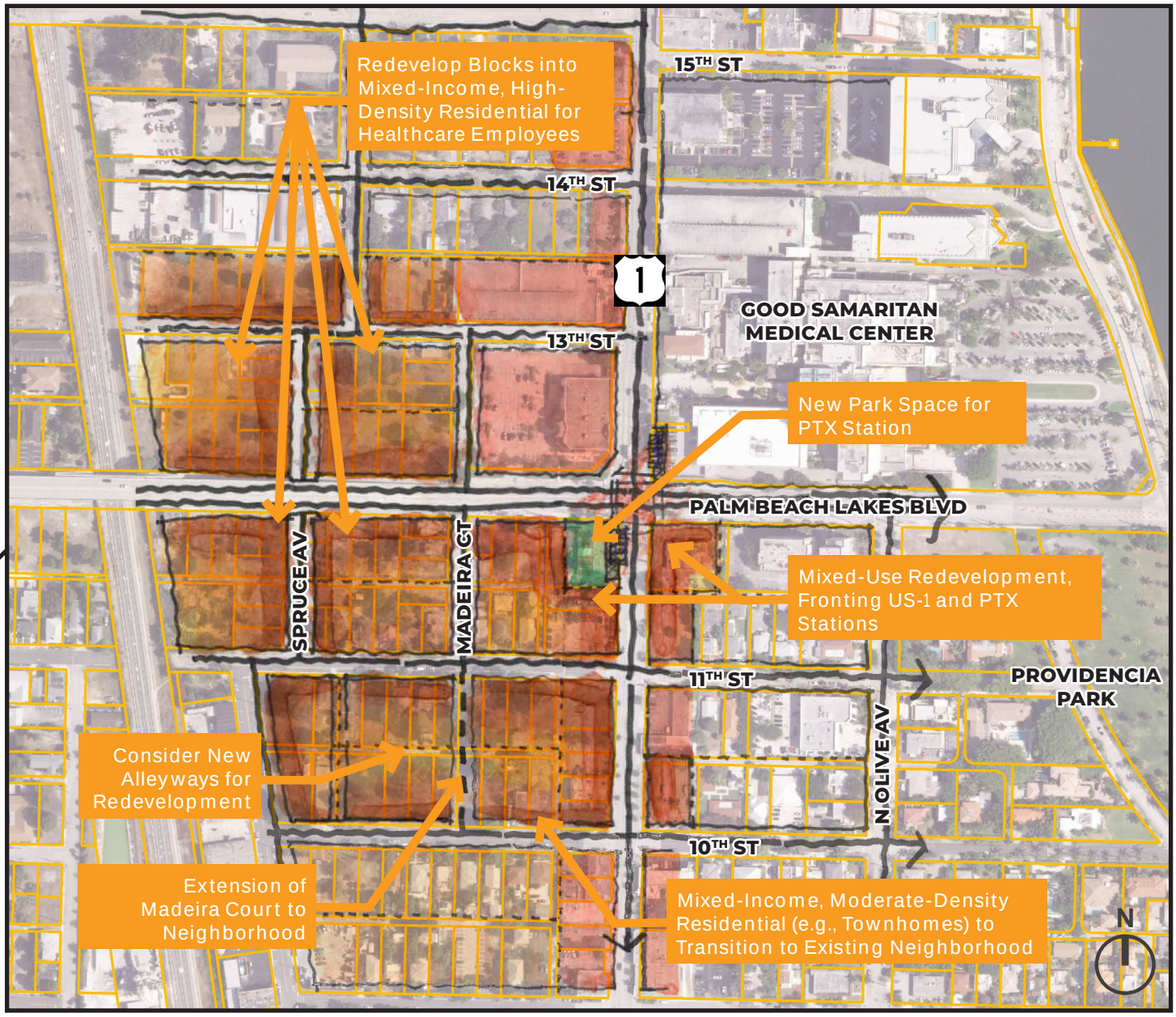


DOWNTOWN WEST PALM BEACH



LEGEND

- New Street
- Pedestrian Connection
- Proposed PTX Location
- New Park Space
- New Mixed-Use
- New Residential



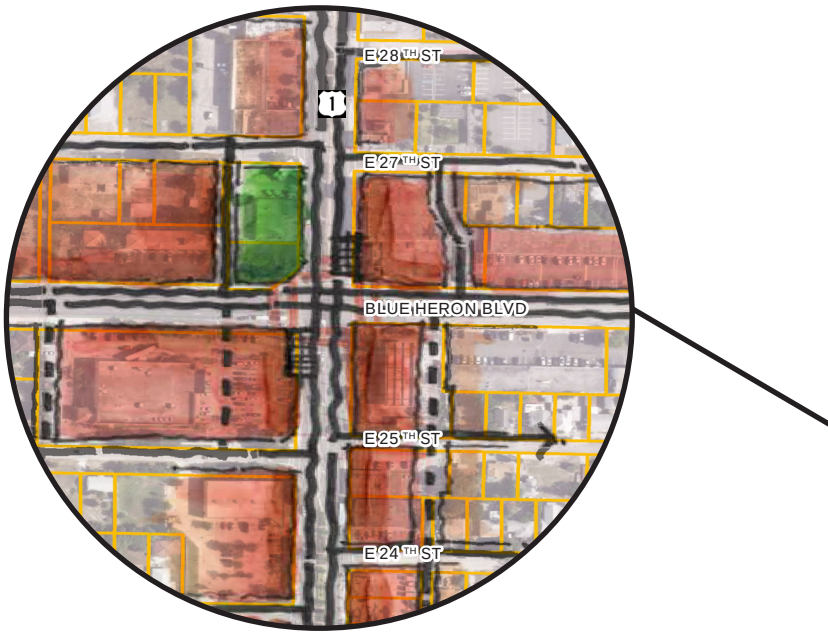
PALM BEACH LAKES BLVD / GOOD SAMARITAN MEDICAL CENTER

CITY OF RIVIERA BEACH

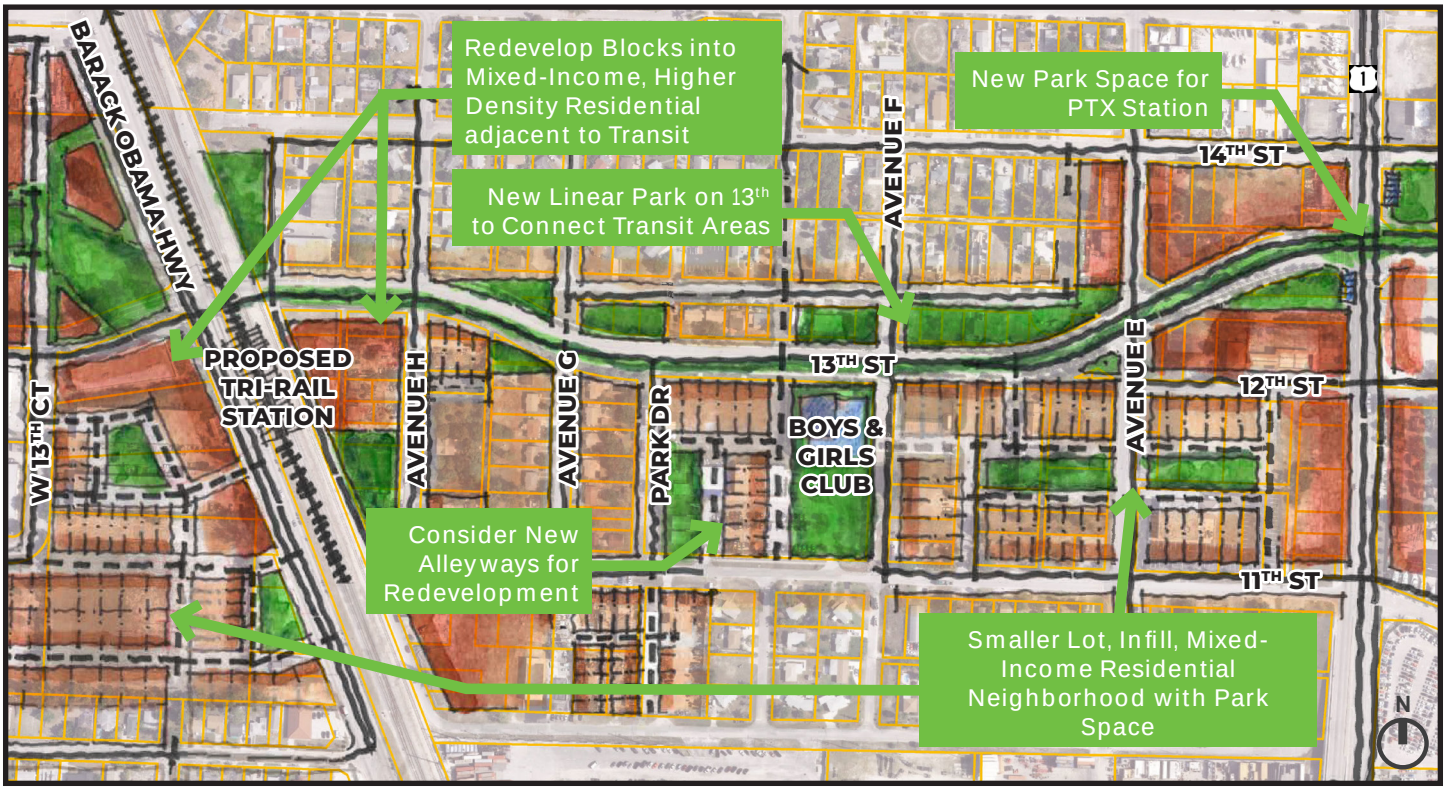
CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

BLUE HERON

- New PTX stations located within US-1 ROW on each direction
- Create new park in northwest corner as gateway and stormwater management
- New mixed-use fronting proposed park
- Focus on pedestrian crossings between PTX station locations
- Examine new alley parallel to US-1 for loading and access management



BLUE HERON



13TH STREET

TOWN OF LAKE PARK

PARK AVENUE

LEGEND

- New Street
- Pedestrian Connection
- Proposed PTX Location
- New Park Space
- New Mixed-Use
- New Residential

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

PARK AVENUE

- New redevelopment, as per Lake Park's Master Plan, should be a mix of uses, including higher density residential
- PTX stations at Kelsey Park and adjacent historic properties
- Examine adding a parallel street between US-1 and Lake Shore Drive for traffic distribution and walkability
- Examine adding an alley west of US-1 for fronting properties to assist with the block transition into existing neighborhoods

VILLAGE OF NORTH PALM BEACH

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

ALT A1A

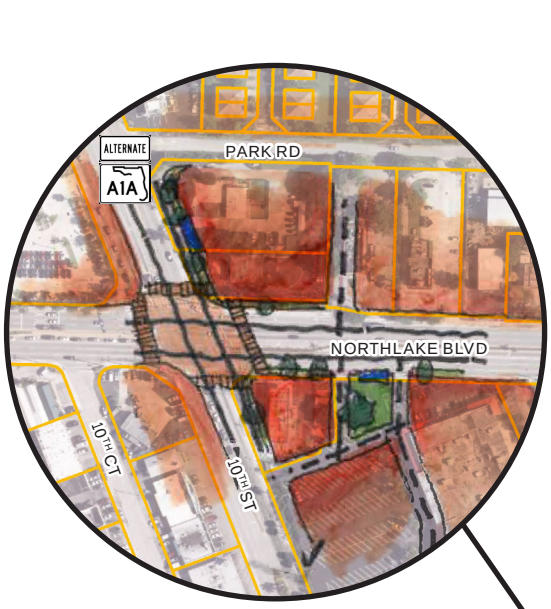
- Utilize portion of parking areas for new park/green space at PTX station
- Redevelop northeast block into mixed-use, residential fronting PTX park area
- Enhance pedestrian crossings

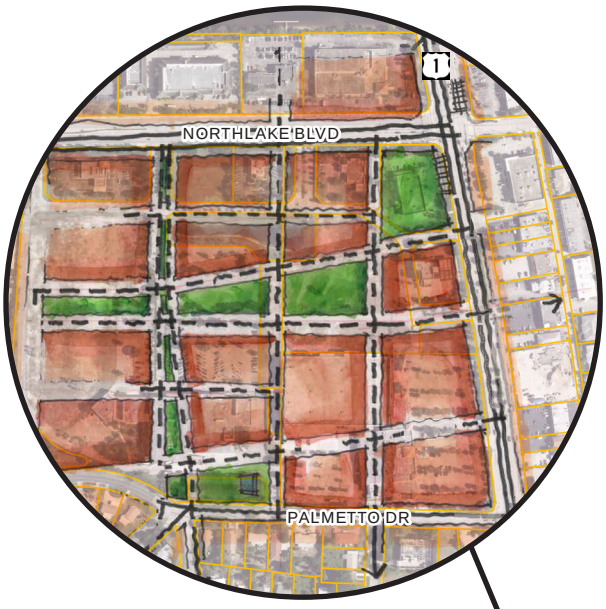
NORTHLAKE

- Redevelop shopping center as new Town Center mixed-use project with higher density residential units and walkable block sizes
- Build on Olmsted Brothers legacy in Lake Park with connected park/green spaces that also function as stormwater areas.
- Connect to adjacent neighborhoods to the south and west

LEGEND

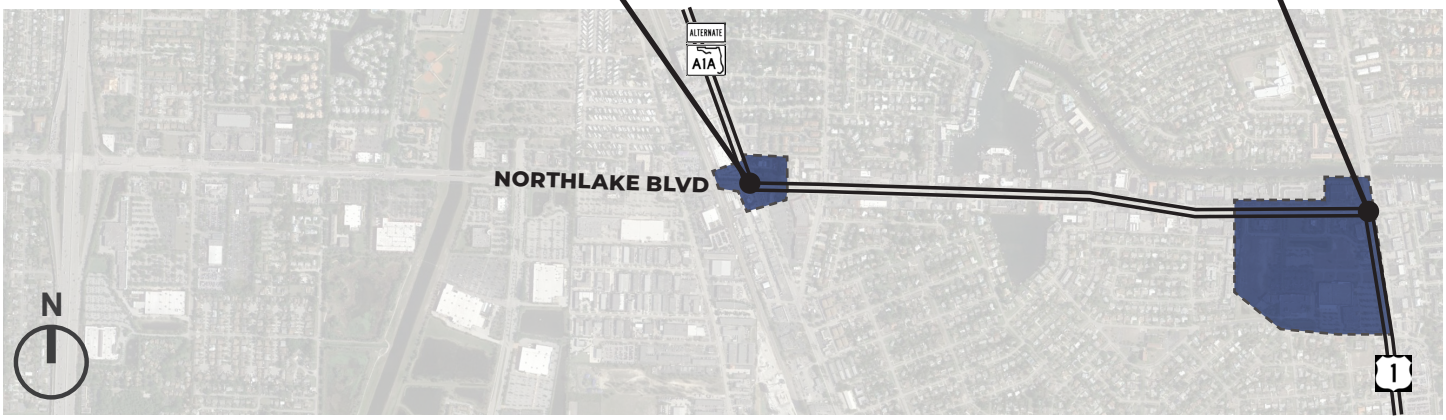
- New Street
- Pedestrian Connection
- Proposed PTX Location
- New Park Space
- New Mixed-Use
- New Residential





ALT A1A

NORTHLAKE



CITY OF PALM BEACH GARDENS

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

BURNS ROAD

- Enhance pedestrian crossings

LAKE VICTORIA GARDENS

- Enhance pedestrian crossing

PALM BEACH STATE COLLEGE

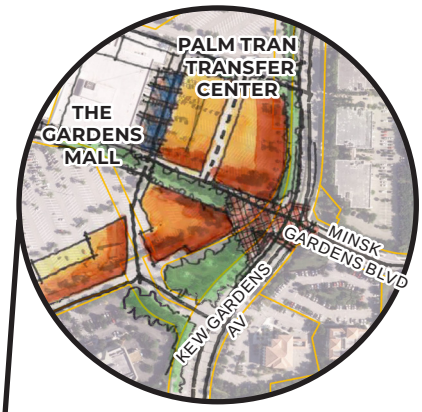
- Enhance pedestrian crossings
- Connect to campus buildings from PTX station

THE GARDENS MALL TRANSFER CENTER

- Utilize portions of existing parking lot for new connection to Minsk Gardens Blvd
- Redevelop portions of existing parking lot for mixed-use, residential blocks with street-fronting buildings
- Incorporate transfer center into redevelopment

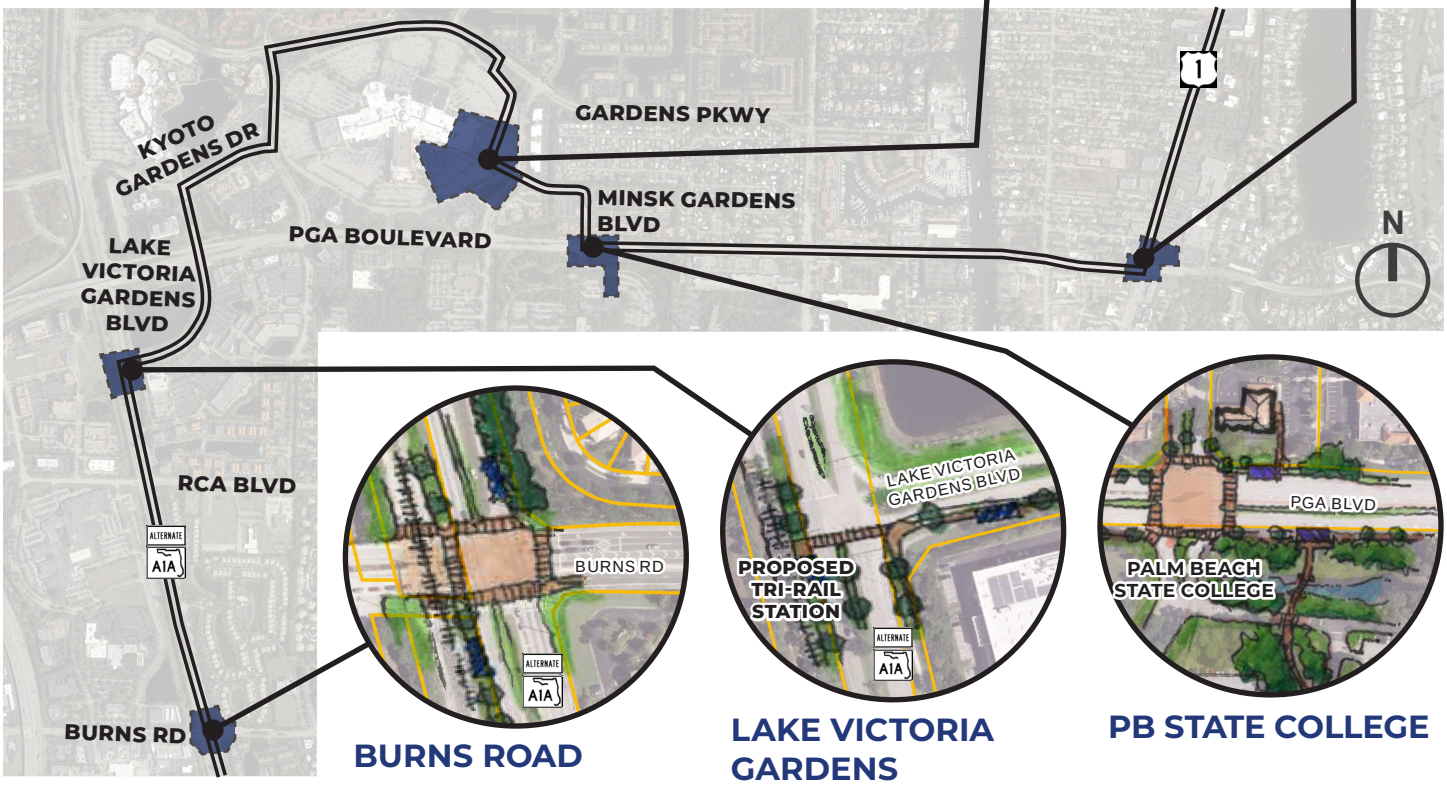
PGA BOULEVARD

- Enhance pedestrian crossings
- Add park/green space at PTX stations
- Utilize portion of Publix parking area for mixed-use redevelopment fronting on PTX park area



THE GARDENS MALL TRANSFER CENTER

PGA BOULEVARD



BURNS ROAD

LAKE VICTORIA GARDENS

PB STATE COLLEGE

TOWN OF JUNO BEACH

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

DONALD ROSS

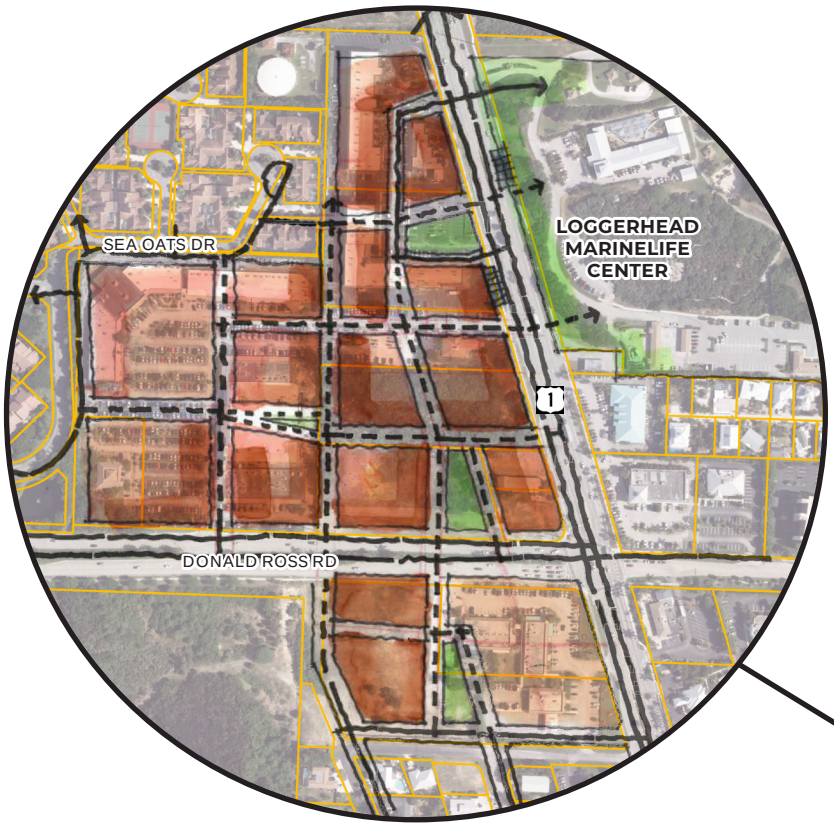
- Redevelop shopping center as new Town Center mixed-use project with higher density residential units, walkable block sizes, and street-fronting buildings
- Incorporate green/ park space, green space should also function for stormwater management
- Connect to adjacent neighborhoods to the west
- Locate PTX station adjacent to the Loggerhead Marinelife Center and connect to new Town Center with mid-block crossing or signalize crossing

SEMINOLE TOD

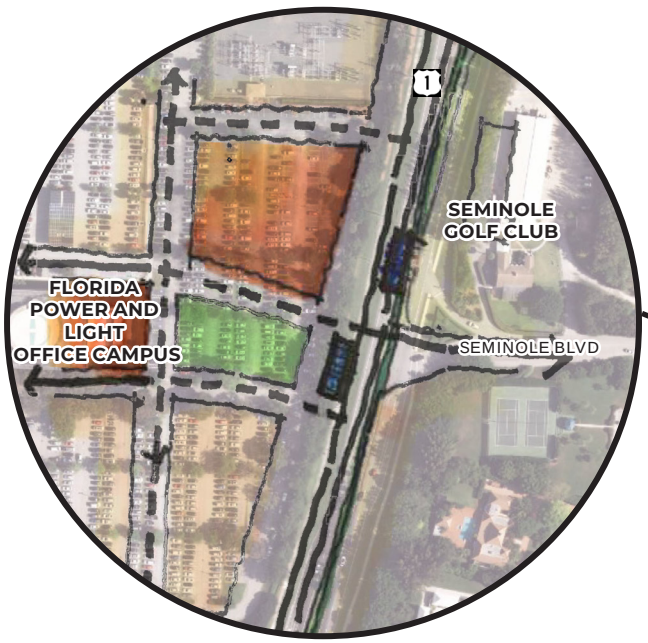
- New PTX station adjacent to Seminole Boulevard with mid-block crossing
- PTX station should connect to pedestrian walk/open space to FPL office campus
- Consider new mixed-use with garage parking on existing parking lots with street-fronting buildings
- Green/Park space as "gateway" to FPL campus

LEGEND

- New Street
- Pedestrian Connection
- Proposed PTX Location
- New Park Space
- New Mixed-Use
- New Residential

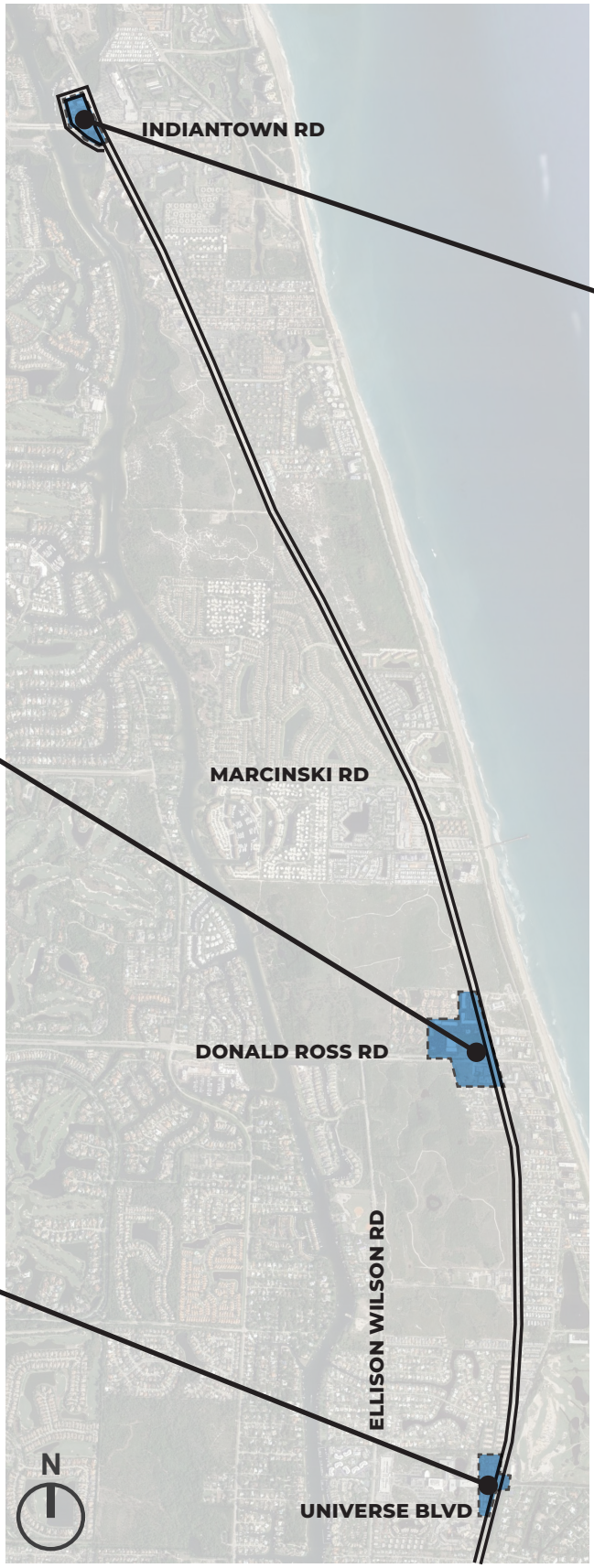


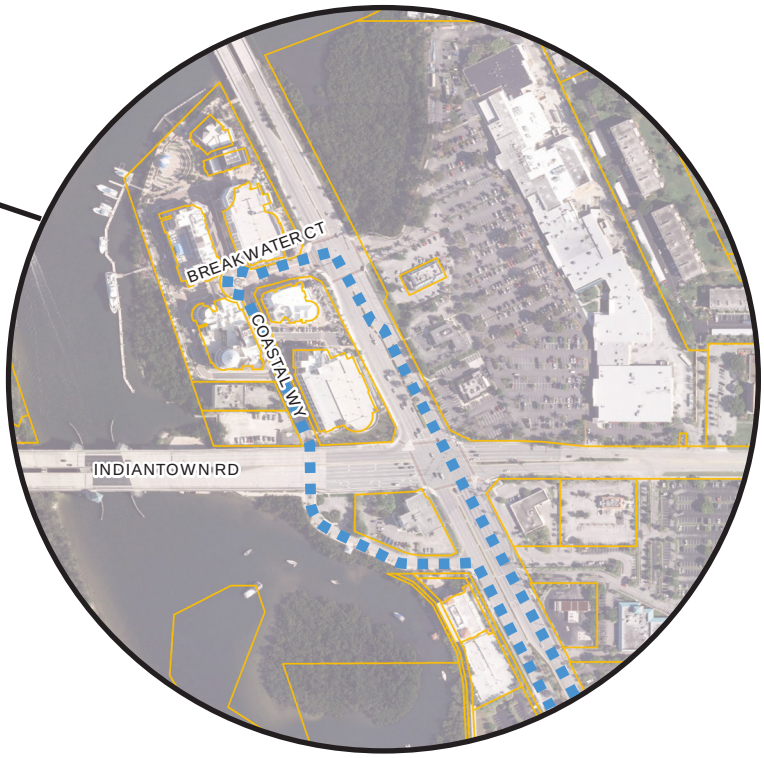
DONALD ROSS/MARINELIFE CENTER



SEMINOLE/FPL

TOWN OF JUPITER





JUPITER/HARBOURSIDE PLACE

CONCEPTUAL OPPORTUNITY AREAS AT A GLANCE:

HARBOURSIDE PLACE

- Route new PTX path to circle through existing development, under Indiantown Road, and back onto US-1

NEXT STEPS

RECOMMENDATIONS

Based on stakeholder discussions with Palm Tran and the TPA, as well as recommendations from the US-1 Multimodal Corridor HIA, this assessment recommends that Palm Tran move forward with the alignment "PTX Yellow - Alternative 2" as a first phase of premium transit on US-1, followed by "PTX Blue - Alternative 1" and "PTX Green" as future phase expansions of the premium transit service (**Table 12** and **Figure 23** on the following pages). This assessment provides the building blocks to assist Palm Tran in future studies advancing the PTX Yellow alignment with the goal of applying for the FTA's Small Starts Program in early 2020.

PTX YELLOW

BENEFITS

- **Transit Ridership -** The PTX Yellow from Boynton Beach to Riviera Beach focuses transit services on the section of the corridor that has the highest existing ridership and contains the greatest concentration of vulnerable households. This service is estimated to add 75,000 additional riders per year over the current Bolt service.
- **Transit Coverage -** The proposed PTX Yellow stations, roughly space 1-mile apart afford a 17% increase in transit access for households and job locations over the existing Bolt.
- **Increased Transit Frequency -** The improved location of PTX stations allows the new service to access more critical locations, like schools and healthcare facilities, as compared to the current limited stop express service The Bolt.

ASSUMPTIONS

- **Reduced Headway -** PTX Yellow assumes that the Local Route 1 bus route would decrease frequency from 20 minutes to 30 minutes at each stop.
- **Balancing Higher Costs -** With that reduction in frequency, the premium transit service, PTX Yellow would only require an additional $287,274 in annual operating costs.

PTX BLUE, PTX GREEN

BENEFITS

- **Transit Ridership -** The PTX Blue Boca Raton to Boynton Beach extends the PTX Yellow to capture an additional high concentration of households and jobs within the southern portion of the corridor. Combine with future phase PTX Green, it is estimated an additional 229,000 riders per year would use this service compared to the existing Bolt.
- **Transit Coverage -** The future PTX Blue and PTX Green stations continue to average the 1-, mile spacing and this would result in a 138% increase in transit access for households and job locations over the existing Bolt.
- **Increased Transit Frequency -** The improved location of PTX stations allows the new service to access more critical locations, like schools and healthcare facilities, as compared to the current limited stop express service The Bolt.

ASSUMPTIONS

- **Reduced Headway -** PTX Blue and PTX Green assume that the Local Route 1 bus route would decrease frequency from 20 minutes to 30 minutes at each stop.
- **Balancing Higher Costs -** With that reduction in frequency, the premium transit service, the addition of PTX Blue and PTX Yellow would require an additional $1,872,000 in annual operating costs.

PLANNING-LEVEL COST ESTIMATE

Based on average industry standards, a planning level cost estimate was generated to forecast both the typical station area and amenities cost (**Table 10**) and the overall cost of all stations and required buses for each alignment (**Table 11**).

TABLE 10: TYPICAL STATION AREAS AND AMENITIES COST ESTIMATE

TYPE	UNIT	PRICE	QTY	TOTAL	TYPICAL FEATURES
TYPICAL PTX STATION	1	$200,000	84	$16,800,000	• TRASH/RECYCLE RECEPTACLES • SEATING, BICYCLE RACKS • COVERED SHELTER WITH LIGHTING (SOLAR) • TICKET VENDING MACHINE (OFF-BOARD TICKETING) • REAL-TIME PASSENGER/TRANSIT INFORMATION • MAPS AND INTERACTIVE WAYFINDING • PEDESTRIAN SCALE LIGHTING
TYPICAL ENHANCED BUS (ELECTRIC)	1	$750,000	VARIES	N/A	• EXAMPLE: 40' PROTERRA (ELECTRIC)

TABLE 11: PTX ALIGNMENTS COST ESTIMATE

	PTX STATIONS	TOTAL COST	BUSES	TOTAL COST	TOTAL CAPITAL COSTS
PTX YELLOW	38	$7,600,000	18*	$13,500,000	$21,200,000
PTX BLUE EXTENSION	24	$4,800,000	5*	$3,750,000	$8,550,000
PTX GREEN EXTENSION	22	$4,400,000	7*	$5,250,000	$9,650,000
				TOTAL	**$39,400,000**

*ASSUMES 25% SPARE BUS RATIO

TABLE 12: CONCEPTUAL PTX PHASING

	EXISTING		PTX YELLOW (PHASE ONE)		PTX BLUE SOUTH EXTENSION (PHASE TWO)		PTX GREEN NORTH EXTENSION (PHASE THREE)	
	ROUTE 1	THE BOLT	ROUTE 1	"PTX"	ROUTE 1	"PTX"	ROUTE 1	"PTX"
ROUTE ASSUMPTIONS								
ALIGNMENT	Boca Raton to Gardens Mall	Boca Raton to WPB ITC	-	Boynton Beach to Riviera Beach	-	Boca Raton to Boynton Beach	-	Boca Raton to Jupiter
ROUTE LENGTH	42 mi	28 mi	-	19 mi	-	+14 mi*	-	+9 mi*
STOP PAIRS	172 stops	12 stops	-	19 stops	-	+11 stops*	-	+11 stops*
HEADWAY	20 min	20 min	30 min[A]	10 min[B]	30 min[A]	20 min[C]	30 min[A]	20 min[C]
SPAN OF SERVICE (AM/PM/ NIGHT)	17 hrs	2 hrs (1/1/0)	-	9 hrs (4/4/1)[D]	-	9 hrs (4/4/1)[D]	-	9 hrs (4/4/1)[D]
			*Incremental Additions to PTX Yellow Service [A]Reduced Headways on Route 1 [B]More Frequent Headway on Premium Transit [C]Extension Alignment at 20-min Headway, PTX Yellow still at 10-min Service [D]7-hour increase to Span of Service					
SERVICE OUTCOMES								
INCREASE IN DAILY BOARDINGS	-		+304 Riders		+559 Riders		+1,205 Riders	
OVERALL DAILY BOARDINGS	7,560		7,864		8,423		9,628	
INCREASE IN ANNUAL BOARDINGS	-		+75,184 Riders		+140,368 Riders		+228,721 Riders	
ANNUAL BOARDINGS	1,922,272		1,997,456		2,125,218		2,226,310	
ANNUAL OPERATING COST	$5,478,018		$5,765,292		$6,156,960		$7,350,222	
CAPITAL COST	-		$21,200,000*		$8,550,000*		$9,650,000*	
			*Capital Investment for Each Phased Service					
PREMIUM TRANSIT EQUITY - ELEMENTS WITHIN A 10-MINUTE WALK OF A STATION								
HOUSEHOLDS & JOBS	-	64,870	-	75,764 *(17% Increase)*	-	123,909 *(91% Increase)*	-	154,289 *(138% Increase)*
VULNERABLE HOUSEHOLDS	-	2,144	-	9,027 *(321% Increase)*	-	9,258 *(331% Increase)*	-	9,657 *(350% Increase)*
SCHOOLS (K-12)	-	11	-	+13 *(Additional Schools)*	-	+22 *(Additional Schools)*	-	+34 *(Additional Schools)*
MEDICAL FACILITIES	-	39	-	51 *(Additional Facilities)*	-	114 *(Additional Facilities)*	-	178 *(Additional Facilities)*

FIGURE 23: CONCEPTUAL PTX PHASING

TRANSIT DEVELOPMENT FUNDING OPPORTUNITIES

The number of traditional federal and state funding sources for fixed route, high-frequency transit service continues to be limited. Most federal funding requires a non-federal match from state or local governments. Due to funding limitations, some transportation needs may be left unmet without dedicated, local funding sources. The use of creative partnerships can enhance funding opportunities and/or financial arrangements. Potential partners may include major local or regional employers directly served by the transit system, human service agencies within the Palm Beach County, and the South Florida Regional Transportation Authority.

During the Route Performance Measurement (RPM) process, Palm Tran may find it necessary to support increasing dedicated revenues to effectively operate an enhanced premium transit service. As details for improving the planned service along US-1 are confirmed, it will be critical to identify sustainable funding opportunities. As transit spending is greatly affected by annual budget and appropriation actions at the federal, state and local levels, dedicated funding will offer Palm Tran increased flexibility to fund multi-modal and flexible transportation options and to keep pace with evolving transportation, market and community trends.

Local discretionary sales taxes are a common source of local tax revenue across the country. Recent increases in the levels of local sales taxes available indicate that Florida's current levels of sales taxation is consistent with other state averages. Additionally, national polling trends indicate a generalized willingness to support increased taxation (nearly 70% national pass rate) if revenues directly support transportation projects that improve mobility and that the benefits are clearly articulated.

Building project champions will be perhaps the most effective way to establish a unified commitment to implement bold, high-frequency transit service development along the US-1 Corridor. This effort includes providing leadership, staff support and other resources to overcome potential institutional, financial and technical complexities; discontinuities due to changing political cycles; and to ensure alignment among key stakeholders such Palm Tran, major employers and businesses along the corridor (including the local Chambers of Commerce), affected Community Redevelopment Agencies and elected officials.

Once consensus on a direction to implement the service is achieved, it is highly recommended that Palm Tran establish a reputable project clearinghouse to establish and convey clear priorities, processes and timelines, including project branding, awareness and funding, to advance premium transit through the US-1 Corridor. Only through the collective engagement and influence of staff, elected officials, business and industry leaders, chamber of commerce stakeholders, business merchants and the local community, can US-1 redefine itself as a sustainable, multimodal corridor.

The following provides a summary overview of the potential local funding opportunities that can be leveraged to assist with implementation.

LOCAL OPTION GAS TAXES

Currently, Palm Beach County is levying the full 12-cents gas tax option allowable under Florida law. This revenue can be used for capital or operations and is levied in 1-cent increments. Palm Beach County and 25 other Florida counties (out of the state's 67 counties) have imposed the 12-cents per gallon maximum, collecting what is known as the 9th Cent Tax, as well as an additional, total 11-cents per gallon local option tax (combination of the full 1-6 Cents & 1-5 Cents Local Options) that all counties don't fully exercise, according to the Florida Department of Revenue. Per the Florida Statutes, revenues can be applied to transportation expenditures identified in the local government comprehensive plan, including both transit capital and operational needs. One note of caution, however, is that given the increasing fuel efficiency standards on cars anticipated to rise significantly in the future, gas tax revenues are less likely to be a sustainable source of funding.

LOCAL OPTION SALES TAXES

The maximum potential local sales tax rate in Florida ranges from 1.5% - 2% allowable above the current, general state sales tax rate of 6%. The highest locally levied rate is 2% in Liberty County. The increased revenues from these taxes could include a portion dedicated to transit services throughout the county; however, local option sales tax revenues can only be used for capital expenditures. Above and beyond the current general rate, there are two types of local options available for transit purposes include:

LOCAL GOVERNMENT INFRASTRUCTURE SURTAX

Created in 1987, this permits the governing authority of each county to levy a surtax of 0.5% or 1% for a period of up to 15 years for the explicit purpose of financing, planning and constructing fixed capital infrastructure or acquiring land for public recreation, conservation, or natural resource protection. The surtax must be approved by a majority of voters via referendum, with proceeds to be shared among local municipalities. The Surtax was passed by referendum in Palm Beach County in 2016, increasing the tax rate an additional 1% to for a total of 7% for 10 years. This is expected to generate an extra $2.7 billion for infrastructure. Palm Beach is now one of 25 counties in the State currently levying this tax. Enacted January 1, 2017, this tax is set to expire not later than December 31, 2026. Funds could be allocated from this source to future premium transit stations.

CHARTER COUNTY AND REGIONAL TRANSPORTATION SYSTEM SURTAX

This permits designated local governments, including Palm Beach County, that are served by a regional transportation or transit authority created under Ch. 343 or 349, F.S., the allowable use of a 1% surtax for the purposes of development, construction, equipment, maintenance, operation, supportive services, including a county-wide bus system, on-demand transportation services, and/or the related costs of a fixed guideway rapid transit system. Unlike the local option sales tax, revenues from the charter county surtax can be used for both capital and operational expenditures. Currently only Duval and Miami-Dade Counties are exercising this option. This tax can only be implemented through passage of a voter referendum.

AD VALOREM TAX REVENUES

Florida law allows counties to levy up to 10 mills for local purposes. Palm Tran is currently the largest ad valorem funded department with FY 2017 support of $60 million. This amount was increased $2.1 million over FY 2016 primarily due to pay increases and pension costs. Although considered regressive and politically challenging, Palm Beach County could either raise ad valorem taxes or dedicate a larger portion of existing revenues to transit.

MOBILITY FEES

Mobility fees allow for greater flexibility in the use of collected pro-rata share funding than traditional roadway impact fees and concurrency to promote compact, infill, mixed-use development. As of 2016, more than 20 jurisdictions in the state have implemented mobility fee programs. Palm Beach County has recently been discussing the pros and cons of replacing its transportation concurrency system with a mobility plan and fee structure. If the County chooses to follow this path, it would be desirable to identify high frequency transit projects, such as BRT, to be included in the mobility plan. A portion of the mobility fees assessed to new development can be allocated to both transit O&M and capital needs.

VALUE CAPTURE

Value capture instruments permit local jurisdictions to collect revenue (based on property values, sales, special business fees, or other measures of value) and allocate towards specific infrastructure improvements, such as public transit infrastructure. In Florida, local governments can create special assessment districts known as Community Redevelopment Areas (CRAs) as authorized under Ch. 163, Pt. III. These districts utilize tax increment financing whereby tax revenue from properties within the district is capped in a specific year for the general fund and then any revenue over the capped amount is directed to public improvements (such as transit infrastructure and operations) within the district.

SPECIAL ASSESSMENT DISTRICTS

The State provides a special purpose taxation option that can be used alone or in combination with other funding mechanisms known as Special Assessment Districts. This permits the establishment of a specific geographic area, known as the "service district" to levy user fees to pay for the desired public improvements that are benefiting the landowners or residents within the district. This can provide a more efficient and direct form of financing since the infrastructure or service being delivered is funded directly by the property owners or businesses and is secured by liens to ensure the collection of funds. For example, The Fort Lauderdale City Commission approved a special assessment on property taxes for downtown property owners in June of 2013 to generate $21 million for the Wave Streetcar project. The assessment went into effect in August 2013 and has a 25-year term. Under the system, housing units in the district are assessed as much as $99 per year, while non-residential property within the district are billed at 9-cents per square foot (vacant property is assessed at 3-cents per square foot).

JOINT USE DEVELOPMENT/ PARTICIPATION AGREEMENTS

In order to finance transit-oriented, mixed-use development around identified station areas along the corridor, Palm Tran can partner with host local jurisdictions and/or private developers to execute agreements to (1) develop property owned by the agency or (2) to assist in the acquisition of properties with federal funds. To encourage greater private participation, it will be imperative to offer a mix of incentives including a combination of public resources (in kind or monetary), tax or fee abatements, parking management, as well as the fast tracking of development review and permitting. Such tools can provide for greater flexibility and facilitate the implementation US-1 Corridor vision and strategies identified around potential premium transit station areas.

ADVERTISING AND LEASE AGREEMENTS

Funds can be generated from direct advertising on buses, shelters and benches and on marketing collateral (online and brochures). Directly generated advertising/miscellaneous revenue represents approximately 2% of the current Palm Tran budget. Palm Tran should explore increasing advertising and/or sponsorship of buses and shelters, particularly for a highly marketable, branded premium transit service. Major transfer hubs along the corridor can also include kiosks or dedicated commercial space for rent, as well as potential naming rights or sponsorship opportunities to increase local revenues that can offset increased operational and capital costs.

FAREBOX REVENUES

As ridership increases, fare box revenues will also increase. However, increasing base fares as well as daily, weekly, and monthly passes should be explored, particularly for a higher frequency service. No transit system pays for itself through fares alone and bus systems in the United States usually recover less than 1/3 of their costs through farebox revenues. Currently, Palm Tran is recovering only about 19% of their costs, as compared to the statewide average of about 23%, so there is room for improvement.

In addition to the spectrum of local revenue options, Palm Tran can apply for state and federal transportation grants. Federal transit funding is changing dramatically as part of the most recent transportation reauthorization bill.

Table 9 shows federal and state discretionary (competitive) grant programs that would be most relevant to Palm Beach County:

TABLE 9: FEDERAL AND STATE FUNDING OPTIONS

OPTIONS	**BUS & BUS FACILITIES INFRASTRUCTURE INVESTMENT PROGRAM (5339 (B) AND (C))**
FEDERAL/STATE	Federal
OPERATING OR CAPITAL	Capital
ELIGIBLE PURPOSE/ PROJECTS	Provides capital funding to replace, rehabilitate and purchase buses and related equipment and to construct bus related facilities. Funding is available to designated recipients and states that operate or allocate funding to fixed-route bus operators providing service to the public via formula allocations and competitive grants. A sub-program (under Part C) provides competitive grants for bus and bus facility projects that support low and zero-emission transit vehicles, including acquisition, construction and leasing of required supporting facilities.
ELIGIBLE RECIPIENTS	Public agencies, including FDOT and local transit agencies eligible to receive federal funds
LEGISLATIVE AUTHORITY	49 USC 5339 / FAST Section 3017
CURRENT SOURCE IN PALM BEACH COUNTY?	Yes
OPPORTUNITIES AND CHALLENGES	Recipients of 5339 funding must pay most capital expenses upfront in order to get reimbursed. The exception is that FDOT will cover upfront costs for vehicles. The match is 80/20, where the federal share of eligible capital costs shall not exceed 80%. For the Low-No Program, the federal share of the cost of leasing or purchasing a transit bus is not to exceed 85% of the total vehicle cost. The federal share for low or no-emission bus equipment and facilities is 90% of the net project cost. Of note, in 2016, the Hillsborough Area Regional Transit Authority (HART) was awarded $4.2 million to purchase new compressed natural gas (CNG) buses to replace existing diesel fleet.
OPTIONS	**FIXED GUIDEWAY CAPITAL INVESTMENT GRANTS (CIG) SMALL STARTS (5309)**
FEDERAL/STATE	Federal
OPERATING OR CAPITAL	Both
ELIGIBLE PURPOSE/ PROJECTS	Small Starts represent new fixed guideway projects, extensions to existing fixed guideway systems, or corridor-based BRT projects with a total estimated capital cost of less than $300 million AND that are seeking less than $100 million in 5309 CIG program funds.
ELIGIBLE RECIPIENTS	State and local government agencies, including transit agencies
LEGISLATIVE AUTHORITY	49 USC 5309 / FAST Section 3005
CURRENT SOURCE IN PALM BEACH COUNTY?	No
OPPORTUNITIES AND CHALLENGES	Discretionary program that supports the design and construction of premium transit services operating in mixed traffic that represents a substantial investment in the corridor and emulates the features of rail. The match is 80/20 where the maximum federal share of capital costs shall not exceed 80%. Projects can seek optional early rating upon completion of environmental review process and requirement to provide frequent, bi-directional service for substantial part of weekend days has been eliminated. The program also offers a new competitive “Expedited Project Delivery CIG Pilot” program, where FTA is selecting up to eight projects supported through P3 arrangements, demonstrated local financial commitments, technical capacity and state of good repair.

TABLE 9: FEDERAL AND STATE FUNDING OPTIONS	
OPTIONS	**PILOT PROGRAM FOR TRANSIT ORIENTED DEVELOPMENT PLANNING (5309)**
FEDERAL/STATE	Federal
OPERATING OR CAPITAL	Capital
ELIGIBLE PURPOSE/ PROJECTS	Competitive program that augments CIG specifically around TOD planning to help support improving public transportation for local communities via the effective integration of land use and transportation with a transit capital investment that is seeking or recently received funding via CIG program.
ELIGIBLE RECIPIENTS	Recipients must be the project sponsor of an eligible transit capital project or an entity with land use planning authority in an eligible transit capital project corridor.
LEGISLATIVE AUTHORITY	49 USC 5309
CURRENT SOURCE IN PALM BEACH COUNTY?	No
OPPORTUNITIES AND CHALLENGES	Maximum 80% federal share with local in-kind matches permitted; awards range from $250K to $2 million. Planning support funds target ways to improve economic development and ridership, foster multimodal connectivity and access; improve transit access for cyclists and pedestrians; engage the private sector, identify infrastructure needs and enable mixed-use development near stations. Miami Dade County was awarded funds in 2016 to maximize TOD planning in the East-West Rapid Transit Corridor between Miami Intermodal and FIU. In 2015, Ft. Lauderdale was awarded funds for TOD planning around the Wave Streetcar project.
OPTIONS	**PUBLIC TRANSPORTATION INNOVATION (5312)**
FEDERAL/STATE	Federal
OPERATING OR CAPITAL	Research
ELIGIBLE PURPOSE/ PROJECTS	Discretionary funding opportunity to develop innovative products and services that will assist transit agencies in better meeting the needs of their customers.
ELIGIBLE RECIPIENTS	Universities, public transportation agencies, state DOTs, non-profit, and for-profit entities
LEGISLATIVE AUTHORITY	49 USC 5312
CURRENT SOURCE IN PALM BEACH COUNTY?	No
OPPORTUNITIES AND CHALLENGES	Leveraging FTA's Office of Research, Demonstration and Innovation, these funds aid with research, development, demonstration and deployment projects, and evaluation of technology of national significance to public transportation. Examples may include new operational processes, improved mobility and traveler experiences; low-zero emissions vehicles; etc.

TABLE 9: FEDERAL AND STATE FUNDING OPTIONS

OPTIONS	TRANSPORTATION INVESTMENTS GENERATING ECONOMIC RECOVERY (TIGER)
FEDERAL/STATE	Federal
OPERATING OR CAPITAL	Capital
ELIGIBLE PURPOSE/ PROJECTS	Competitive, discretionary funding opportunity for state and local entities to obtain funding for multi-modal, multi-jurisdictional projects that are typically more difficult to support via traditional DOT programs. Since 2009, the program has awarded over $5.5 billion to 463 projects. Examples include roads and bridges, public transportation, ports, passenger and freight rail, and intermodal projects.
ELIGIBLE RECIPIENTS	State and local government agencies; private sector partners; MPOs and transit agencies
LEGISLATIVE AUTHORITY	Consolidated Appropriations Act, 2017; 49 USC (Chp 53); 49 CFR (Chp 6)
CURRENT SOURCE IN PALM BEACH COUNTY?	Yes (FY2013-South Florida Freight and Passenger Rail Enhancement via FDOT)
OPPORTUNITIES AND CHALLENGES	Provides substantial funding for innovative, multimodal projects that can demonstrate significant economic, public health and safety, connectivity, and environmental benefits to an entire metropolitan area or region. Total federal share for urban areas may not exceed 80%, with a variety of non-federal share contributions allowable. Highly competitive and requires tremendous political capital; most recent round substantially reduced amount allocated to transit funding. Recently awarded BRT projects in the Southeast include MARTA's 9.4-mile Summerhill BRT anchored by Georgia State and a new 15-mile system in Downtown Birmingham, AL. The average transit award amount since program inception is approximately $12 million.
OPTIONS	**MOBILITY ON DEMAND (MOD) SANDBOX PROGRAM**
FEDERAL/STATE	Federal
OPERATING OR CAPITAL	Both
ELIGIBLE PURPOSE/ PROJECTS	Part of a larger research effort at USDOT designed to support transit agencies and communities as they integrate new mobility tools such as smart phone apps, bike- and car-sharing, and demand-responsive bus and van services. MOD projects help make transportation systems more efficient and accessible, particularly for people who lack access to a car.
ELIGIBLE RECIPIENTS	Public transit agencies, state and local DOT's
LEGISLATIVE AUTHORITY	49 USC 5312
CURRENT SOURCE IN PALM BEACH COUNTY?	No
OPPORTUNITIES AND CHALLENGES	Personalized mobility is the key ensuring that transit is fully integrated and a vital element of a regional transport network that provides consistent, reliable and accessible service to every traveler. This program provides opportunities for agencies to seek out innovative partnerships and technologies (leveraging private sector) to develop improved payment systems, personalized travel options, decision support tools, etc. Could serve as a funding option for first/last mile gaps along the US-1 corridor. The federal share of project costs under this program is limited to 80%. Proposers may seek a lower federal contribution. The applicant must provide the local share of the net project cost in cash, or in-kind, and must document in its application the source of the local match. Pinellas Suncoast Transit Authority was awarded funds to support its partnership with local taxi and rideshare companies.

TABLE 9: FEDERAL AND STATE FUNDING OPTIONS (CONTINUED)	
OPTIONS	**TRANSFERRING FEDERAL TRANSPORTATION FUNDS (FLEXED STP FUNDS)**
FEDERAL/STATE	Federal
OPERATING OR CAPITAL	Capital
ELIGIBLE PURPOSE/ PROJECTS	Funding from the Federal Highway Administration's (FHWA) Surface Transportation Program (STP) may be used by states and localities for a wide range of projects including highway, transit, intercity bus, bicycle and pedestrian projects. STP funds may be transferred (also referred to as "flexed") to transit agencies and local governments for eligible transit projects.
ELIGIBLE RECIPIENTS	Public agencies including local governments and transit agencies.
LEGISLATIVE AUTHORITY	23 USC 133
CURRENT SOURCE IN PALM BEACH COUNTY?	Yes
OPPORTUNITIES AND CHALLENGES	Funding supports a wide variety of multimodal opportunities, both from a capital-based standpoint.
OPTIONS	**PUBLIC TRANSIT SERVICE DEVELOPMENT GRANT PROGRAM**
FEDERAL/STATE	State
OPERATING OR CAPITAL	Both
ELIGIBLE PURPOSE/ PROJECTS	Provides initial funding for special project involving new or innovative ways to increase service to the riding public, such as new technologies, services, routes or vehicle frequencies. Projects submitted for funding must be justified in the recipient's Transit Development Plan (TDP) or transportation disadvantaged service plan (TDSP), if applicable.
ELIGIBLE RECIPIENTS	Public agencies, including counties, municipalities, transit agencies, and other government entities.
LEGISLATIVE AUTHORITY	Chp. 341, F.S.
CURRENT SOURCE IN PALM BEACH COUNTY?	Yes
OPPORTUNITIES AND CHALLENGES	Potential additional source of funding for needed services, vehicles, marketing, signage, etc. Must add transit projects to the recipient's TDP. Challenge is relatively Short-term funding source with limited renewal opportunity and transit agency must be able to continue the funding when the grant expires.
OPTIONS	**COMMUTER ASSISTANCE PROGRAM (CAP)**
FEDERAL/STATE	State
OPERATING OR CAPITAL	Operating
ELIGIBLE PURPOSE/ PROJECTS	Established to encourage public/private partnerships to provide brokerage services to employers and individuals for carpools, van-pools, bus pools, express bus service, subscription transit service, group taxi services,heavy and light rail, and other systems designed to increase vehicle occupancy, particularly during peak travel time periods.
ELIGIBLE RECIPIENTS	Local governments or their designees including: the TPA, regional planning councils, transportation authorities or CTCs.
LEGISLATIVE AUTHORITY	Chp. 187 & 341, F.S.
CURRENT SOURCE IN PALM BEACH COUNTY?	Yes
OPPORTUNITIES AND CHALLENGES	South Florida Commuter Services can assist the County and Palm Tran with building transit awareness and champion premium transit development.

TABLE 9: FEDERAL AND STATE FUNDING OPTIONS (CONTINUED)

OPTIONS	**TRANSPORTATION REGIONAL INCENTIVE PROGRAM (TRIP)**
FEDERAL/STATE	State
OPERATING OR CAPITAL	Capital
ELIGIBLE PURPOSE/ PROJECTS	As part of a major initiative to improve growth management planning and the provision of transportation infrastructure, the program was created in 2005 to improve regionally significant transportation facilities in "regional transportation areas". State funds are available throughout Florida to provide incentives for local governments and the private sector to help pay for critically needed projects that benefit regional travel and commerce. Funds derive from the State Transportation Trust Fund.
ELIGIBLE RECIPIENTS	Local governments or their designees, including the TPA. Multi-County regional transportation authorities.
LEGISLATIVE AUTHORITY	Chp 339.2819, F.S.
CURRENT SOURCE IN PALM BEACH COUNTY?	Yes
OPPORTUNITIES AND CHALLENGES	Must be consistent with Strategic Intermodal System Plan (SIS), consistency with local government comprehensive plan capital improvement elements and follow local corridor management policies adopted in applicable local government comprehensive plans, and be in the adopted LRTP. Regional capital project opportunities may include a major transit hub/transfer center, for example that is part of a regionally significant corridor. TRIP funds are used to match local or regional funds up to 50% of the total project costs. In-kind matches including ROW donations and private funds are also permitted.
OPTIONS	**FLORIDA NEW STARTS TRANSIT PROGRAM (NTSP)**
FEDERAL/STATE	State
OPERATING OR CAPITAL	Capital
ELIGIBLE PURPOSE/ PROJECTS	Established by the 2005 Legislature to assist local governments in developing and constructing fixed-guideway and BRT projects to accommodate and manage urban growth and development. Additionally, the program leverages state funds to generate local transportation revenues and secure FTA Small/ New Starts funding for Florida projects. Funds may be uses for final design, ROW acquisition, and construction projects, following the guidance of FTA's 5309 Program.
ELIGIBLE RECIPIENTS	Public agencies including local governments and transit agencies.
LEGISLATIVE AUTHORITY	Chp 341, F.S.
CURRENT SOURCE IN PALM BEACH COUNTY?	No
OPPORTUNITIES AND CHALLENGES	Once a project receives a favorable rating in its FTA application, an FDOT joint participation agreement (JPA) with the local transit agency can be immediately executed to release funds. The state's participation may not exceed 50% of the non-federal share of a project. Other state funds, such as the Transportation Regional Incentive Program (TRIP) or Intermodal Program Funds, cannot be used as a match.

SUCCESSFUL EXAMPLES

ORANGE LINE

LA METRO
LOS ANGELES, CA

The Orange Line is a Bus Rapid Transit route built and operated by the Los Angeles County Metropolitan Transportation Authority (Metro). The Orange Line began operating in 2005 in the San Fernando Valley of Los Angeles. In the planning phase, Metro projected 5,000 to 7,500 average weekday boardings in the first year of operation, growing to 22,000 average daily boardings by the year 2020. Within seven month of opening, the Orange Line met its 2020 goal of 22,000 average daily boardings. Ridership continued to increase to 28,000 average daily boardings in 2008 and has remained steady ever since.

In addition to the Orange Line specific ridership achievements, the entire east-west corridor between Canoga Avenue and Tujunga Avenue has showed growth in ridership following the opening of the Orange Line. According to a 2011 project evaluation by the Federal Transit Administration, prior to construction of the Orange Line, the corridor averaged 41,580 daily boardings. Two years after opening, the corridor was transporting 62,597 average daily boardings, an increase of 51%.

In 2012, a northern extension to the Orange Line was opened serving Chatsworth Station, an Amtrak intercity rail and Metrolink commuter rail station. The current system now covers 18-miles and has 18 stations, with every station connecting to perpendicularly-oriented local bus service. Eight of the stations provide Park & Ride lots, all the stations have bicycle lockers, and all the stations provide direct pedestrian access to surrounding neighborhood businesses and households.

KEY FEATURES

ROUTE/OPERATIONS

18-Mile Route in Dedicated Right-of-Way

15-Minute Headways

Full Corridor Runtime: 42-minutes (20.7mph)

39% Faster than Local Bus
Only 16% Slower than Personal Car

STATIONS

Stations every 1-Mile

Designed and Branded Stations

Off-Board Ticketing, Proof-of-Payment

MULTIMODAL CONNECTIONS

Park & Rides, Commuter Rail, Heavy Rail, etc.

Perpendicular Feeder Routes at Every Station

Parallel Running Bicycle/Pedestrian Path

Photo: Mariana Gill/EMBRAQ Brasil

VELOCIRFTA
RFTA
ASPEN-GLENWOOD SPRINGS, CO

VelociRFTA is a unique, rural Bus Rapid Transit system in Pitkin County, Colorado. It is built and operated by the Roaring Fork Transportation Authority (RFTA) which provides transit services along the US-82 Highway Corridor between Aspen and Glenwood Springs. The VelociRFTA line runs from the West Glenwood Park & Ride off Interstate 70 to the Rubey Park Transit Center in Downtown Aspen.

While the alignment mostly utilizes rural roadways with few traffic concerns, 18 miles of HOV lanes were established along US-82 for use by RFTA vehicles to maintain on-time performance during peak ski season, when roads have the potential to become congested. In addition, *traffic signal priority* was added at select intersections prone to delays.

The operations of VelociRFTA are funded by a 4/10th cent regional sales tax approved by referendum in 2008. The design was completed and construction commenced in 2012 funded through a Federal Transit Administration Very Small Starts grant. The total cost of the project was $46.2 million, opening to the public on September 3, 2013.

In the first year following the line's opening, RFTA saw an increase of 16% in system-wide ridership adding an additional 650,000 annual trips. In 2016, the system-total ridership increased an additional 5% reaching 5.1 million trips. Much of the success of the system is credited to multimodal access. Stations were placed and designed to accommodate access to the paralleling Rio Grande Trail which is also owned and maintained by RFTA. Additionally, Park & Rides, real-time information, heated and sheltered waiting areas, and clear signage makes the VelociRFTA an attractive alternative to local car owners.

KEY FEATURES

ROUTE/OPERATIONS

43-Mile Route in Peak Direction HOV Lanes

15-Minute Headways

Full Corridor Runtime: 80-minutes (32.5 mph)

33% Faster than Local Bus
33% Slower than Personal Car

STATIONS

Stations every 2.25 Miles

Designed and Branded Stations

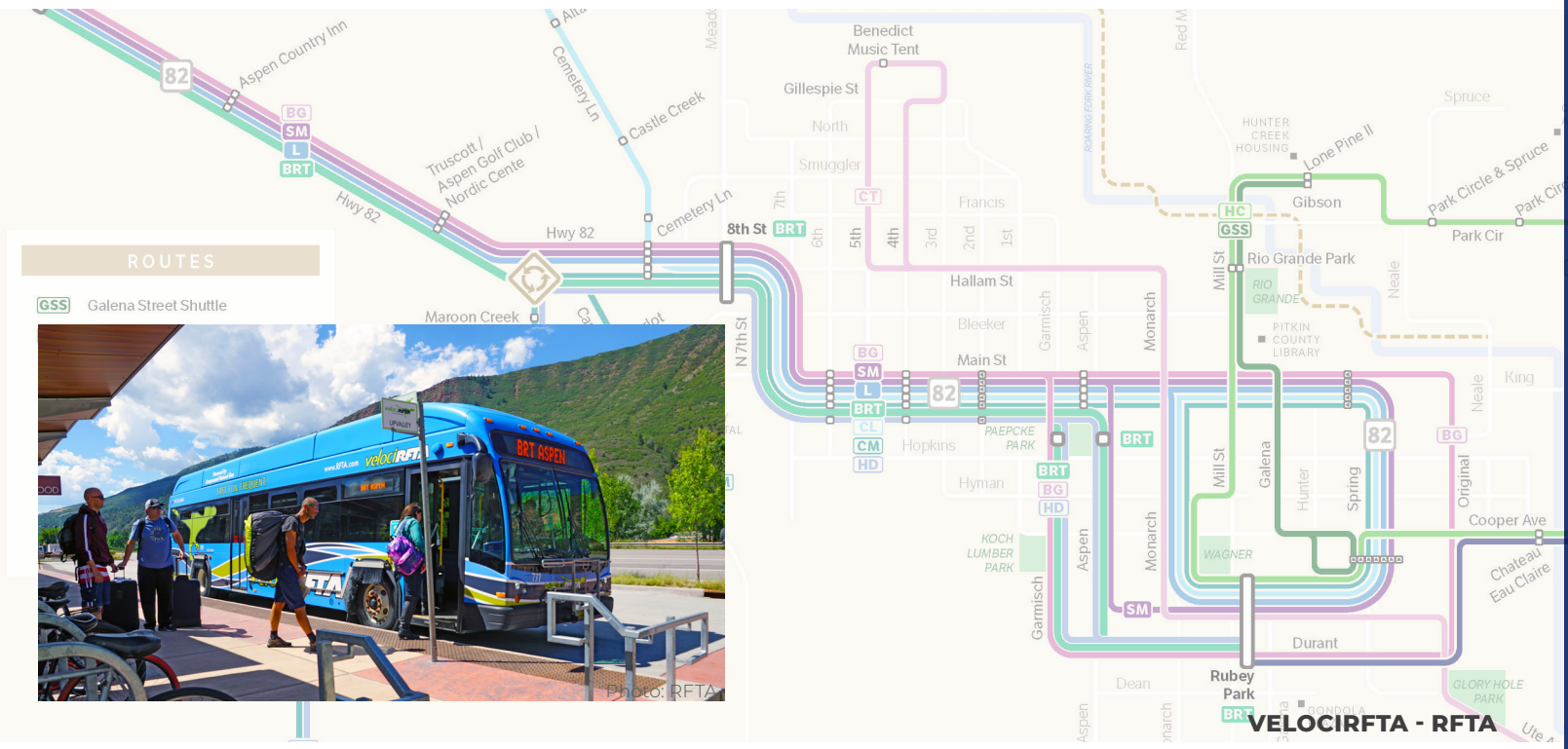
Off-Board Ticketing, Proof-of-Payment

Low-Floor Platforms (Local Service Routes)

MULTIMODAL CONNECTIONS

Park & Rides, Ski Lifts, Amtrak, etc.

Parallel Running Bicycle/Pedestrian Path



VELOCIRFTA - RFTA

IMPLEMENTATION PROCESS

Implementing a premium transit system, like the proposed PTX, is a large and complex project that requires extensive coordination at all levels of government and a concerted effort over many years to implement. Premium transit project implementation occurs in several primary development stages based on available and appropriate sources of funding.

FUNDING PLAN

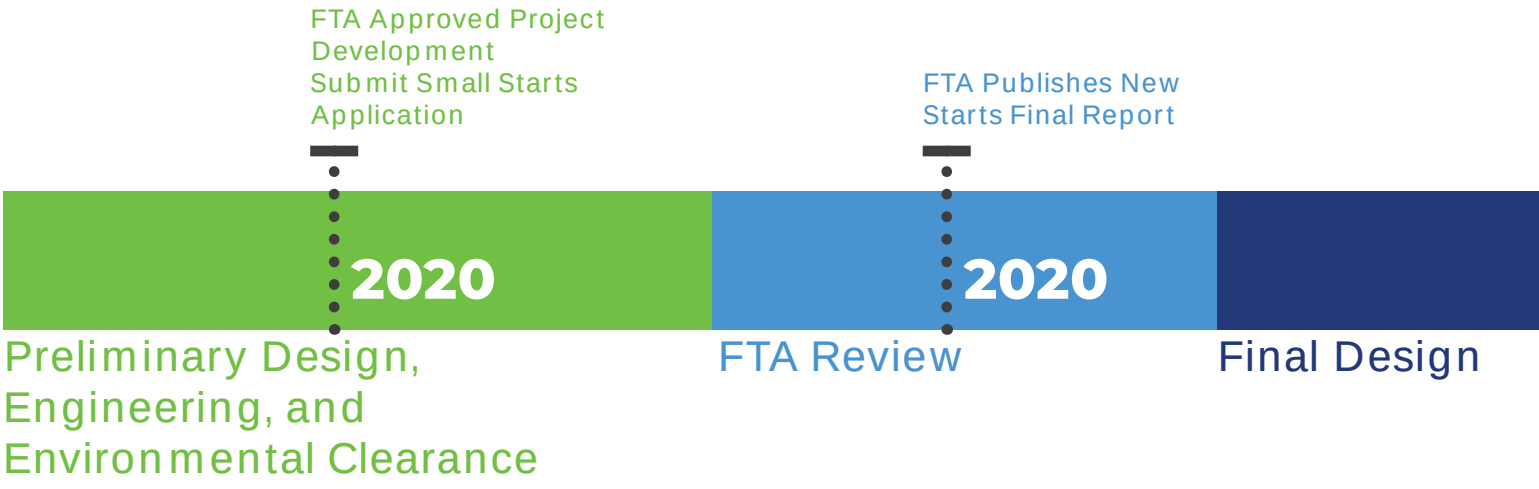
A funding plan looks at multiple potential avenues to fund the project, identifies and secures local funding for the project, and corresponds available local funding with state and federal programs to narrow down eligible sources of funding. The funding plan also breaks the project into different phases and identifies specific funding streams for each phase to allow for the pursuit of incremental funding. Funding plans are also a key communication tool with local, state, and federal elected officials and allow for a high-level view of what needs to be in place to realize the entirety of the PTX service.

PHASING

There are two potential ways to implement PTX, (1) pursue a large-scale funding program such as **FTA Small Starts** to complete all elements at once or (2) **phase-in improvements** as local, non-federal funding becomes available**.**

A key assumption in the implementation of express bus service is the reduction in frequency of Route 1 local service from 20 minutes to 30 minutes. This focuses limited transit funding where it can serve the most people and allows for introduction of PTX Yellow service at a nearly cost-neutral level. Implementation of this service **requires Palm Tran** to further study this assumption, along with frequency and span of service for the PTX service, in order to refine the service to a supportable outcome and subsequently pursue capital funding for implementation.

PTX DEVELOPMENT TIMELINE
(ASSUMES EXPEDITED PROCESS)



SMALL STARTS PROCESS

The **FTA Small Starts** funding program justifies transit projects through an evaluation of mobility, environmental benefits, congestion relief, economic development, and cost effectiveness. The program justification also examines the level of local financial commitment including evidence of stable and dependable financing sources. Some of the specifics of the program is listed below:

- Total project cost is less than $300 million and total Small Starts funding sought is less than $100 million
- Project must be located in a corridor that is at or over capacity or will be in five years
- Project must be increase capacity by 10%
- Grant funding request must not include project elements designated to maintain a state of good repair

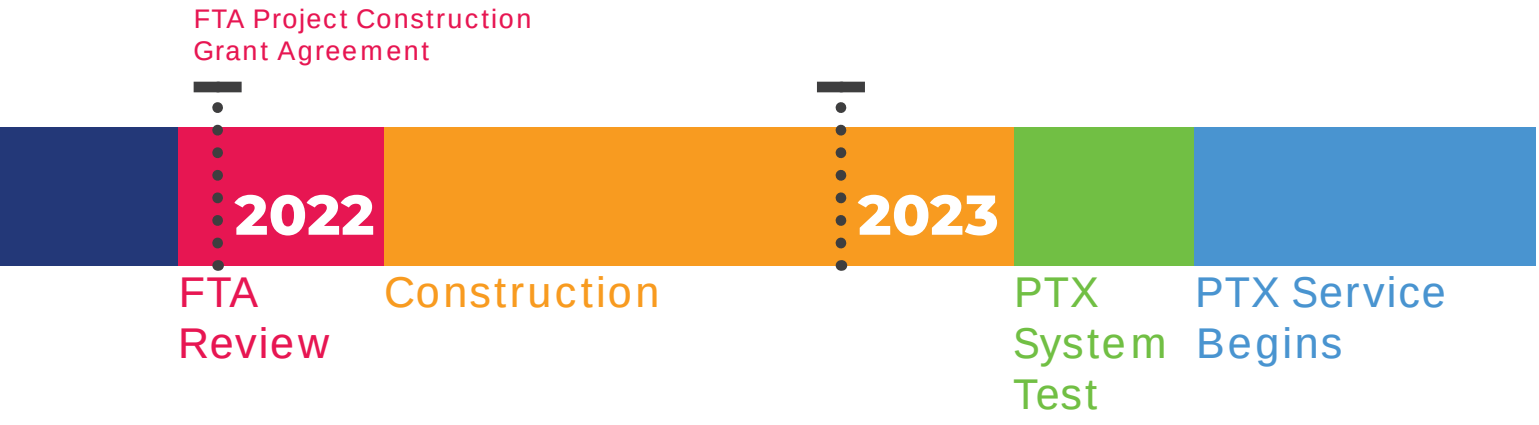
The FTA's decision to recommend a project for funding in the President's Budget is driven by several factors, including:

- "Readiness" of the project for capital funding
- Project's overall rating (receive a "medium" or higher overall rating)
- Geographic equity
- Amount of available funds versus the number and size of the projects in the pipeline

NEXT STEPS

It is recommended that **Palm Tran pursue the FTA Small Starts** for Phase 1 PTX Yellow. The appropriate timeline (based on an "expedited process," due to the work already completed) would follow the steps shown below and summarized in the adjacent graphic.

1. Complete environmental review process including developing and reviewing alternatives, selecting locally preferred alternative (LPA), and adopting it into fiscally constrained long-range transportation plan
2. Gain commitments of all non-5309 funding
3. Complete sufficient engineering and design
4. FTA evaluation, rating, and approval: Construction Grant Agreement
5. Construction



US-1 MULTIMODAL CORRIDOR STUDY

Transit Assessment Appendix