SR 436

TRANSIT CORRIDOR STUDY

CONNECTING COMMUNITIES

JANUARY 2019

FINAL REPORT

Thank You

to all the SR 436 stakeholders, community champions, and citizens for your participation and support of the SR 436 Transit Corridor Study!

Your contributions are vitally important towards transforming SR 436 into an even more vibrant, accessible, and healthier Corridor.

This report compiles the results of the State Road 436 Transit Corridor Study and includes:

- Findings from the Study,
- Recommendations for limited-stop service and Bus Rapid Transit (BRT) between the Orlando International Airport and the Altamonte Springs SunRail station, and
- Next steps for implementing the recommendations.

This effort is the product of collaboration between Central Florida Regional Transportation Authority (LYNX) and its regional and local partners. LYNX and its partners engaged the community at each stage of the Study. The community input helped inform the vision for a transit-friendly SR 436.

The collaboration cannot stop here. Going from idea to reality is a long and complex process. LYNX is able and ready to lead the effort but will need the support of community leaders, transportation and planning organizations, and the general public!

To see how you can help, please read on and visit: lynxsr436.com/onboard

CONTENTS

Figures

Tables

1

STUDY BACKGROUND

1 Study Background

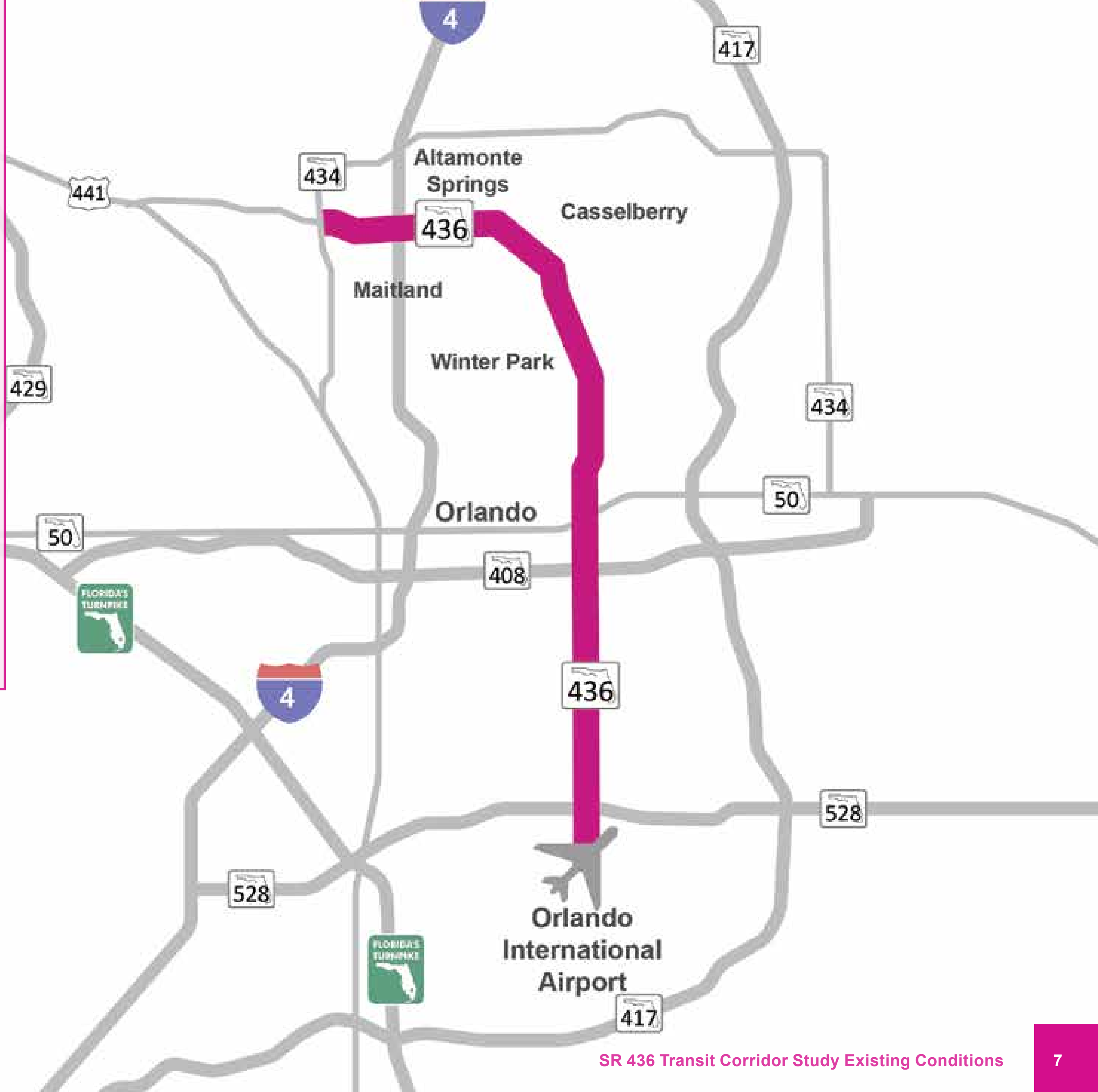
LYNX conducted the State Road 436 (SR 436) transit study (the Study) to identify and advance solutions to improve transit service along the SR 436 corridor. The goal of this Study was to arrive at a shared regional transit vision for the SR 436 corridor, as well as to better define how transit can play a role in developing a complete transportation system that accommodates and supports all users. The Study focused on identifying the issues, opportunities, and mobility and access needs that must be met to support robust and successful transit service along the corridor.

The completed Study provided a clear understanding of:

- Transit needs in the corridor,
- The range of potential solutions and the potential benefits and impacts of those solutions, and

A preferred set of alternatives that are implementable and supported by LYNX and its partner agencies.

FIGURE 1 STUDY CORRIDOR



1.1 Study Extents and Schedule

As shown in **FIGURE 1**, the SR 436 study corridor runs from SR 434 in Altamonte Springs to the Orlando International Airport (OIA) South Terminal. SR 436 faces unique challenges in balancing its roles as a regional corridor, as a gateway to Central Florida from OIA and other regional roadways, as a business address to local shops, and as the main access to residences and neighborhoods.

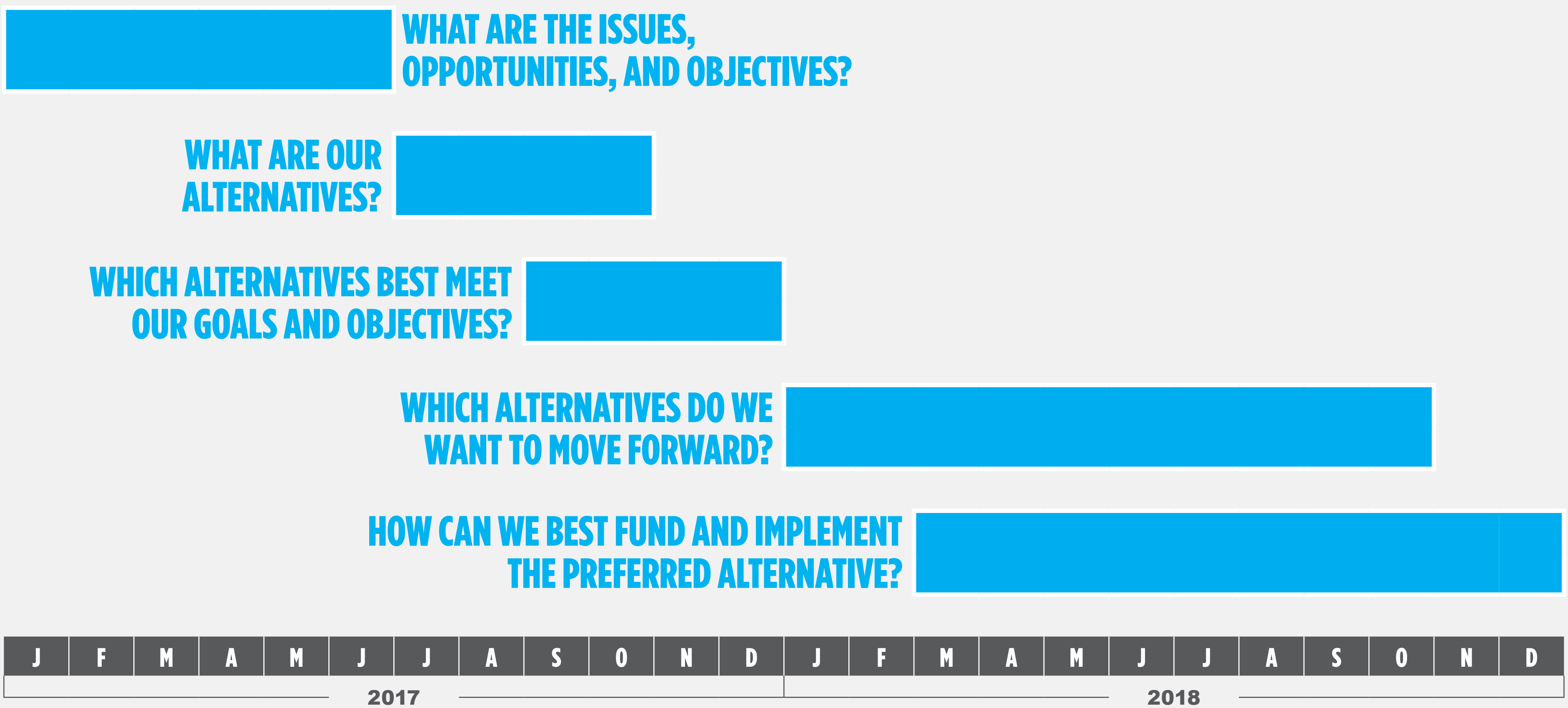
The SR 436 study was conducted between January 2017 and December 2018. (See the schedule in **FIGURE 2**.) The Study was organized into five overlapping phases. Each project phase encompassed various Study tasks, which are described throughout the report.

1.2 A Regional Initiative

LYNX and its regional partners have advanced a number of key transit initiatives in the last five years, including the implementation of SunRail; the completion of transit studies for regional corridors such as SR 50, US 192, US 441, and Volusia Transit Connector; and the expansion of LYMMO and local bus routes. The SR 436 corridor presents another critical opportunity for regional partners to address key mobility challenges and to demonstrate the region's ability to focus investments along growth corridors that form the framework for regional transit service.

A Partner Agency Working Group (PAWG) was convened to represent LYNX's regional partners and serve as the sounding board for every step of the Study. The PAWG guided the Study and helped identify and evaluate the transit alternatives that would best serve the region.

FIGURE 2 STUDY SCHEDULE



2

A PUBLIC PROCESS

2 A Public Process

The Study's Public Involvement Plan (PIP) established a process that informed and sought feedback from corridor stakeholders (including agencies, transit customers, members of the public, and community leaders). The PIP was also designed to encourage stakeholders to take ownership of and support a common transit vision and its implementation. **FIGURE 3** summarizes how decision-making was informed at various feedback points. Further details can be found in the full PIP.

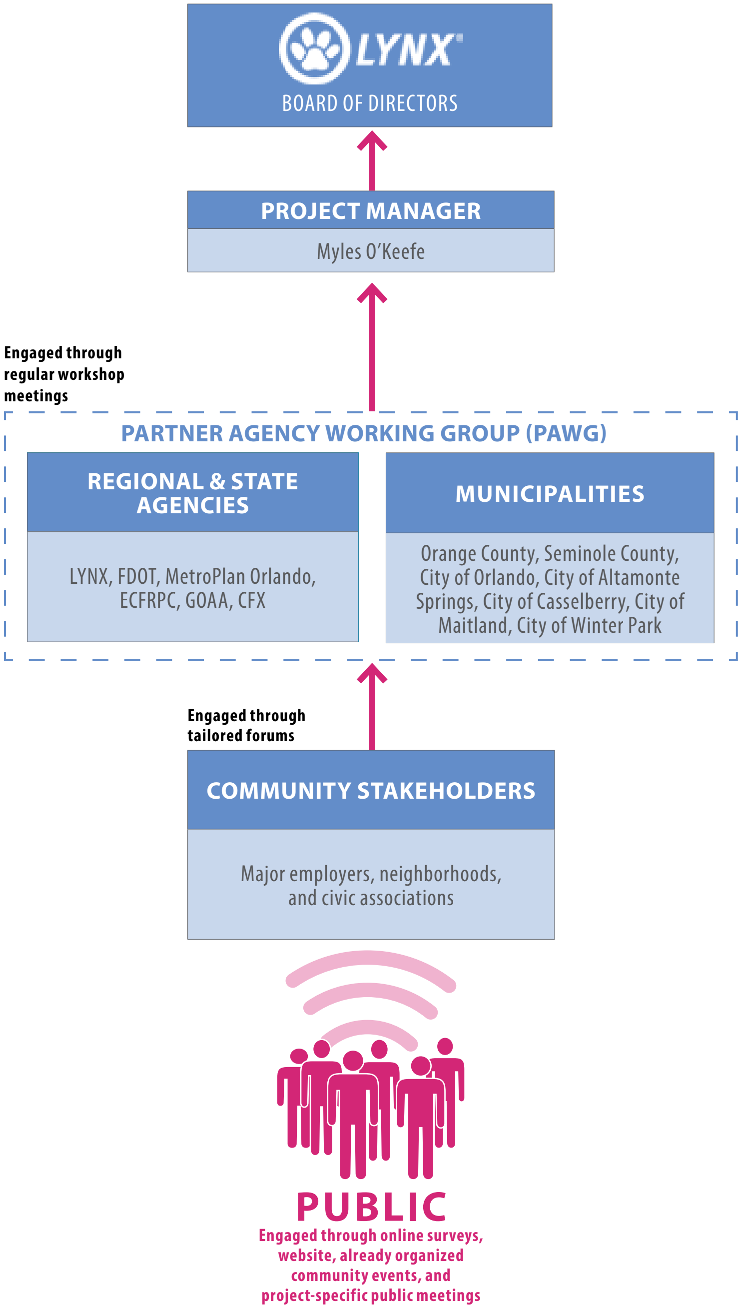
The goals of the public involvement activities were to have early and continuous engagement, engagement through various channels and opportunities, and engagement of a diverse group of community members.

2.1 PAWG Meetings

The Study Team met with the PAWG ten times at key Study milestones. The PAWG helped establish the Study's goals and objectives, helped identify alternatives, and provided feedback for each level of screening of alternatives. Ultimately, the PAWG helped develop the final set of alternatives for the project. The PAWG meetings helped in getting feedback and input on preliminary ideas and functioned as an additional communication channel between the Study Team, the SR 436 communities, and regional leadership bodies. The PAWG also reviewed key deliverables for the Study.

PAWG Bus Field Tour

FIGURE 3 SR 436 STUDY DECISION-MAKING FRAMEWORK



2.2 Stakeholder Interviews

Concurrent with data collection efforts, one-on-one interviews were conducted with key corridor stakeholders to understand the issues and opportunities that needed to be considered throughout the Study. A total of 22 interviews were conducted. All PAWG members were interviewed, along with representatives of community organizations and institutions. The Study Team conducted targeted meetings with Full Sail University, Gateway Orlando, East Orlando Chamber of Commerce, Azalea Park Safe Neighborhood Association, City of Orlando District 2 community members, Keiser University, Orange County Public Schools, Seminole County Public Schools, Florida Hospital, and Tavistock/Lake Nona.

2.3 Community Leadership Outreach and Briefings

The Study Team supported the LYNX Project Manager during presentations to LYNX leadership to share project updates and results at the end of each major phase of the Study. The Study Team also supported the LYNX Project Manager at meetings with regional agencies. These included meetings with leadership and staff of the City of Orlando, Florida Department of Transportation (FDOT), Orange County, Seminole County, City of Casselberry, MetroPlan Orlando, and the City of Altamonte Springs (forthcoming meeting in 2019).

2.4 General Public Outreach

The Study Team used a combination of in-person and online outreach activities to solicit input and feedback throughout the Study, including the following:

Pop-Up Meetings

The Study Team conducted a series of “pop-up” community engagement events throughout the Study to solicit feedback at ongoing community events. These events occurred at already organized community events throughout the corridor as well as at transit stops and high-traffic community destinations (e.g. supermarkets and Full Sail University open house). The goals for these meetings included reviewing the corridor planning process and study objectives, reviewing issues and opportunities identified from stakeholder interviews and data collection and analysis, vetting the goals and objectives of the Study, and presenting and receiving feedback on the alternatives being considered. Twenty-four pop-up meetings and workshops were conducted along the corridor between March 2017 and July 2018.

Study Website and Online Surveys

Study-related information was posted on the Study’s website. This information included the Study schedule, reports, and presentations. The website has a search function that could be used to access all posted materials.

The Study Team developed three online interactive surveys to solicit public input on Study purpose, needs, and project alternatives.

Get to Know You Survey

This initial survey gathered a snapshot understanding of the people who live, work, and travel in the SR 436 corridor. The Study Team collected over 400 responses to this survey.

Goals and Priorities Survey

The Goals and Priorities Survey sought public feedback on the Study goals and objectives, along with input on popular destinations along the corridor and preferences on transit amenities. The Study Team collected 230 responses to this survey. The results of the survey were used to finalize the Study goals, objectives, and evaluation criteria (discussed in greater detail in Section 4).

Alternatives Survey

The Alternatives Survey sought public feedback on the four shortlisted SR 436 transit alternatives (discussed in greater detail in Section 8). The Study Team collected 335 responses to this survey.

11,500+
WEBSITE VIEWS

3,400+
WEBSITE VISITORS

960+
TOTAL SURVEY RESPONSE

PUBLIC OUTREACH WAS A VAST AND INTEGRAL PART OF THE PROJECT.

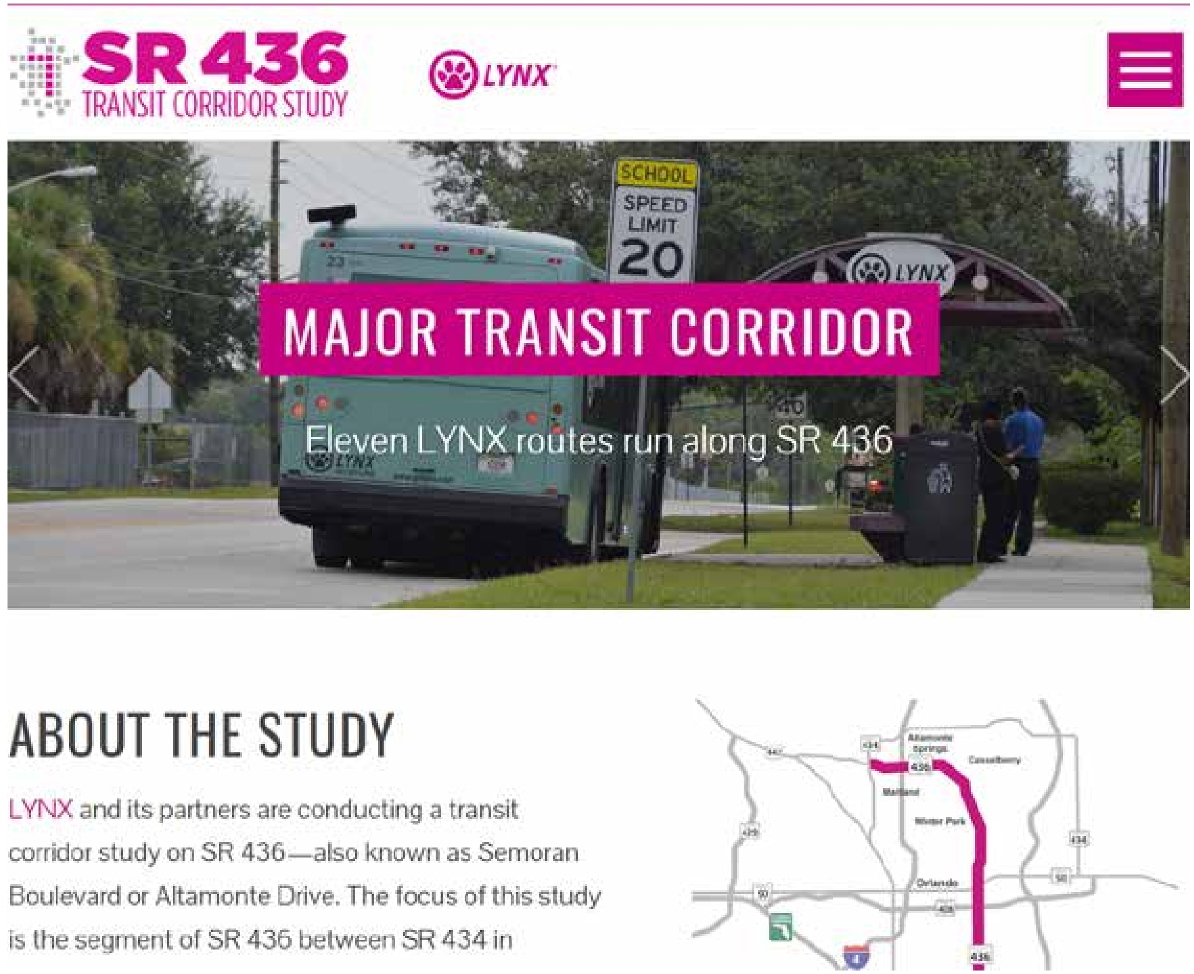

LYNX

POP-UP MEETINGS

- Gateway Orlando Rebranding Event (3/18/17)
- Semoran Block Party (4/1/17)
- Full Sail SCA Networking Summit (4/24/17)
- City of Casselberry Earth Fest (4/27/17)
- Casselberry Chamber of Commerce Business Expo (8/23/17)
- Winter Park Active Living Expo (9/23/17)
- Casselberry Latin Jazz and Art Festival (9/30/17)
- Baldwin Park First Friday (10/6/17)
- Bravo Supermarket (10/13/17, 6/20/18)
- Curry Ford SuperStop (10/18/17, 6/21/18)
- OIA SuperStop (10/26/17, 6/22/18)
- Fern Park SuperStop (11/1/17, 6/19/18)
- City of Casselberry Art and Music in the Park/ Food Truck Bazaar (5/9/18, 6/8/18, 7/13/18)
- Altamonte Springs Rhythms at the Roost Festival (6/16/18)
- Full Sail University (6/18/18)

LARGE FORMAT WORKSHOPS

- City of Orlando District 2 Neighborhood Leaders' Council (5/18/17)
- Gateway Orlando Guardian Public Safety Committee (6/1/17)
- City of Orlando District 2 Workshop (7/17/18)



SR 436 Study Website Landing Page

3

WHY SR 436 AND WHY NOW?

3 Why SR 436 and Why Now?

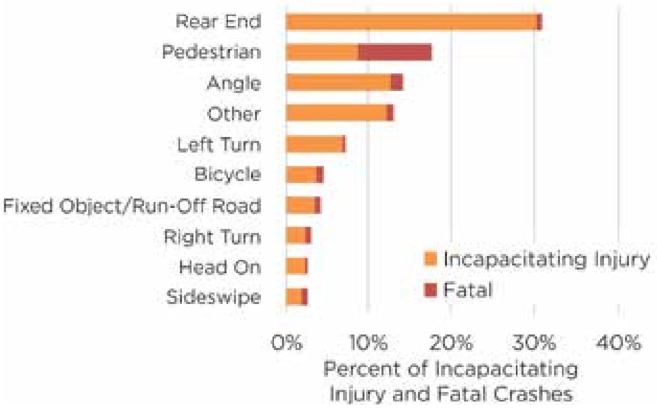
The Study Team reviewed the existing conditions of SR 436 to understand current and proposed land uses, multimodal travel patterns, and market and economic conditions that could be used to frame future improvement opportunities along the corridor. Further details on the assessment can be found on the Study website page on Existing Conditions.

3.1 Corridor Challenges

SR 436 is one street that serves many roles - it faces unique challenges in balancing those roles:

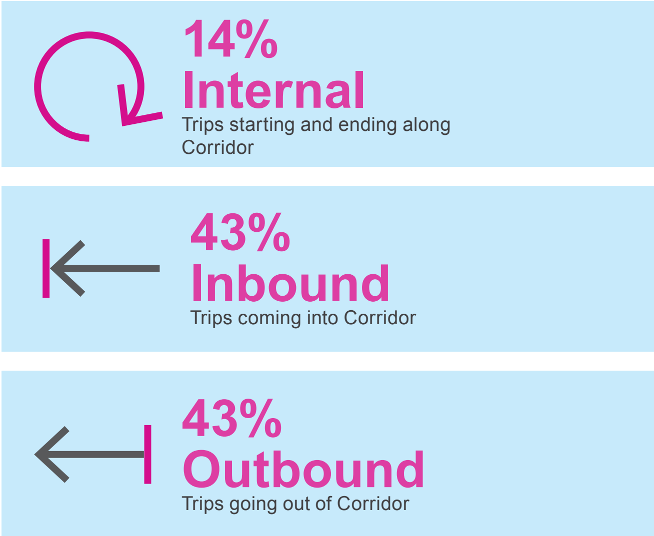
- Roadway and land development patterns do not support safe and comfortable walking and bicycling
- Pedestrian crashes are the second most common severe crash type - approximately half of all fatalities occur as a result of pedestrian crashes (See **FIGURE 4**).
- The majority (86%) of trips (vehicular and transit) that touch SR 436 start or end outside the corridor, emphasizing the need for solutions that consider system-level thinking (see **FIGURE 5**)
- Transit ridership is dispersed along the long corridor, such that no segment carries more than 1,300 passengers per day.

FIGURE 4 SR 436 CORRIDOR INCAPACITATING INJURY AND FATAL CRASHES



Source: FDOT CARS data (2011-2015)

FIGURE 5 PERCENTAGE OF TRIPS BY TYPE ALONG THE CORRIDOR



Source: MetroPlan Orlando AirSage Data (April 2015)

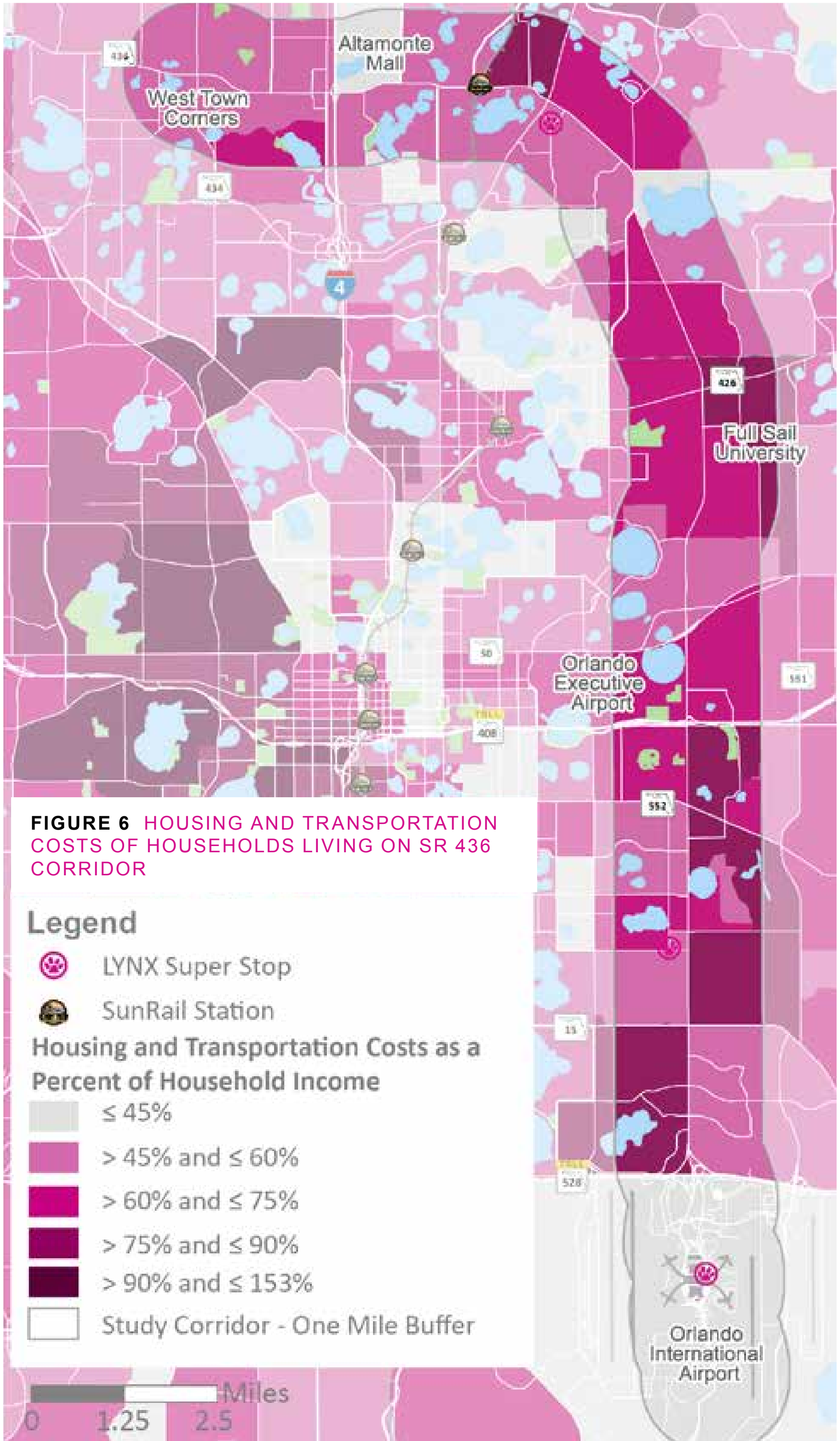
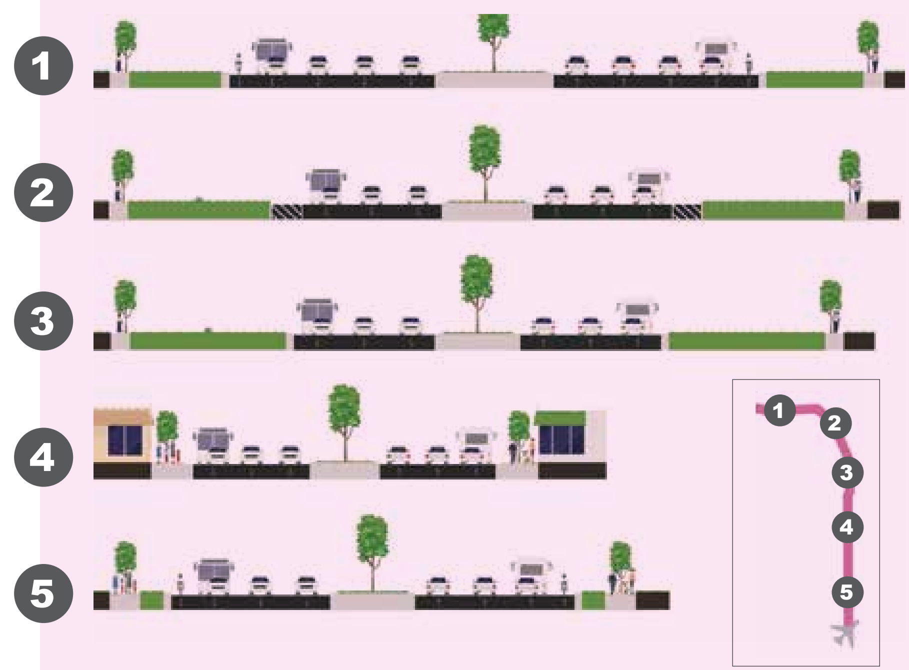


FIGURE 6 HOUSING AND TRANSPORTATION COSTS OF HOUSEHOLDS LIVING ON SR 436 CORRIDOR

Most areas along the SR 436 corridor are cost burdened as it relates to housing and transportation costs (see **FIGURE 6)**.

- Many corridor residents are spending a disproportionate share of their income on housing and transportation.
- **45% of income** is considered affordable
- Vulnerable populations (low-income, minority, zero-car household, etc.) are located in dense pockets along the corridor

SR 436 Roadway Cross Sections



In general, SR 436 roadway design and cross sections are not always consistently supportive of adjacent land uses

- **Numerous and wide travel lanes encourage speeding**
- **In some sections, large swales create uncomfortable and large separation between sidewalks, bus stops, and land uses.**

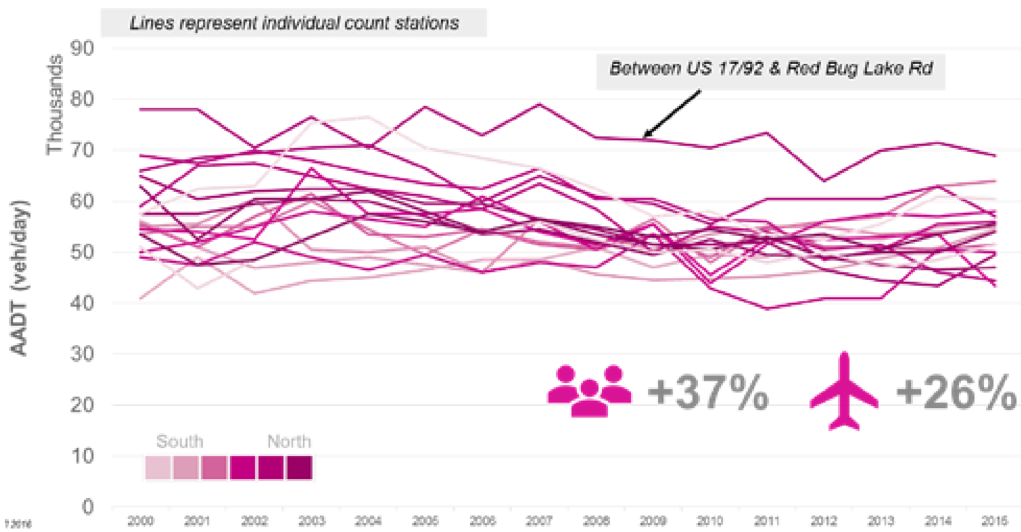
3.2 Corridor Opportunities

The Study Team collected and analyzed various data and information to better understand the opportunities along the Corridor. The data provided clarity on stakeholder perceptions shared related to the SR 436 Corridor and the transit service along it. Below, they are presented as "myths and facts" related to SR 436.

MYTH: TRAFFIC IS GETTING WORSE ON SR 436

FACT: *AADT has been steady or slightly declining on SR 436 since 2000, despite the fast growth of population and airport passenger travel*

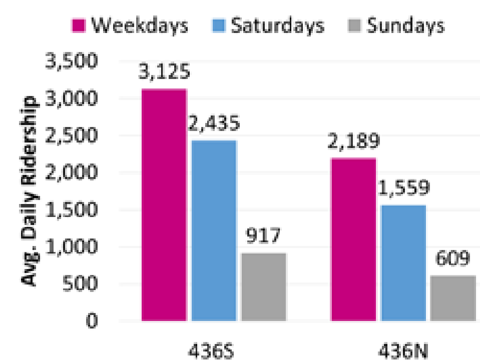
Auto Volume over Time



MYTH: NO ONE TAKES THE BUS ON SR 436

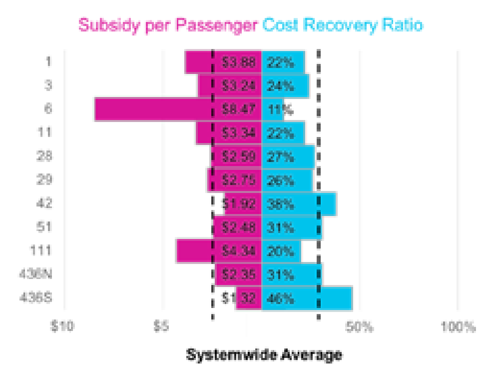
FACT: Link 436S has the highest ridership in the system for routes with peak headways of 30 minutes or more

2 of the top 5 stops that account for a quarter of LYNX's boardings are on SR 436: OIA Transfer Center and Fern Park Transfer Center



MYTH: BUS SERVICE ON SR 436 IS ECONOMICALLY INEFFICIENT

FACT: LYNX's farebox cost recovery ratios are some of the highest in the nation for similarly sized transit systems, and ridership and farebox revenues are particularly high for Link 436N and Link 436S

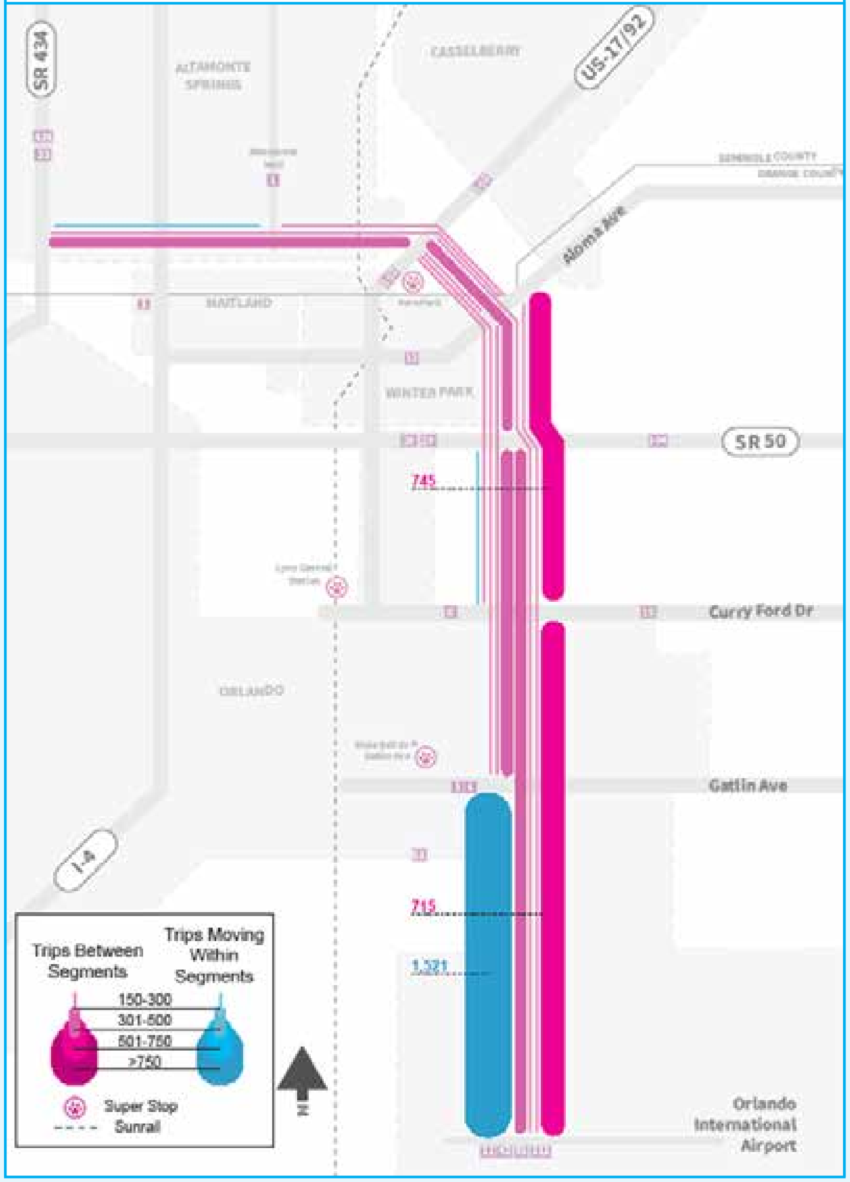


MYTH: SR 436 IS CONGESTED

FACT: Average travel speeds are fairly high along the corridor, and there are currently no LOS F conditions along the corridor

MYTH: NO ONE USES LYNX TO GET TO THE OIA

FACT: Highest passenger volumes are seen on SR 436 at OIA, and consistently higher passenger volumes are seen between OIA and Aloma Avenue (SR 426). 30% of airport-bound transit trips are for airport passengers.



4

HOW DO WE EVALUATE ALTERNATIVES?

4 How Do We Evaluate Alternatives?

The Study Team developed goals, objectives, and screening criteria that align with LYNX, PAWG, and public visions for Central Florida. These became the basis for evaluating alternatives and determining if alternatives respond to the needs and opportunities in the corridor. Further details can be found on the Study website's [Identification of Alternatives page](#).

4.1 Goals and Objectives

Based on the issues and opportunities gleaned from the existing conditions analysis, the Study Team and the PAWG developed a set of project goals and objectives. These goals and objectives formed the framework for measuring the effectiveness of potential transit alternatives. Screening criteria developed in subsequent steps of alternatives evaluation were tied to each of the project goals and objectives. **FIGURE 7** presents the project goals developed with the PAWG.

FIGURE 7 PROJECT GOALS

4.2 Screening Criteria

The screening of alternatives was conducted in an iterative fashion, with each successive level of screening increasing in level of analysis detail, as shown in **FIGURE 8**.

FIGURE 8 ALTERNATIVES ANALYSIS PROCESS

1 Level 1

The Level 1 screening evaluated transit modes that could be feasible along SR 436. It reflected operational and maintenance needs, construction costs, environmental impacts, land use compatibility, and community concerns. It also considered existing ridership patterns.

2 Level 2

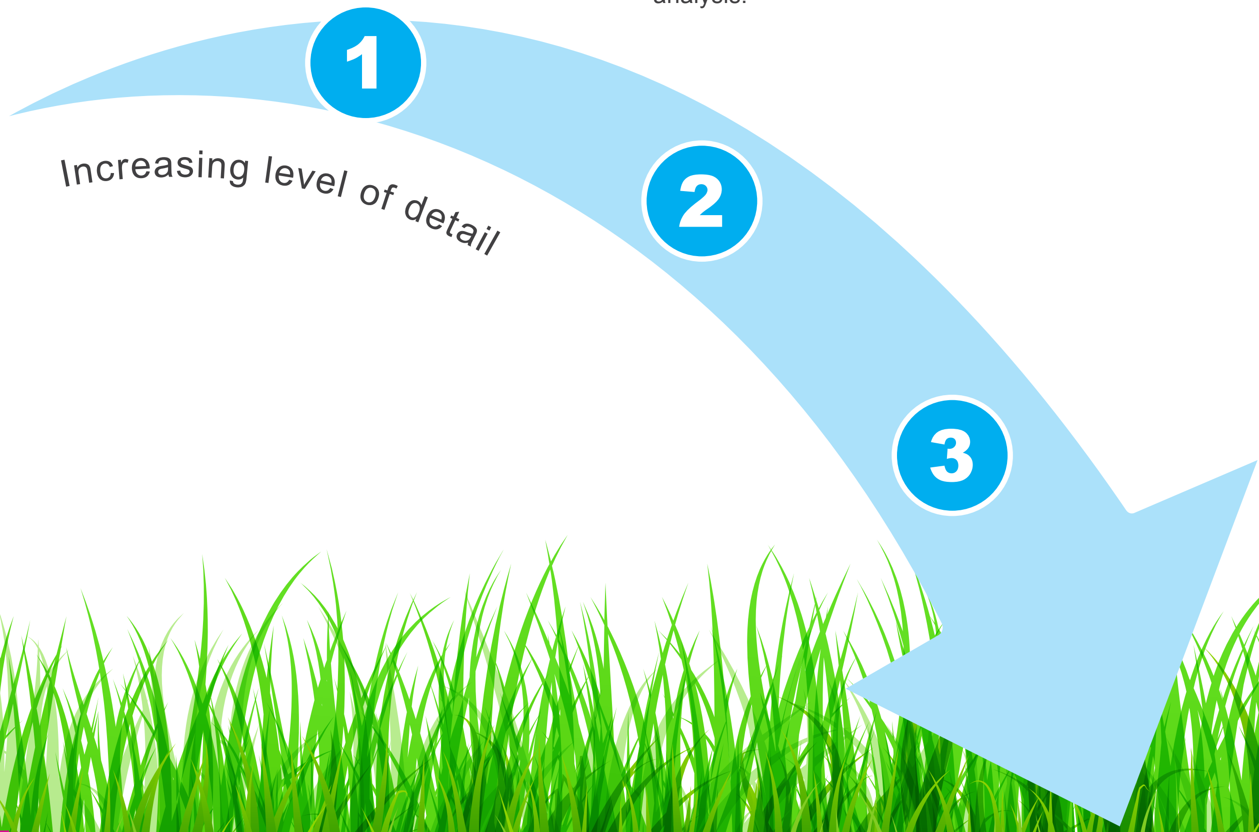
The Level 2 screening evaluated the alternative alignments where potential transit investments could be implemented. This level of evaluation considered the results of the Level 1 screening but contained a higher level of detail and more information and analysis.

3 Level 3

The Level 3 screening combined the results of the Levels 1 and 2 screenings and advanced the highest-ranking modes and alignments to more detailed analysis. This level of evaluation also considered operating plan scenarios, station characteristics and location options, and multimodal access to transit service, including Complete Streets solutions.

Level 3 was performed in two steps:

- Level 3a used data and analysis tools that enabled the Study Team to look at a large number of alternatives without consuming an excessive amount of time and resources.
- Once the number of potential alternatives was reduced through the Level 3a screening, Level 3b applied the full set of data and tools available to the Study Team.



5

WHAT ARE THE ALTERNATIVES?

5 What Are the Alternatives?

This section describes outcomes from the Level 1, Level 2, and Level 3a screenings. The Study Team aimed to develop alternatives that are feasible, are supported by stakeholders, and—most importantly—meet the project's goals and objectives.

Throughout the rest of this document, color-coded tables are used to aid in synthesizing the evaluation results. Darker green colors represent relatively better performance with respect to the screening criteria, while lighter green colors reflect relatively worse performance. Further details can be found on the Study's Identification of Alternatives website page.

5.1 Level 1 Screening: Transit Modes

Identification of Modes

A comprehensive list of transit modes was developed and evaluated for potential applicability to SR 436. The modes were categorized based on their suitability for providing "trunk" or "feeder" service. Modes applicable for trunk service have high peak capacities and perform best when there is strong demand between a defined origin-destination pair. Modes applicable for feeder service have relatively lower passenger capacities but are more flexible on route alignments and can more effectively cover dispersed origins and destinations.

Eleven trunk and nine feeder transit modes were evaluated for applicability along SR 436. **TABLE 1** summarizes key features for these transit modes. **TABLE 2** illustrates how the different trunk transit modes meet the Study's goals and objectives.[1]

Trunk Mode Screening Results

The results suggested that four trunk modes would perform better than the rest on SR 436:

- LOCAL BUS
- LIMITED-STOP BUS
- CORRIDOR-BASED BUS RAPID TRANSIT (BRT)
- FIXED GUIDEWAY BRT

Feeder Mode Screening Results

The screening of potential feeder modes followed a similar process as the screening for trunk modes, with the following four feeder modes performing the best based on the screening criteria:

- ON-DEMAND TRANSIT
- VANPOOL
- CIRCULATOR
- UBER POOL/LYFT LINE

1 A corresponding table that summarizes the feeder modes can be found in the Identification of Alternatives website page.

TABLE 1 KEY FEATURES OF VARIOUS TRANSIT MODES

Category	Mode	Data for:	Example Weekday Ridership	Example Capital Cost	Example Operating Cost[1]
Trunk	**Local bus**	Corridor	2,700-3,200	$130-$135,000/mile	$82-$130/hour
	Limited-stop bus	Corridor	300-6,000	$75-$200,000/mile	$82-$130/hour
	Corridor-based BRT	Corridor	3,000-6,000	$1.7-$4.2 million/mile	$100-$140/hour
	BRT- Bronze or Silver (Fixed Guideway BRT)	Corridor	10,000-480,000	$5-$30 million/mile	$100-$140/hour
	BRT- Gold (Fixed Guideway BRT)	Corridor	31,000-850,000	$15-$35 million/mile	$100-$140/hour
	Streetcar	System	15,200-27,300	$25-$50 million/mile	$185/hour
	Light Rail Transit	System	16,200-23,200	$45-$140 million/mile	$270-$380/hour
	Commuter rail	Corridor	3,600	$38 million/mile	$500-$640/hour
	Heavy rail	System	230,000-8.5 million	$50-$250 million/mile	$270-$650/hour
	High-speed rail	System	9,000-45,000	$6.3-$510 million/mile	$500-$650/hour
	MagLev (Magnetic Levitation)	Corridor	10,000-20,000	$150-$300 million/mile	$500-$650/hour
Feeders	**On-demand transit**	System	600	$0.6 million	$30-$70/hour
	Circulator	System	4,600	$0.5-$7 million/mile	$65-$70/hour
	Driverless shuttles and buses	Vehicle	10-35	$200-$300,000	$10-$30/hour
	Personal Rapid Transit	System	2,000	$11-$24 million/mile	$40/hour
	Automated People Movers	System	36,400	$35 million/mile	$420/hour
	Vanpool	System	1,200	$2.3 million	$20-$30/hour
	Gondola	Corridor	1,100-28,800	$30-$40 million/mile	$0 to $500,000/mile
	Uber Pool/Lyft Line	System	20,000-30,000	~$0	$20-$30 million
	Monorail	Corridor	13,000-25,000+	$200-$700 million/mile	$160-$200/hour

[1] Overall costs per vehicle revenue hour, except for Gondola and Uber Pool/Lyft Line. Sources included on the Identification of Alternatives page.

= LOCAL EXAMPLE

TABLE 2 TRUNK MODES SELECTION ASSESSMENT

GOAL	CRITERIA	LOCAL BUS	LIMITED-STOP BUS	CORRIDOR-BASED BRT	FIXED GUIDEWAY BRT	BRT-GOLD	MODERN STREETCAR	LIGHT RAIL TRANSIT	COMMUTER RAIL	HEAVY RAIL	HIGH-SPEED RAIL	MAGLEV
	POPULATION AND EMPLOYMENT DENSITIES	Better	Better	Better	Worse	Worse	Worse	Worse	Worse	Worse	Worse	Worse
	EXISTING RIDERSHIP SUPPORTS MODE	Better	Better	Better	Worse	Worse	Worse	Worse	Better	Worse	Worse	Worse
	PROVEN IN NORTH AMERICA	Better	Better	Better	Better	Better	Better	Better	Better	Better	Better	Worse
	EASY/SIMPLE ACCESSIBILITY	Better	Better	Better	Better	Better	Better	Better	Better	Worse	Worse	Worse
	INFLUENCE ECONOMIC ACTIVITY	Worse	Worse	Middle	Better	Better	Better	Better	Middle	Better	Better	Worse
	ADAPT TO LAND USE CHANGES	Better	Better	Better	Middle	Middle	Worse	Worse	Worse	Worse	Worse	Worse
	PERMANENCE OF INFRASTRUCTURE	Worse	Worse	Middle	Better	Better	Better	Better	Better	Better	Better	Better
	RIGHT-OF-WAY NEEDS	Better	Better	Better	Worse	Worse	Middle	Worse	Worse	Worse	Worse	Worse
	IMPACT TO AUTO ACCESS/TURNS	Better	Better	Better	Middle	Worse	Middle	Worse	Worse	Middle	Middle	Middle
	ENVIRONMENTAL/ RIGHT-OF-WAY IMPACTS	Better	Better	Middle	Middle	Worse	Middle	Worse	Worse	Worse	Worse	Worse
	REQUIRES MAJOR IMPROVEMENTS	Better	Better	Middle	Worse	Worse	Worse	Worse	Worse	Worse	Worse	Worse
	RELATIVE CAPITAL COST	Better	Better	Better	Middle	Middle	Worse	Worse	Worse	Worse	Worse	Worse
	RELATIVE OPERATIONAL COST	Better	Better	Better	Better	Better	Middle	Middle	Worse	Worse	Worse	Worse
	POTENTIAL FOR SIMPLE MODIFICATIONS	Better	Better	Better	Middle	Middle	Worse	Worse	Worse	Worse	Worse	Worse

Refer to the website for a detailed version of this table as well as an explanation of the screening criteria.

RELATIVE PERFORMANCE

WORSE		BETTER

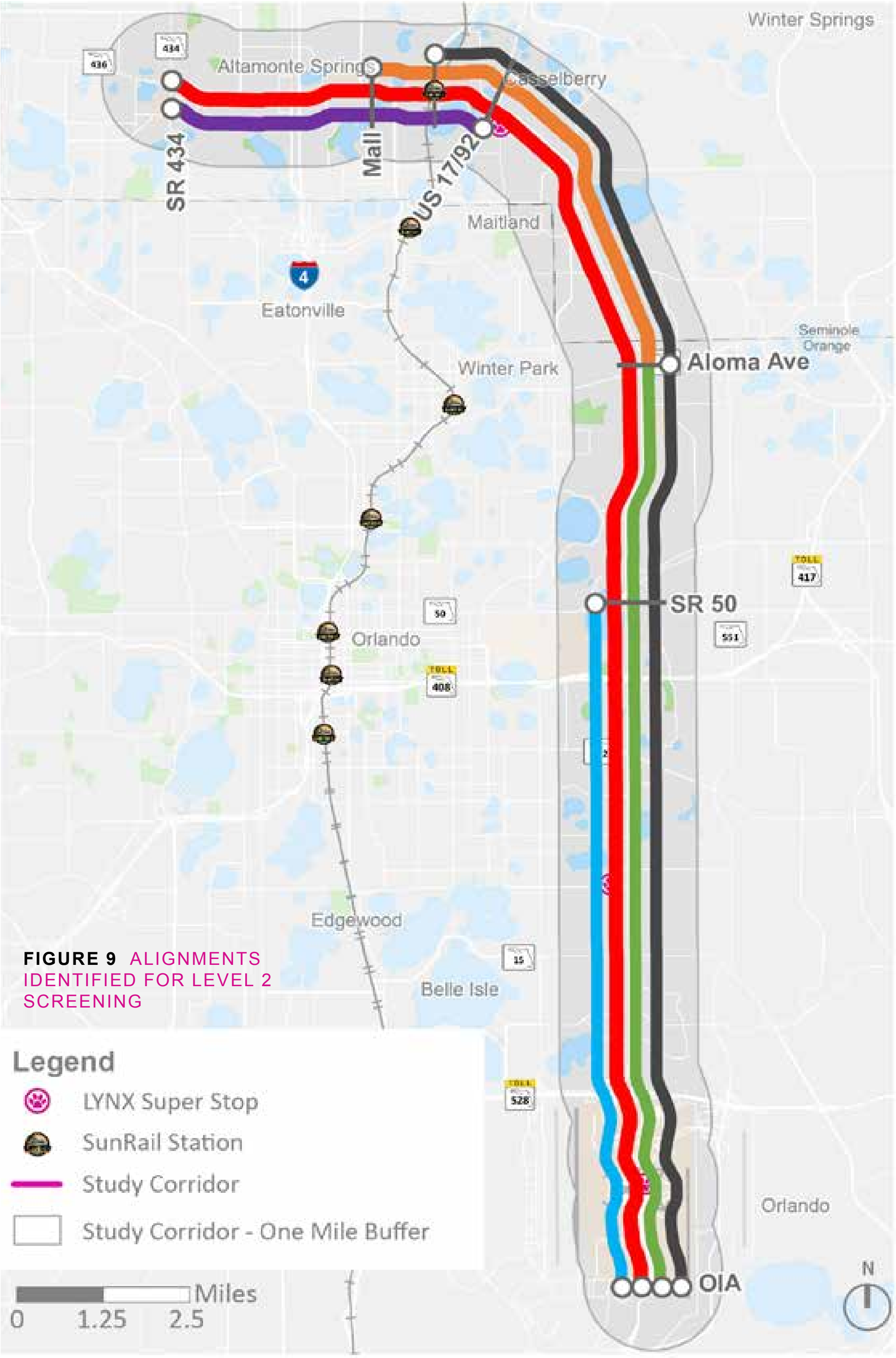


FIGURE 9 ALIGNMENTS IDENTIFIED FOR LEVEL 2 SCREENING

5.2 Level 2 Screening: Alignments

Identification of Alignments

The Study Team worked with the PAWG to identify a preliminary list of potential trunk mode alignments. Two guiding principles were identified for the selection of alignments:

- **High productivity:** Productivity refers to a transit route's ability to serve trips. High existing ridership and high household or employment densities are usually associated with high productivity. Productivity was evaluated through a combination of ridership and socio-demographic data and an assessment of future productivity. These efforts are documented in the Existing Conditions report.
- **Logical endpoints:** Transit routes should have logical endpoints. Logical endpoints may be areas with large trip generators or attractors, or intersections with major connecting transit service(s). Logical endpoints were identified based on the corridor's activity centers, boarding and alighting data, and connecting transit services. These features are also documented in the Existing Conditions report. This information was then complemented with an analysis of transit transfers, using LYNX onboard survey data. A summary of these data is presented in the Onboard Survey Data Summary document.

FIGURE 9 and **TABLE 3** illustrate potential alignments identified in collaboration with the PAWG and key stakeholders.

TABLE 3 ALIGNMENTS IDENTIFIED FOR LEVEL 2 SCREENING

Trunk Alignment Name[1]	Southern Terminus	Northern Terminus	Approx. Length (miles)
End-to-end	OIA	SR 434	22.7
OIA to SunRail	OIA	SunRail Station	18.9
OIA to Aloma	OIA	Aloma Ave	13.3
OIA to SR 50	OIA	SR 50	10.0
Aloma to Altamonte Mall	Aloma Avenue	Altamonte Mall	7.1
US 17/92 to SR 434	US 17/92	SR 434	4.8

[1] Shorthand notation

Level 2 Screening Results

The Level 2 screening of alignments answered the following questions related to proposed transit alternatives:

ALIGNMENTS:

Q: FROM WHERE TO WHERE?

Q: FACILITIES: ON WHICH ROAD(S)?

The six candidate alignments in **TABLE 4** were screened using a combination of metrics, which are summarized in **TABLE 5**.

TABLE 4 ALIGNMENTS SELECTION ASSESSMENT

GOAL	CRITERIA	END-TO-END	OIA TO SUNRAIL	OIA TO ALOMA	OIA TO SR 50	ALOMA TO MALL	US 17/92 TO SR 434
	APPROX. LENGTH (MI):	22.7	18.9	13.3	10.0	7.1	4.8
	EXISTING RIDERSHIP	3	4	4	4	2	1
	ZERO-CAR HOUSEHOLDS	3	4	4	4	3	1
	LOW-INCOME POPULATION	3	3	4	5	2	1
	POPULATION DENSITY	3	3	3	5	4	1
	COVERS ALL-MODES INTERNAL TRIPS	4	2	2	1	3	5
	COVERS MULTI-ROUTE TRANSIT TRIPS	4	5	4	4	1	2
	ONE-SEAT TRANSIT TRIPS	5	5	5	5	2	2
	PEDESTRIAN/BIKE INFRASTRUCTURE	1	2	3	4	2	5
	PEDESTRIAN LEVEL OF SERVICE	3	3	1	1	3	3
	NUMBER OF TRAFFIC SIGNALS	3	2	2	2	4	5
	AVERAGE CROSSING DISTANCE	3	4	4	4	2	1
	JOB DENSITY	3	2	2	2	3	5
	VACANT/UNDERUTILIZED LAND	2	2	2	3	4	5
	LAND WITHIN SPECIAL DISTRICTS	2	3	4	5	1	2
	VISITOR TRIPS FROM OIA	3	3	4	5	1	2
	TRAVEL TIME RELIABILITY	4	4	4	3	1	1
	WEEKDAY 5-6 PM SPEED	3	4	4	5	2	1
	ACCESS MANAGEMENT COMPLIANCE	3	5	5	5	3	1
	% MILES MEETING LOS D	3	4	4	4	3	1
	POTENTIAL FOR JOINT-DEV'T OPPS.	3	3	1	2	5	5
	# OF SURVEY "TOP DESTINATIONS"	2	2	4	5	2	3
	# OF VULNERABLE HOUSEHOLDS	2	3	4	5	2	1

Refer to the website for a detailed version of this table.

RELATIVE PERFORMANCE

WORSE				BETTER

5.3 Level 3a Screening

The Study Team and PAWG developed Level 3a screening candidates based on the results of the Level 1 and Level 2 screening efforts. The Level 3a candidates combined the highest performing modes (from Level 1) with the highest performing alignments (from Level 2).

The first step in the Level 3 screening (Level 3a) examined alternatives using coarser data sources and high-level analysis techniques. These data sources and techniques included the following:

- Transit run times from a literature review and rule-of-thumb estimates
- Segment-level traffic impact analysis
- Ridership estimates from FDOT's ridership estimation tool
- Planning-level capital and operational cost estimates

The alternatives evaluated in Level 3a are illustrated in **FIGURE 10** and listed in **TABLE 5**.

TABLE 5 ALTERNATIVES IDENTIFIED FOR LEVEL 3A SCREENING

Trunk Mode	Trunk Alignment	Approx. Length (miles)
Local Bus	End-to-end	22.7
Limited-stop Bus	OIA to Aloma	13.3
	Aloma to SR 434	9.4
Corridor-based BRT	OIA to SR 50	10.0
	OIA to Aloma	13.3
	OIA to SunRail	18.9
	Aloma to SR 434	9.4
Fixed Guideway BRT	OIA to SR 50	10.0
	OIA to Aloma	13.3

A key part of the Level 3a screening was to define each alternative's mode and operating scenarios. A detailed description of the features of the different modes is available in the offline Ridership Modeling report.

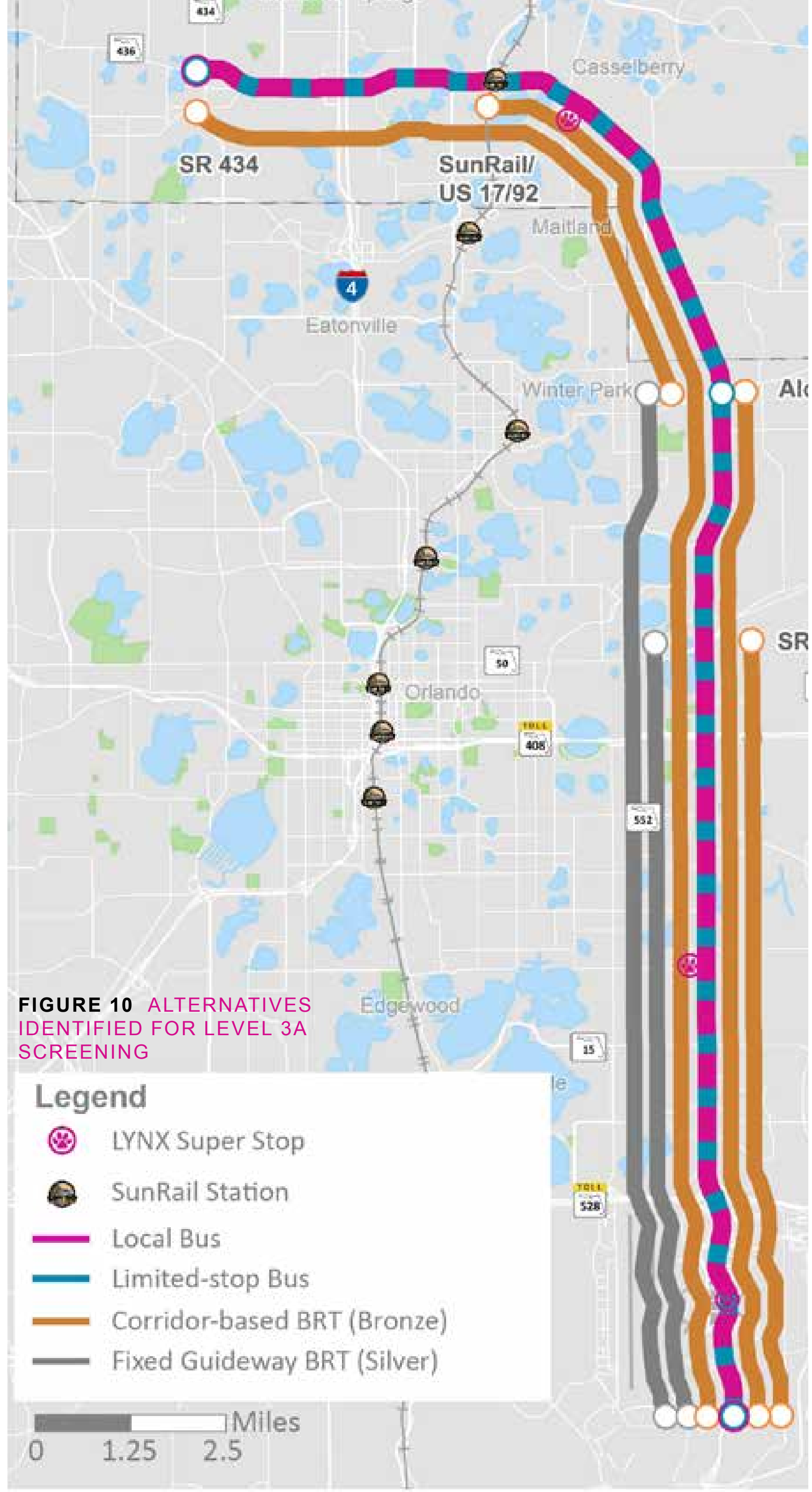


FIGURE 10 ALTERNATIVES IDENTIFIED FOR LEVEL 3A SCREENING

Local Bus

Local Bus service is the baseline scenario, or the service already in operation on SR 436 (see **FIGURE 11**). It operates with traditional buses in mixed-flow traffic at 30-minute headways. On average, stops are spaced a quarter of a mile apart. Local bus service does not receive priority at intersections.

Limited-stop Bus

Limited-stop bus service is assumed to operate with traditional buses in mixed-flow traffic at 15-minute headways. Limited-stop bus has longer stop spacing than local bus service; this study developed a set of preliminary stations spaced at an average distance of about 0.75 mile. Limited-stop bus is assumed to receive priority at intersections through queue jumps and transit signal priority (TSP).

FIGURE 12 shows an example of limited-stop bus service branded as "rapid".

BRT

BRT is often distinguished from local bus service through dedicated lanes, substantial infrastructure in stations, premium vehicles, and unique branding (see **FIGURE 13** and **FIGURE 14**). BRT systems may deploy those items to varying degrees, so there is no single definition of BRT services. This study assumes all BRT alternatives would operate at 15-minute headways and would serve the same set of preliminary stations used for limited-stop bus service.

- **Corridor-based BRT** operates on a combination of mixed-traffic and dedicated transit facilities. Corridor-based BRT is assumed to receive priority at intersections through queue jumps and TSP.
- **Fixed Guideway BRT** operates on exclusive lanes (i.e., lanes reserved for transit vehicles) for most of its length.

The Level 3a screening was conducted using data analysis and input from the PAWG. **TABLE 6** summarizes the results of Level 3a screening.

FIGURE 11 LOCAL BUS IN ORLANDO, FLORIDA

FIGURE 12 LIMITED-STOP BUS IN OAKLAND, CALIFORNIA

FIGURE 13 BRT IN EUGENE, OREGON

FIGURE 14 BRT IN CLEVELAND, OHIO

TABLE 6 LEVEL 3A ALTERNATIVES ASSESSMENT

	TRANSIT MODE:	LOCAL BUS	LIMITED-STOP BUS		CORRIDOR-BASED BRT				FIXED GUIDEWAY BRT - WIDENING[1]		FIXED GUIDEWAY BRT - LANE REPURPOSE[2]	
	APPROX. LENGTH (MI)	22.7	13.3	9.4	10	13.3	18.9	9.4	10	13.3	10	13.3
GOAL	CRITERIA	END-TO-END	OIA TO ALOMA	ALOMA TO SR 434	OIA TO SR 50	OIA TO ALOMA	OIA TO SUNRAIL	ALOMA TO SR 434	OIA TO SR 50	OIA TO ALOMA	OIA TO SR 50	OIA TO ALOMA
	FIVE-MINUTE TRAVEL TIME ON BUS											
	TARGET % EXCLUSIVE LANES											
	ZERO-CAR HOUSEHOLDS											
	TOTAL POPULATION											
	LOW-INCOME HOUSEHOLDS											
	% MULTI-ROUTE TRIPS : % CORRIDOR											
	% ONE-SEAT RIDES : % CORRIDOR											
	# OF EXISTING RIDERS											
	% INCREASE IN NEW RIDERS											
	PERCENT OF LOW-STRESS STREETS											
	CROSSING DISTANCES											
	JOB AVAILABILITY											
	SPECIAL USE/MIXED-USE LAND											
	TRANSIT IMAGE											
	POTENTIAL TO IMPACT TRAFFIC											
	OPPORTUNITIES FOR ACCESS MGM'T											
	CAPITAL COSTS											
	OPERATING COSTS PER RIDER											
	OPERATING COSTS PER YEAR											
	VULNERABLE POPULATIONS											
	EST. CAPITAL COST RANGE	(EXISTING)	$6M-$20M	$5M-$14M	$20M-$50M	$27M-$67M	$38M-$95M	$19M-$47M	$150M-$400M	$200M-$532M	$50M-$150M	$67M-$200M

[1] Widening: Widening SR 436 to accommodate exclusive median-running transit lanes in each direction.
[2] Lane Repurpose: Repurposing an existing travel lane in each direction as an exclusive transit lane.

Refer to the website for a detailed version of this table.

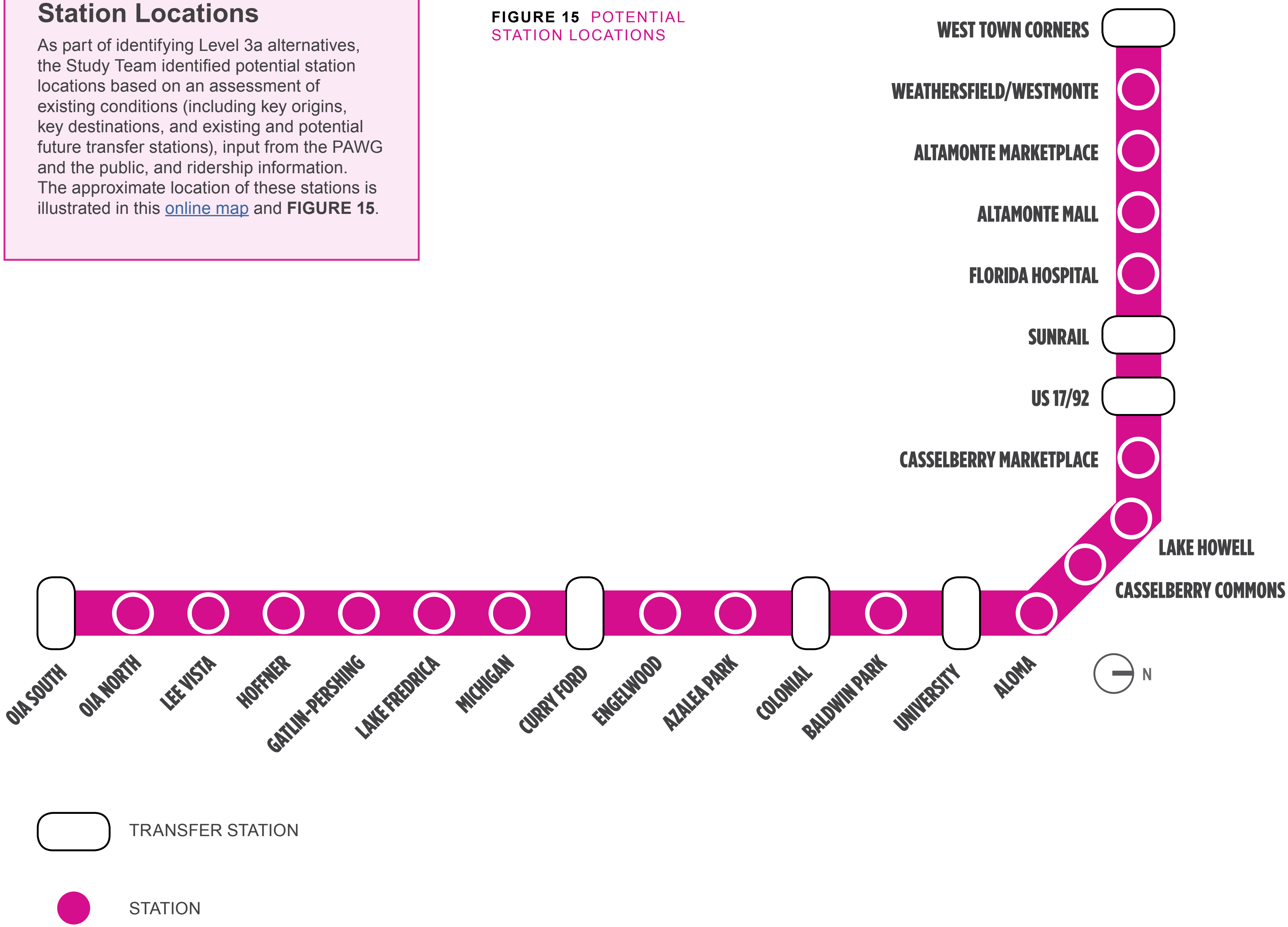
RELATIVE PERFORMANCE

WORSE				BETTER

Station Locations

As part of identifying Level 3a alternatives, the Study Team identified potential station locations based on an assessment of existing conditions (including key origins, key destinations, and existing and potential future transfer stations), input from the PAWG and the public, and ridership information. The approximate location of these stations is illustrated in this [online map] and **FIGURE 15**.

FIGURE 15 POTENTIAL STATION LOCATIONS



5.4 Findings

After reviewing information about the potential productivity and costs of the Level 3a alternatives, the Study Team and the PAWG arrived at the following observations:

- Local bus service is considered necessary on SR 436 regardless of the chosen long-term alternative. The Study analysis overlays each Level 3b alternative on local bus service.
- The limited-stop bus alternative is projected to boost ridership on SR 436 by about a quarter relative to existing levels at little additional capital cost. As such, limited-stop bus is recommended as a short-term alternative that could be implemented by LYNX and its funding partners, potentially without additional funding from federal partners.
- The highest projected ridership increase is associated with the alternative that terminates at the Altamonte Springs SunRail station (Alternative B). In addition to connecting to the SunRail commuter rail line, this alternative also connects to the important regional corridor of SR 17/92 and the Fern Park SuperStop, which serves high-ridership routes Links 102 and 103.
- For any alternative terminating at SunRail, the local Link 436S route from OIA to Fern Park would be extended to SunRail. This change is expected to reduce rider confusion that could arise if the local Link 436S route terminates at the Fern Park SuperStop (as it currently does) while the Level 3b alternative terminates at SunRail.
- The higher projected ridership and connection to the activity center at University Boulevard made the alternatives terminating at University Boulevard rank higher than the ones terminating at SR 50—despite the slightly higher capital and operational costs associated with serving an additional three miles.

Given these observations and input from the PAWG and other stakeholders, the Study Team defined four alternatives to advance to the Level 3b screening. These alternatives are considered the Study's "shortlist" alternatives and are outlined in **TABLE 7** and illustrated in **FIGURE 16**. Sections 6 and 7 of this report detail the traffic impact/access analysis and ridership forecasts developed in support of the Level 3b screening.

TABLE 7 ALTERNATIVES IDENTIFIED FOR LEVEL 3B SCREENING

Alternative	Trunk Mode[1]	Trunk Alignment	Transit Runningway	Approximate Distance (miles)
A[2]	Corridor-based BRT (Bronze)	OIA to University Boulevard	BAT Lanes converted from Existing Auxiliary Lanes (40% of segment)	12.9
B[2]		OIA to SunRail		18.9
C1[3]	Fixed Guideway BRT (Silver)	OIA to University Boulevard	Exclusive Median Running Lanes (100% of segment)	12.9
C2[3]			Exclusive Curbside Lanes Repurposed from Existing Outside Through Lanes (100% of segment)	

[1] The trunk mode is assumed to be overlaid on local bus service and complemented by limited-stop service outside of its alignment.

[2] Alternatives A and B convert existing auxiliary lanes to business access and transit (BAT) lanes that accommodate transit and right-turning vehicles. An auxiliary lane is a lane other than a through lane, used to separate entering, exiting or turning traffic from the through traffic (https://en.wikipedia.org/wiki/Lane). In the context of SR 436, these are the long, continuous right-turn lanes, and merge/acceleration lanes). Auxiliary lanes are present for approximately 40 percent of both Alternatives A & B alignments.

[3] Alternative C1 widens SR 436 to have median-running transit lanes, while Alternative C2 repurposes existing outside through travel lanes as transit lanes.

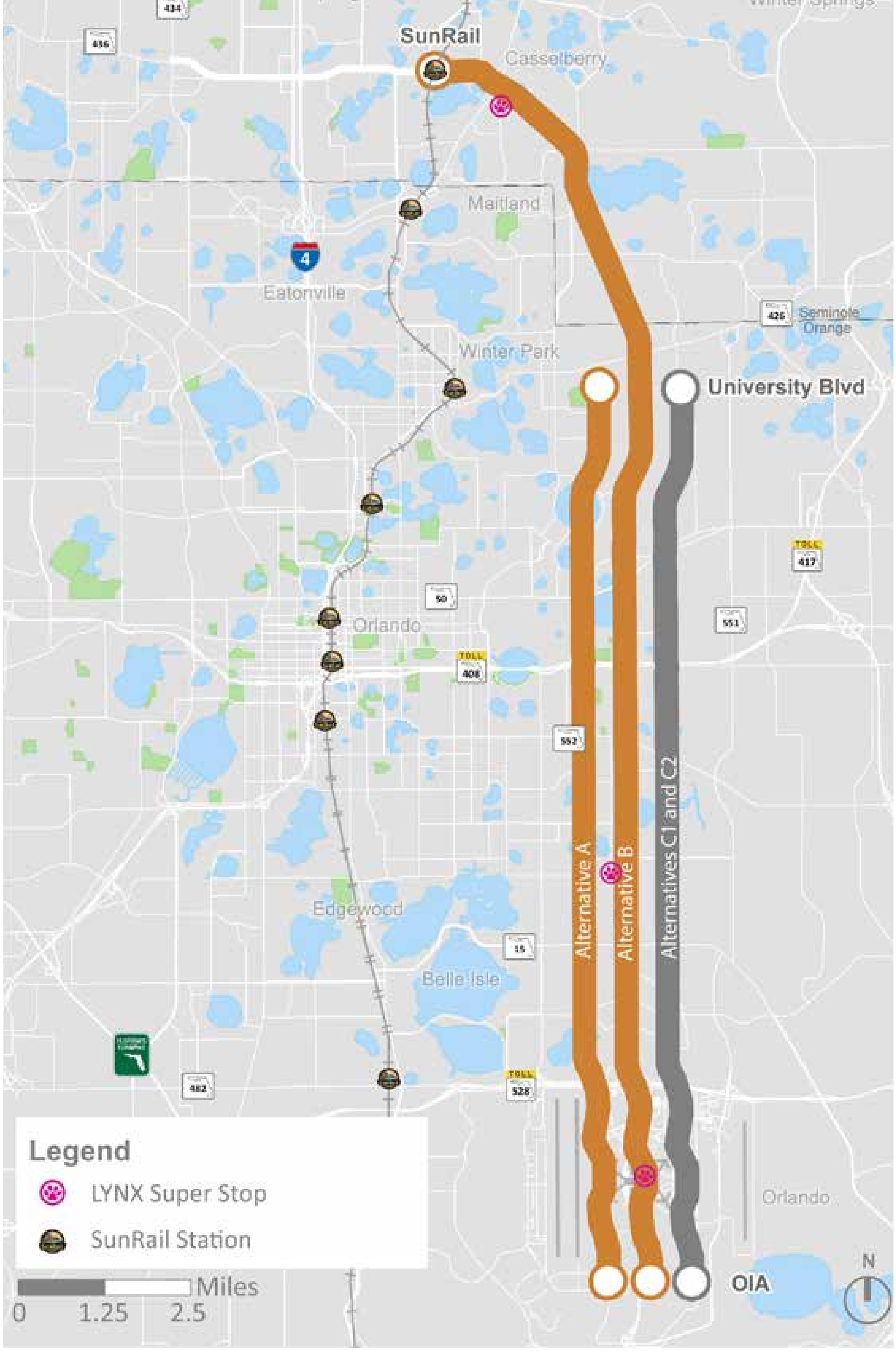
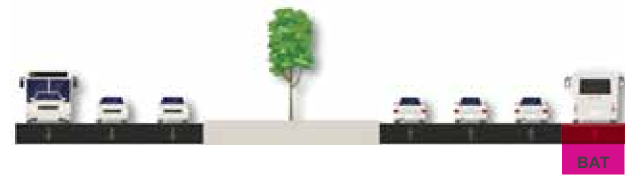


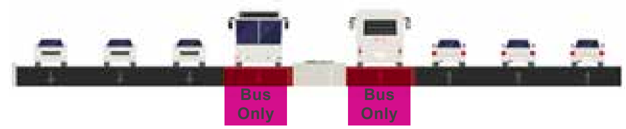
FIGURE 16 ALTERNATIVES IDENTIFIED FOR LEVEL 3B SCREENING

In **Alternatives A & B**, existing right-turn lanes and auxiliary lanes are converted to Business Access and Transit (BAT) lanes. Elsewhere, the bus runs in mixed-traffic.

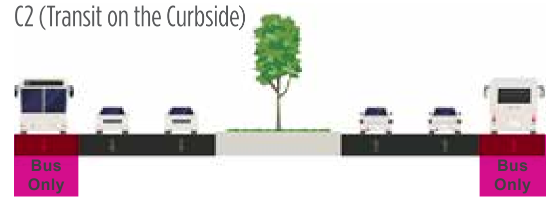


In **Alternatives C1 & C2**, the bus would run in exclusive transit lanes along the median or on the curbside.

C1 (Transit in the Median)



C2 (Transit on the Curbside)



6

HOW DO ALTERNATIVES IMPACT TRAFFIC AND ACCESS?

6 How Do Alternatives Impact Traffic and Access?

The objective of the Traffic Impact/Access Study (TIAS) task was to document and quantify multimodal traffic conditions along SR 436—with and without the addition of the proposed transit alternatives. The TIAS methodology, assumptions, and results are described in greater detail on the website's Traffic Impact/Access Study page.

6.1 Study Intersections

Intersections

Study intersections were selected after consultation with the PAWG. These signalized intersections represent major intersections in the study area. The locations of the study intersections are illustrated in **FIGURE 17**.

SR 436 at Pershing Avenue, one of the study intersections

Source:KAI

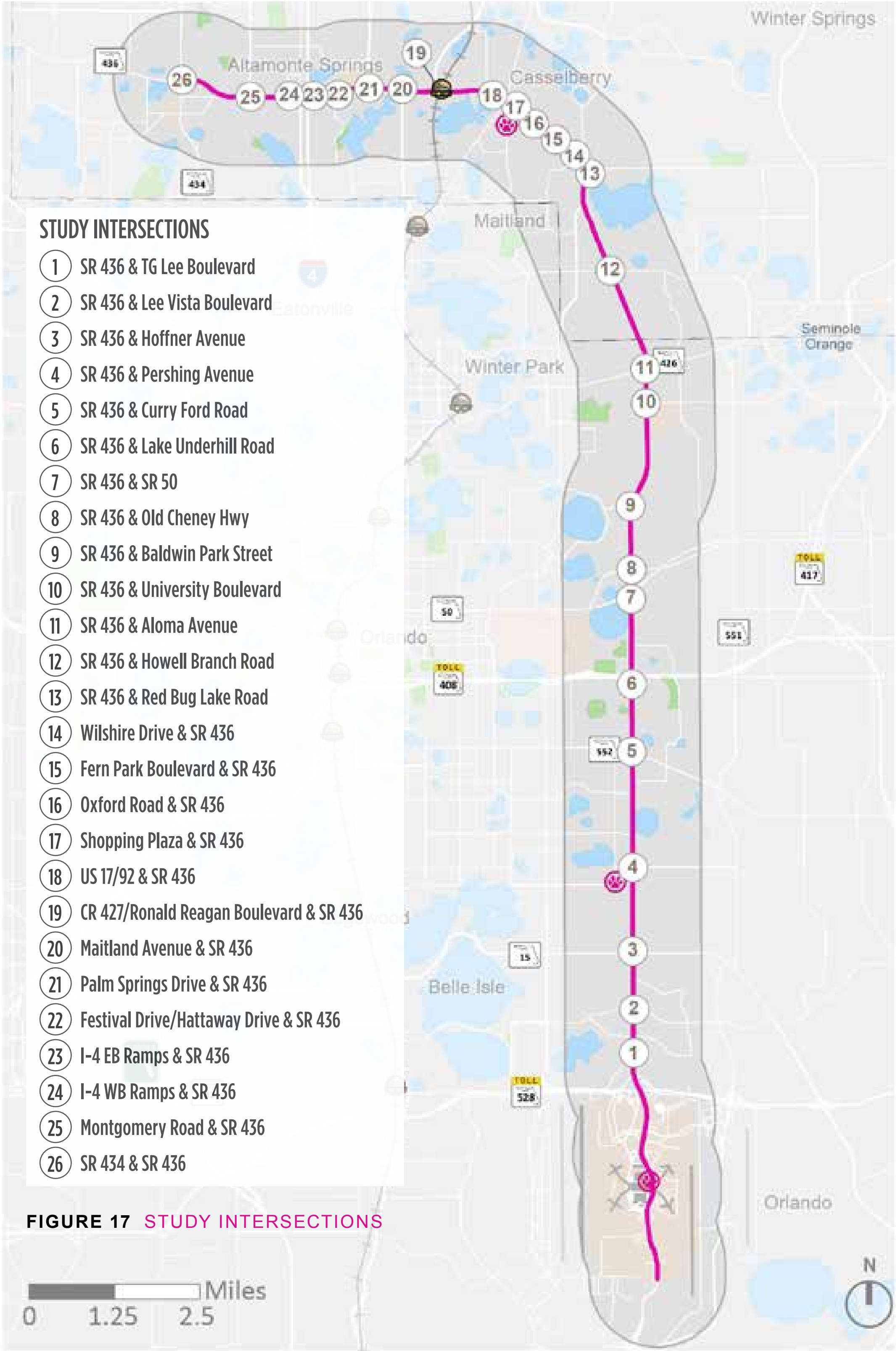


FIGURE 17 STUDY INTERSECTIONS

Midblock Crossing Locations

FIGURE 18 shows the 11 midblock locations where pedestrian and bicyclist crossing data were collected along the SR 436 corridor.

Pedestrians crossing mid-block on SR 436

Source: KAI

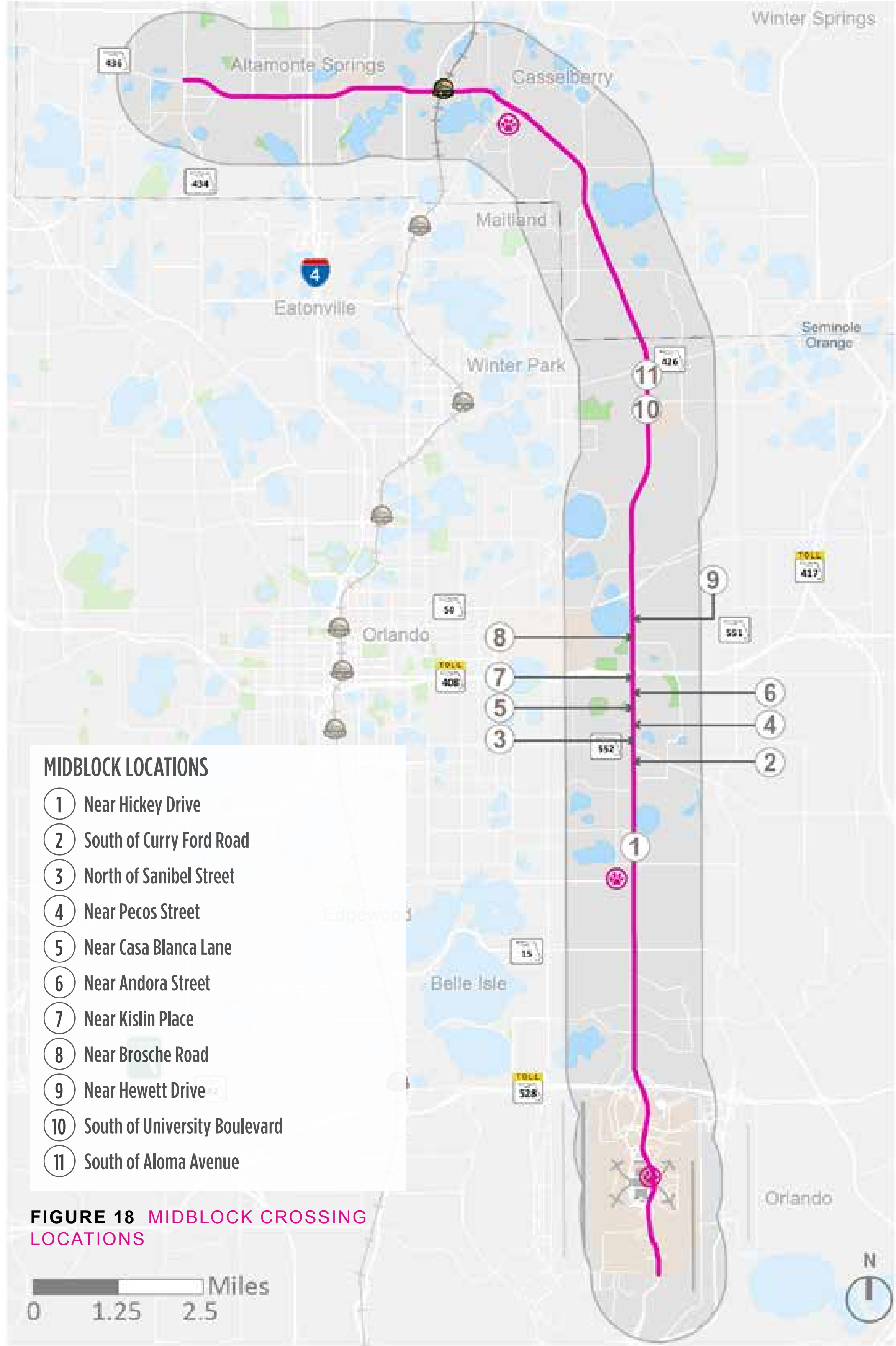


FIGURE 18 MIDBLOCK CROSSING LOCATIONS

6.2 TIAS Methodology

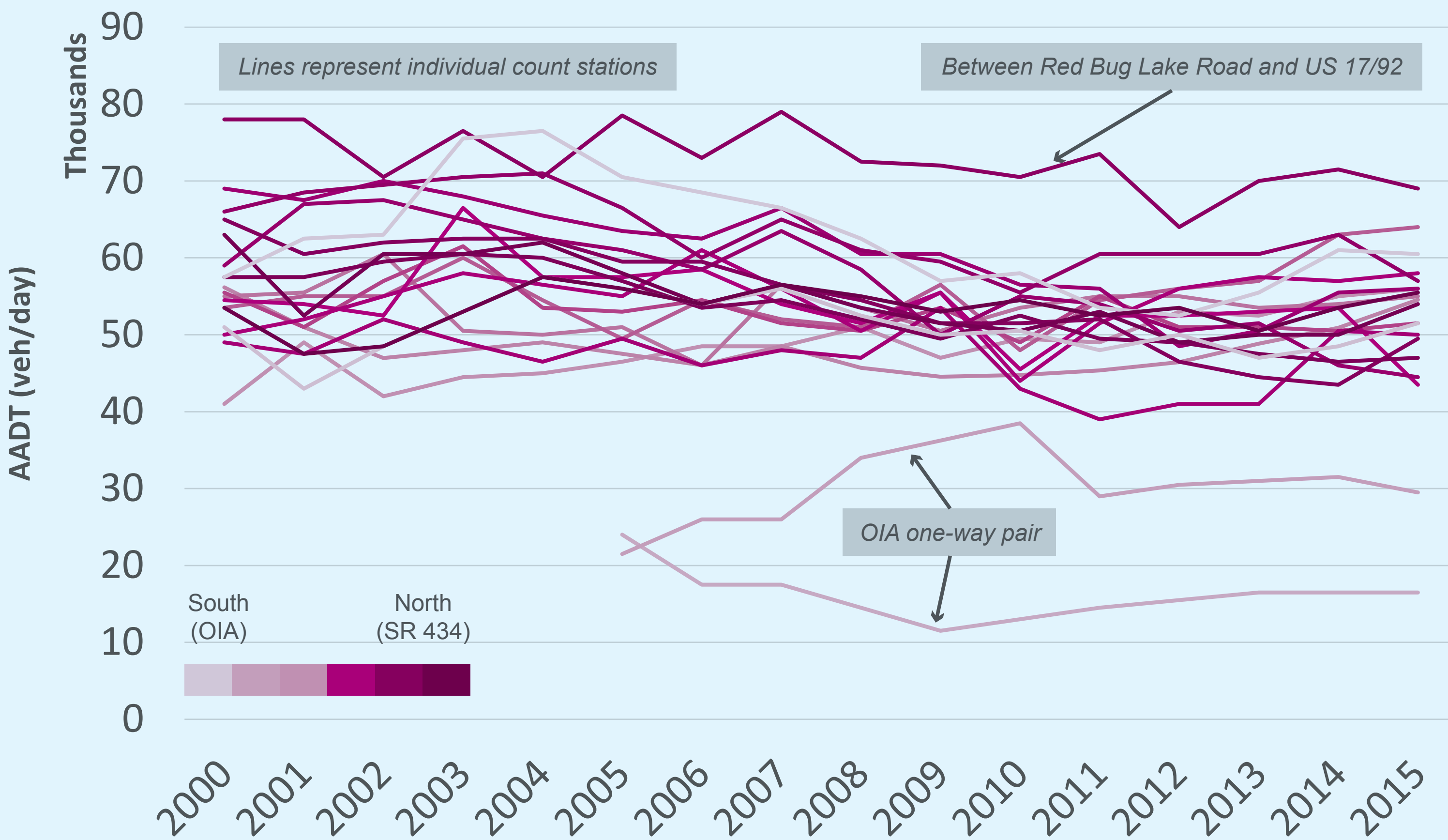
The Study Team conducted the following analyses as part of the TIAS:

- **Roadway Segments:** Planning-level analysis of average travel speeds for roadway segments
- **Intersections:** Analysis of peak hour level of service, delay, and queue lengths for each movement at the study intersections
- **Pedestrian and Bicyclist Crossings:** Planning-level analysis of the need for midblock crossings

The TIAS analyses were conducted using the following data sources:

- **Automobile Data Sources:** traffic signal timing data, turning movement counts, average travel speeds, and FDOT's average daily traffic volume data
- **Pedestrian and Bicyclist Data Sources:** turning movement counts (including pedestrian crosswalk usage and bicycle turning movement data), pedestrian data, and field survey data

FIGURE 19 HISTORIC ANNUAL DAILY TRAFFIC



Source: FDOT Florida Traffic Information Online

6.3 Baseline Conditions

Key findings from the baseline conditions assessment are the following:

- Over the past 16-year period, daily traffic volumes on SR 436 have remained steady or slightly declined, except for a modest upward trend over the post-recession period (2011-present) that has not exceeded historical highs (as shown in **FIGURE 19**).
- An assessment of 2015 daily traffic volumes highlighted notable spikes on SR 436 between Red Bug Lake Road and US 17/92 and between Curry Ford Road and SR 408. These higher-traffic locations may point to motorists using SR 436 for a short distance to connect to and from other regional facilities, or to access more destinations and origins along these segments.
- During the weekday peak hour, average travel speeds indicated that no segment of SR 436 operates at a highly congested level during the weekday peak hour. Slowdowns were noted primarily in the Altamonte Springs section, but average speeds there are still above 15 miles per hour (mph). **FIGURE 20** illustrates this point.
- An assessment of roadway segment performance during off-peak hours shows that SR 436 operates with free-flow or near free-flow speeds outside of the peak hours.
- Nighttime average travel speeds—which reach 45-58 mph in some segments—suggest that speeding is an issue during low-volume traffic conditions.
- Operations at-capacity or better are generally experienced along SR 436 approaches, while congestion on side-street approaches is relatively worse (as shown in **TABLE 8**). This condition is typical of many state regional arterials with long cycle lengths, where signal timing allocates more green time to major and regional roadways than to local roadways.
- Two midblock locations (Sites 2 and 11) meet FDOT criteria for midblock pedestrian crossings. Three other locations (Sites 1, 5, and 6) had relatively higher pedestrian crossings, but these crossing volumes were not enough to meet FDOT criteria (TEM §3.8.5[3b]). The number of pedestrian crossings at these locations may increase in the future, especially if premium transit is implemented along SR 436. Prior to the implementation of transit improvements, these locations should be re-evaluated for potential pedestrian crossing warrants.

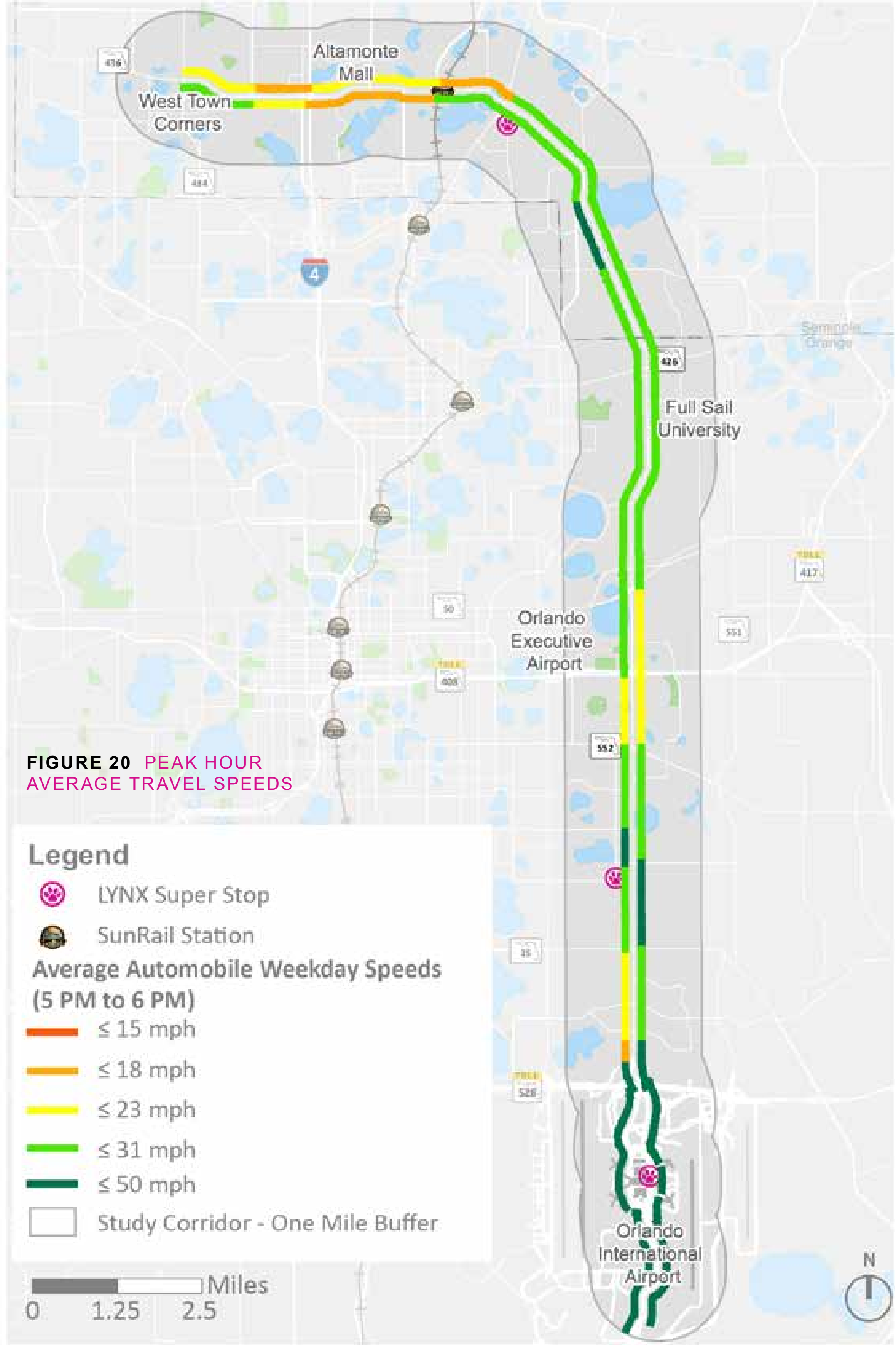


FIGURE 20 PEAK HOUR AVERAGE TRAVEL SPEEDS

TABLE 8 LEVEL OF SERVICE SUMMARY BY NUMBER OF INTERSECTIONS

Analysis Scale	Peak Hour	Number of Intersections (Percentage of All Intersections)	
		At Capacity or Better[1]	Over Capacity[2]
Overall Intersection	AM	23 (88%)	3 (12%)
	PM	17 (65%)	9 (35%)
SR 436 Approaches[3]	AM	21 (81%)	5 (19%)
	PM	18 (69%)	8 (31%)
Cross-Street Approaches[1]	AM	11 (42%)	15 (58%)
	PM	2 (8%)	24 (92%)

[1] In a traditional Level of Service (LOS) analysis, this condition is given a letter grade of A, B, C, D or E.
[2] In a traditional LOS analysis, this condition is given a letter grade of F.
[3] The worst approach was used to determine LOS.

6.4 Projected Conditions

Key findings from the projected conditions assessment are summarized in **FIGURE 21** and include the following:

- Alternatives A and B do not result in notable increases to intersection delay or queue lengths. In fact, most intersections would be expected to perform better with Alternatives A or B as a result of signal optimization combined with having transit run and stop on the auxiliary lane as opposed to a through lane.
- Alternative C1 would result in increases in average delay at most study intersections. Because the median-running transit lanes in Alternative C1 limit the flexibility of left-turn phasing, increased queue lengths and spillbacks are expected for busy left-turn movements.
- Because of the reduction in number of lanes for automobile travel, the Alternative C2 analysis included a diversion factor to account for the percentage of motorists who would shift their travel to other roads or other times. Based on results from the regional travel demand model and case studies, a 12 percent diversion percentage was found to be reasonable.
- Alternative C2's intersection-level results are similar to those of Alternative C1. However, Alternative C2 is expected to have more over-capacity movements—particularly for cross-street traffic. Longer queue lengths would be expected as a roughly similar number of queued vehicles would occupy two lanes versus three lanes.

TABLE 9 summarizes the projected impact of each alternative on by presenting existing travel times and the estimated change as a result of each alternative. Bicycle and pedestrian impacts directly related to the transit alternatives are outlined in **FIGURE 10**.

TABLE 9 COMPARISON OF ALTERNATIVES – ANTICIPATED PROPORTIONAL INCREASE TO TRAVEL TIME RELATIVE TO EXISTING

Limits	Existing Travel Time (min.)[1]	Change in Traffic Signal Delay Compared to Existing Travel Time			
		A	B	C1	C2 – 12% Diversion
OIA to University	20-70	-1 to -5%	-	+6 to +20%	+7 to +25%
OIA to SunRail	35-100	-	-4 to -11%	-	-

[1] Travel time from Google Maps is shown as a range, for the anticipated travel time departing at 5:00 PM on Wednesday, June 27

6.5 TIAS Recommendations

This section summarizes various recommendations to mitigate the impact of the proposed transit alternatives on traffic operations and the pedestrian/bicyclist experience. The application of the following recommendations should be based on the alternative selected and the existing conditions at each location:

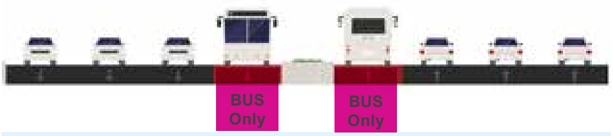
Optimize signal timing and progression. Optimizing signal timing is a relatively low-cost strategy that can have a significant effect on reducing automobile travel times. Any modifications to signal timing should take into consideration impacts on all intersection users.

Consider alternative intersection designs. Two alternative intersection designs are considered to be suitable for SR 436: the Restricted-Crossing U-Turn (RCUT) and the Median U-Turn (MUT). Both concepts would increase intersection capacity without requiring much new right-of-way. In addition, new RCUT and MUT intersections may provide additional protected crossing locations for pedestrians.

Upgrade pedestrian infrastructure at intersections. Several geometric modifications can improve the pedestrian experience when crossing intersections. These include wider sidewalks, curb extensions, tighter curb radii, raised crosswalks, median islands, and more.

FIGURE 21 BICYCLE AND PEDESTRIAN IMPACTS

Alternative C1

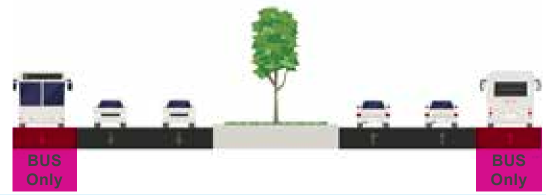


- − Increased midblock crossing distances
- − Always crossing to access median stations
- − Transit riders waiting in the median
- + Fewer left-turn conflicts
- + Only crossing one side of roadway each time

Alternatives A & B

- + Fewer driveway conflicts
- + Transit riders waiting on sidewalk closer to destinations

Alternative C2



- + Fewer vehicles
- + Fewer driveway conflicts
- + Transit riders waiting on sidewalk closer to destinations

BIKE PED IMPACTS: + Positive − Negative

7

WHAT IS THE IMPACT OF ALTERNATIVES TO EXISTING AND FUTURE RIDERS?

7 What Is the Impact of Alternatives to Existing and Future Riders?

This section of the report documents the projected future ridership of the baseline and Levels 3a and 3b alternatives, as well as impacts of alternatives on existing transit riders. Ridership estimates were developed for both Level 3a and Level 3b alternatives. The ridership forecast methodologies and results are described in greater detail in the website's Ridership Modeling page.

7.1 Ridership Forecast Methodologies

The ridership models were developed using tools and platforms that follow guidelines from the Federal Transit Administration (FTA) and FDOT. These models are the following:

- **Transit Boarding Estimation and Simulation Tool (TBEST):** Used to estimate ridership on the numerous Level 3a alternatives, TBEST allowed for more efficient analysis of multiple options for headways, spans of service, transit run times, and other service characteristics.
- **Simplified Trips On Project Software (STOPS):** Used to estimate ridership on the Level 3b alternatives, STOPS v2.5 was specifically developed to support FTA's Capital Investment Grant Program and funding eligibility analyses.

7.2 Level 3a Ridership Modeling Using TBEST

In TBEST, the Level 3a alternatives were distinguished by their alignments, average speeds, and premium transit characteristics.

As outlined in Section 5, key findings from the Level 3a ridership modeling process were paired with other metrics that reflected the project's diverse goals. Insights from TBEST were used to select the four alternatives for the Level 3b screening.

7.3 Level 3b Ridership Modeling Using STOPS

The most detailed round of ridership modeling was applied to the four best-performing transit alternatives from the Level 3a screening. STOPS provides more robust ridership forecasting but requires more data inputs to build and run, including assumptions about what future infrastructure projects will be implemented and will further impact LYNX ridership.

The Study Team used STOPS to develop ridership estimates for one future "no-build" alternative and the four Level 3b alternatives. The future design year used in the analysis was 2025. For the different alternatives, the analysis showed ridership ranging from 1,100 to 1,900 new corridor riders per day and 7,000 to 7,900 total corridor riders per day. **TABLE 10** summarizes the results of the Level 3b screening using STOPS.

7.4 Additional Ridership Modeling

The Study Team also used a combination of other tools to understand the impacts of each level 3b alternative on existing ridership, including Remix[1] and Open Trip Planner.[2] Preliminary analyses using Open Trip Planner reported that the level 3b alternatives would have benefits to and impacts on existing riders (see **FIGURE 22**):

FIGURE 22 IMPACTS OF LEVEL 3B ALTERNATIVES ON EXISTING TRANSIT RIDERS

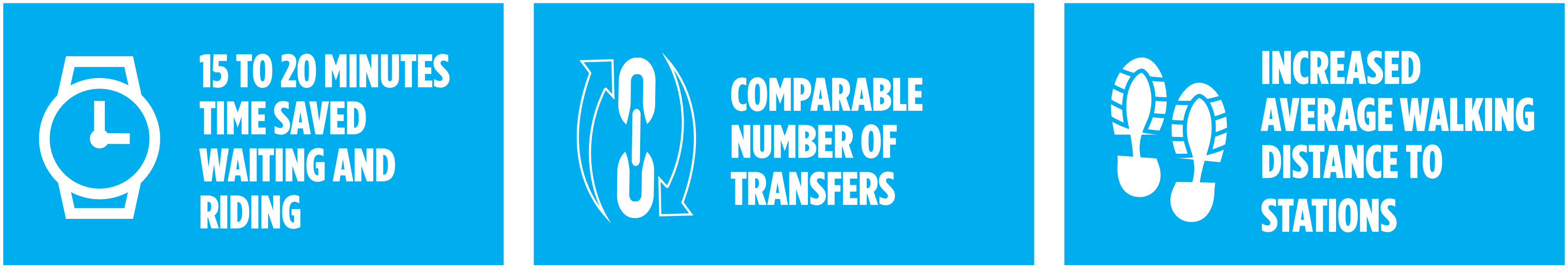


TABLE 10 STOPS 2025 WEEKDAY BOARDINGS ON THE SR 436 CORRIDOR

	CORRIDOR-BASED (BRONZE) BAT LANE USING AUX LANES		FIXED GUIDEWAY BRT (SILVER) MEDIAN EXCLUSIVE BY WIDENING	CURBSIDE EXCLUSIVE BY LANE REPURPOSE
LENGTH (MILES):	12.9	18.9	12.9	12.9
ALTERNATIVE	Alt A	Alt B	Alt C1	Alt C2
No Build	5,900	5,900	5,900	5,900
Local bus (436S/N)	5,900	5,900	5,900	5,900
Build	7,000	7,800	7,900	7,800
Alternative	2,800	4,400	3,900	3,800
Local bus (436S/N)	4,200	3,400	3,900	3,900
New Corridor Riders[1]	+1,100	+1,900	+1,900	+1,800

[1] New riders compared to future no-build scenario, rounded to the nearest 100.

1 Remix is transit route planning software that can test the impacts of any route change on the LYNX network.

2 Open Trip Planner provides transit routing directions given an origin-destination pair and a description of a transit system.

8

COMPARING THE TOP-PERFORMING ALTERNATIVES

8 Comparing the Top-Performing Alternatives

The objective of the Alternatives Review task was to compare the shortlist (Level 3b) alternatives and provide decision-makers with the information needed to sleect the best solution(s) to advance. This is the final level in the tiered screening and review process.

8.1 Level 3b Screening

As mentioned in Section 5.4, four alternatives were advanced to the Level 3b screening following completion of the Level 3a screening. These alternatives were summarized in **TABLE 7** and **FIGURE 16**.

As with the previous levels of screening, each of the Level 3b alternatives was evaluated using metrics related to the project's goals and objectives. **FIGURE 23** through **FIGURE 26** and **TABLE 11** illustrate the evaluation results of the four alternatives against each of the Project goals.

All Level 3b alternatives incorporate basic elements of BRT, including:

- Sheltered stations spaced farther apart than local bus stops
- Real-time bus arrival information
- Priority for buses at intersections
- Off-board ticketing
- Near-level boarding
- Bicycle racks
- Enhanced buses

FIGURE 27 illustrates these BRT elements in the context of SR 436.

Alternatives A and B convert existing auxiliary lanes (i.e., right-turn only lanes and merge lanes) into BAT lanes. That is, the auxiliary lanes would be dedicated to transit vehicles and right-turning vehicles. Where there are no auxiliary lanes, the bus would run in mixed traffic. Approximately 40 percent of the Alternatives A and B alignments have existing auxiliary lanes.

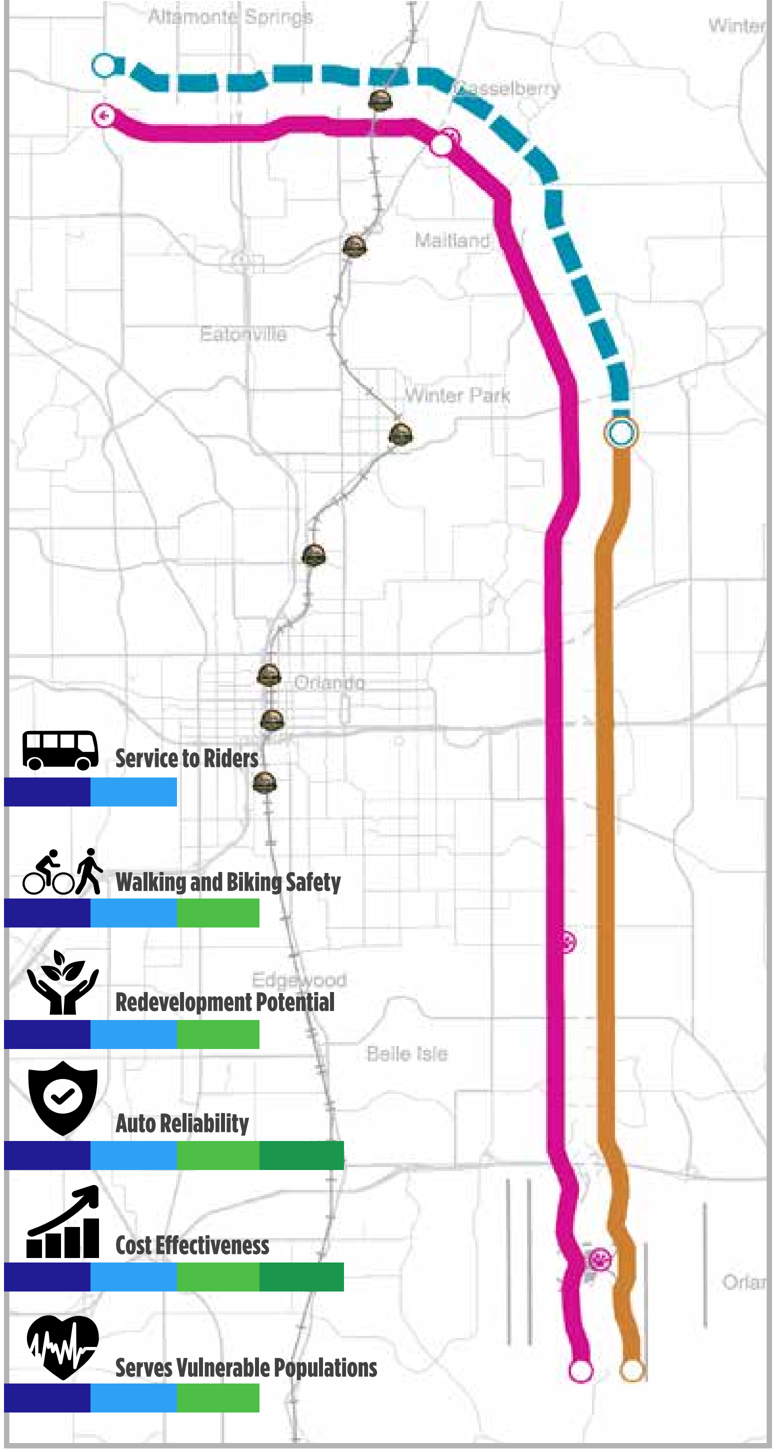
Alternative A serves the alignment between OIA and University Boulevard, while Alternative B serves the alignment between OIA and the Altamonte Springs SunRail station.

Alternatives C1 and C2 serve the OIA to University Boulevard alignment using exclusive transit lanes.

In Alternative C1, SR 436 is widened to accommodate two median-running transit lanes—one in each direction. Where the median is wide enough, the widening will be toward the centerline (i.e., without increasing the curb-to-curb distance). Where the median is too narrow, the alternative assumes that additional right-of-way would be purchased to widen SR 436 to the outside. Alternative C1 involves roadway reconstruction and major signal timing changes to eliminate conflicts between left-turning traffic and buses running in the median.

In Alternative C2, the outside through travel lanes of SR 436 are repurposed for exclusive transit use. This would mostly entail signage and striping changes. Existing auxiliary lanes and right-turn pockets would be maintained for right-turning vehicles to use. Where right-turn pockets are not in place and their construction is not feasible, Alternative C2 assumes that vehicles will turn right from the transit lane—and the alternative will act as a BAT lane at those locations.

Section 9 outlines the recommended alternatives selected from the Level 3b alternatives.



LYNX Super Stop

SunRail Station

Local Bus

Limited-Stop Bus (Implemented as part of short-term)

Corridor-Based BRT (Bronze)

Relative Level of Support for Project Goals

LESS MORE

FIGURE 23 LEVEL 3B SCREENING – ALTERNATIVE A

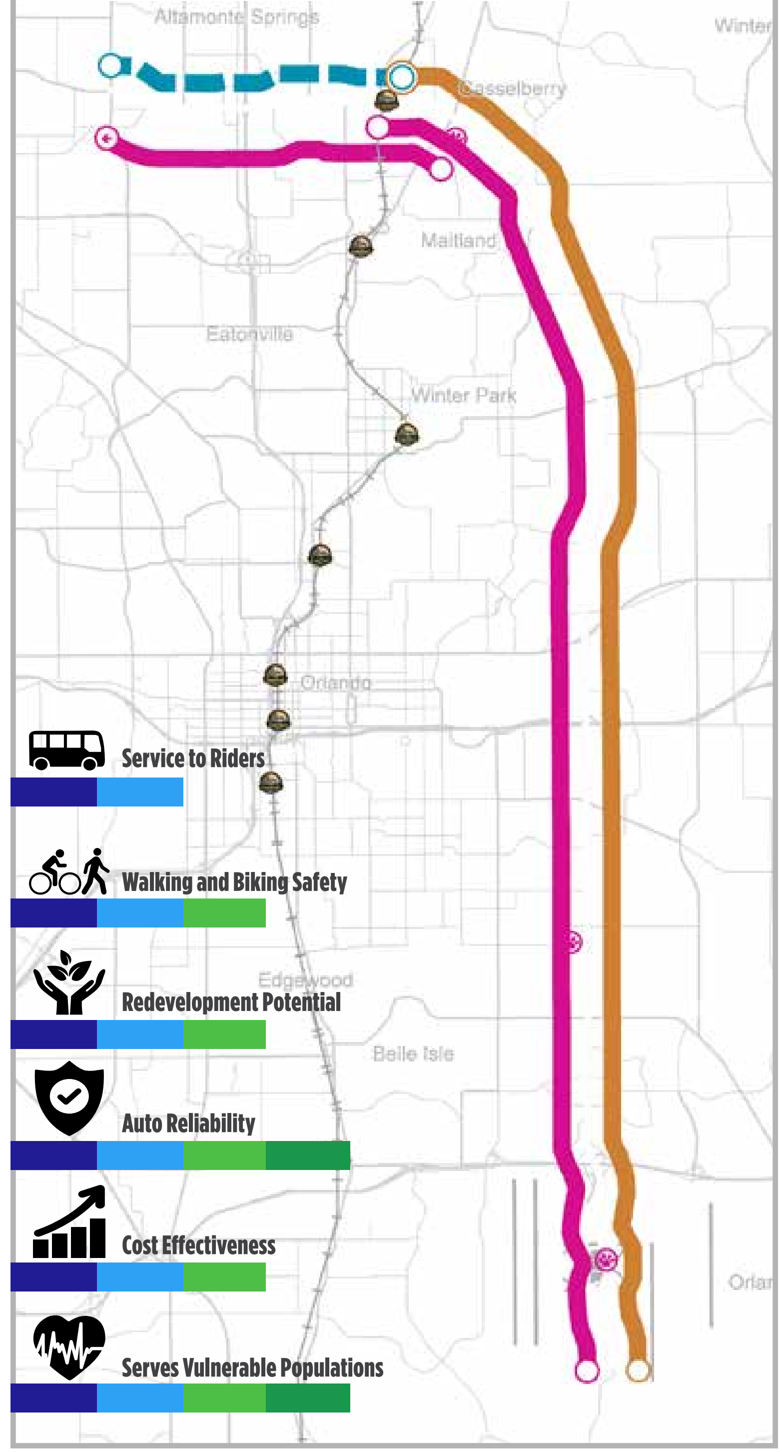


FIGURE 24 LEVEL 3B SCREENING – ALTERNATIVE B

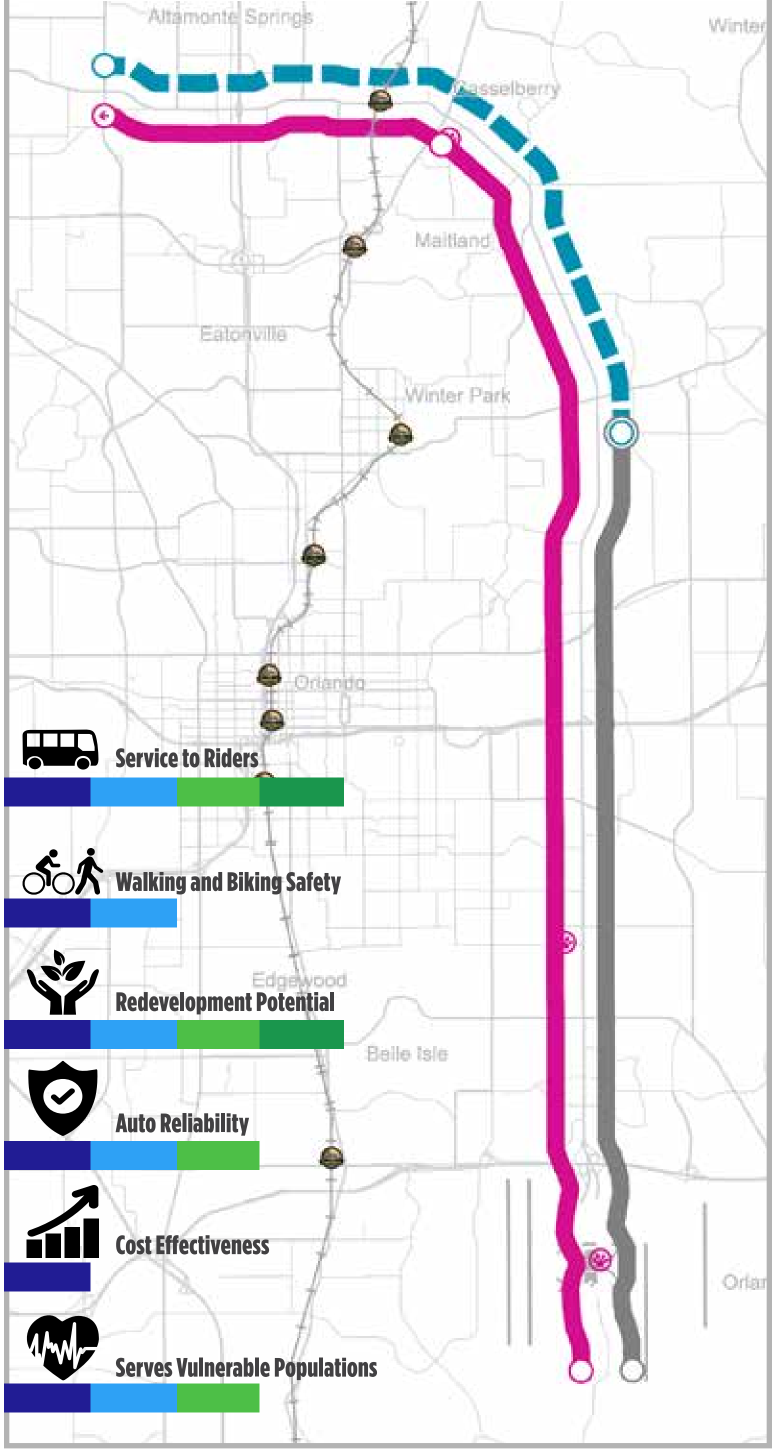


FIGURE 25 LEVEL 3B SCREENING – ALTERNATIVE C1

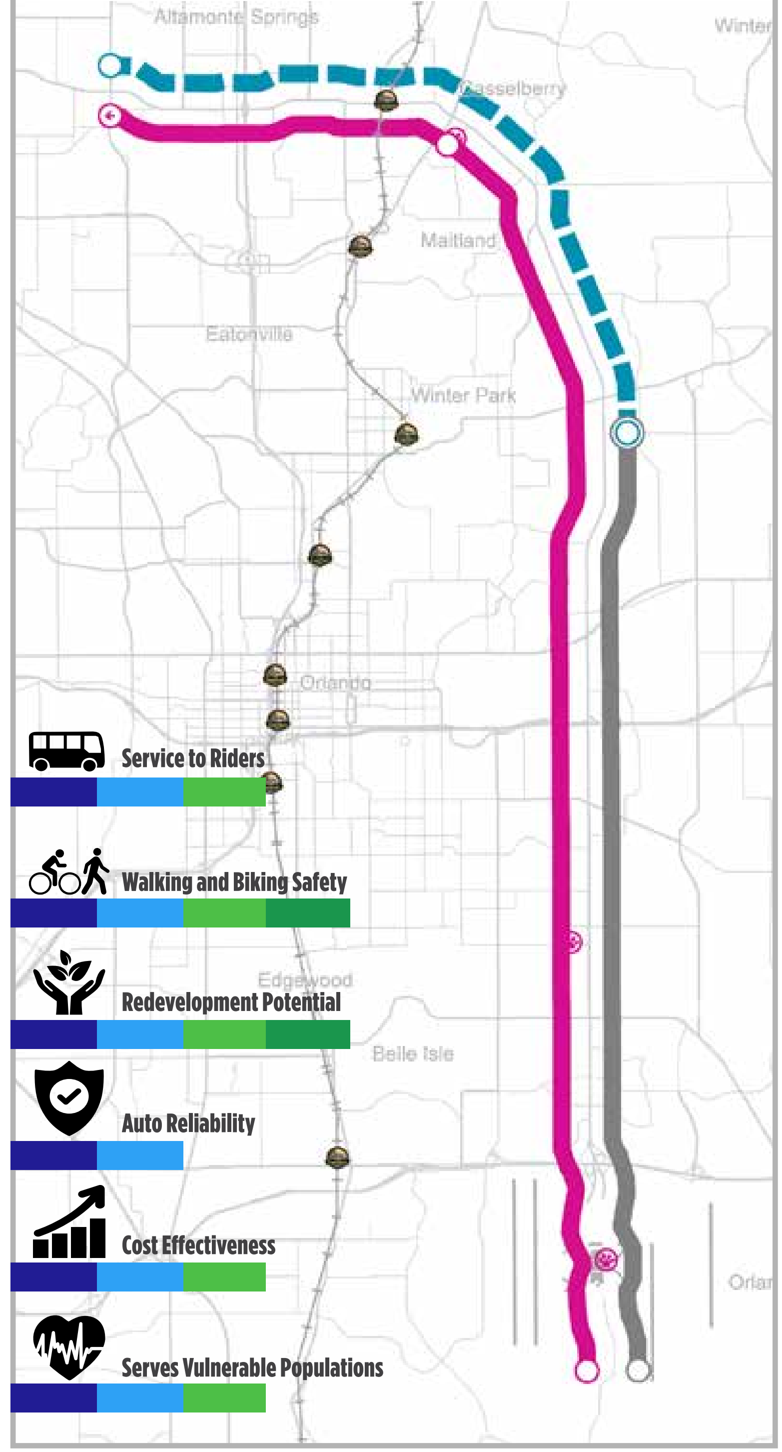


FIGURE 26 LEVEL 3B SCREENING – ALTERNATIVE C2

TABLE 11 LEVEL 3B ALTERNATIVES ASSESSMENT

GOAL	CRITERIA	CORRIDOR-BASED (BRONZE) BAT LANE USING AUX LANES ALT A	CORRIDOR-BASED (BRONZE) BAT LANE USING AUX LANES ALT B	FIXED GUIDEWAY BRT (SILVER) MEDIAN EXCLUSIVE BY WIDENING ALT C1	FIXED GUIDEWAY BRT (SILVER) CURBSIDE EXCLUSIVE BY LANE REPURPOSE ALT C2
	FIVE-MILE TRAVEL TIME ON BUS				
	TRAVEL TIME SAVINGS FOR EXISTING RIDERS				
	PROJECTED NEW RIDERS				
	PROJECTED RIDERSHIP				
	AVERAGE CROSSING DISTANCE				
	MULTIMODAL EXPERIENCE				
	MARKET READINESS ALONG ALIGNMENT				
	TRANSIT IMAGE				
	ADDITIONAL VEHICULAR DELAY				
	CAPITAL COSTS PER MILE				
	ROW COSTS* PER MILE				
	OPERATING COST PER RIDER				
	OPERATING COST PER YEAR				
	ESTIMATED CAPITAL COSTS	$57M	$71M	$160M	$78M
	ESTIMATED ROW COSTS*	$8M	$8M	$100M	$0
	ESTIMATED ANNUAL OPERATING COST	$2.3M	$3.8M	$2.1M	$2.2M

*ROW costs do not include potential stormwater mitigation and ROW needs.

Refer to the website for a detailed version of this table.

RELATIVE PERFORMANCE

WORSE				BETTER

WHAT ARE THE INGREDIENTS FOR BETTER BUS SERVICE ON SR 436?

Many strategies to improve bus service have been implemented throughout the country. Here are the ones that we can adopt for SR 436 and the Central Florida region.

FIGURE 27 RECOMMENDED BRT ELEMENTS

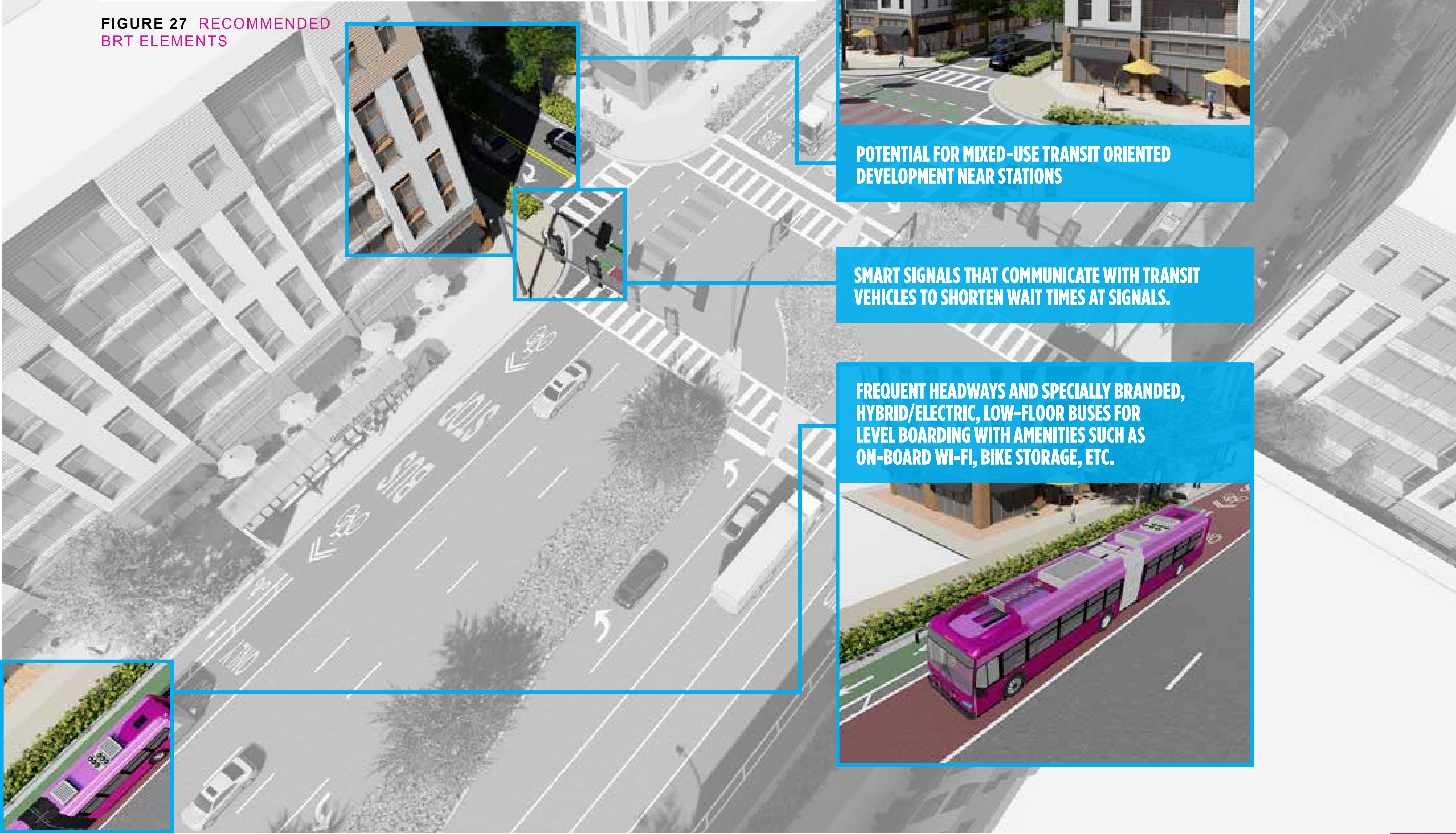
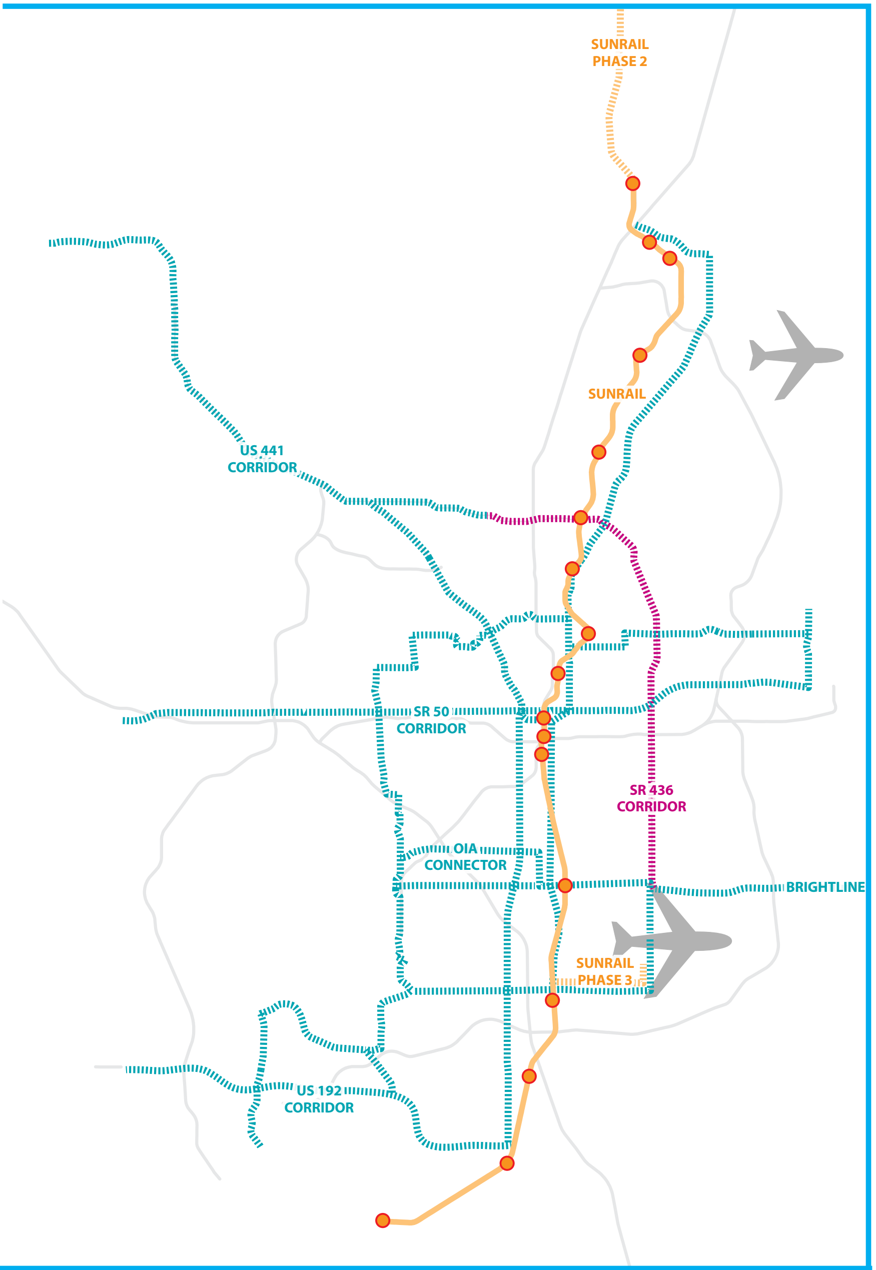


FIGURE 27 (CONTINUED)
RECOMMENDED BRT ELEMENTS



CONNECTIONS TO OTHER MODES
The success of transit on SR 436 depends on a successful regional transit system.

8.2 Operating Scenarios

Defining operating scenarios for the proposed transit service was necessary to project ridership, estimate capital and operational costs, and assess benefits to existing and future riders. The following operating characteristics were established for all Level 3b alternatives:

- **Span of Service:** Assumed to be 6:00 AM to 8:00 AM (14 hours). The span of service is broken into four time periods to account for travel time differences by time of day.
- **Days of Service:** Assumed 252 weekdays, 52 Saturdays, and 52 Sundays.
- **Frequency:** Assumed 15-minute headways during all time periods and days.
- **Recovery time:** A minimum of 10 percent of running time is allotted for operator breaks and recovery time (i.e., time in which the buses can get back on schedule if needed). This recovery time is adjusted based on the frequency of the route.

The analysis used to estimate running times and operating costs for the SR 436 study builds upon methods typically used in the public transit sector. Additional detail has been added to these methods to account for corridor-specific traffic conditions by time of day and direction, as well as the travel time impacts of proposed infrastructure priority treatments. More details on this methodology are included on the website's Technical Reports page.

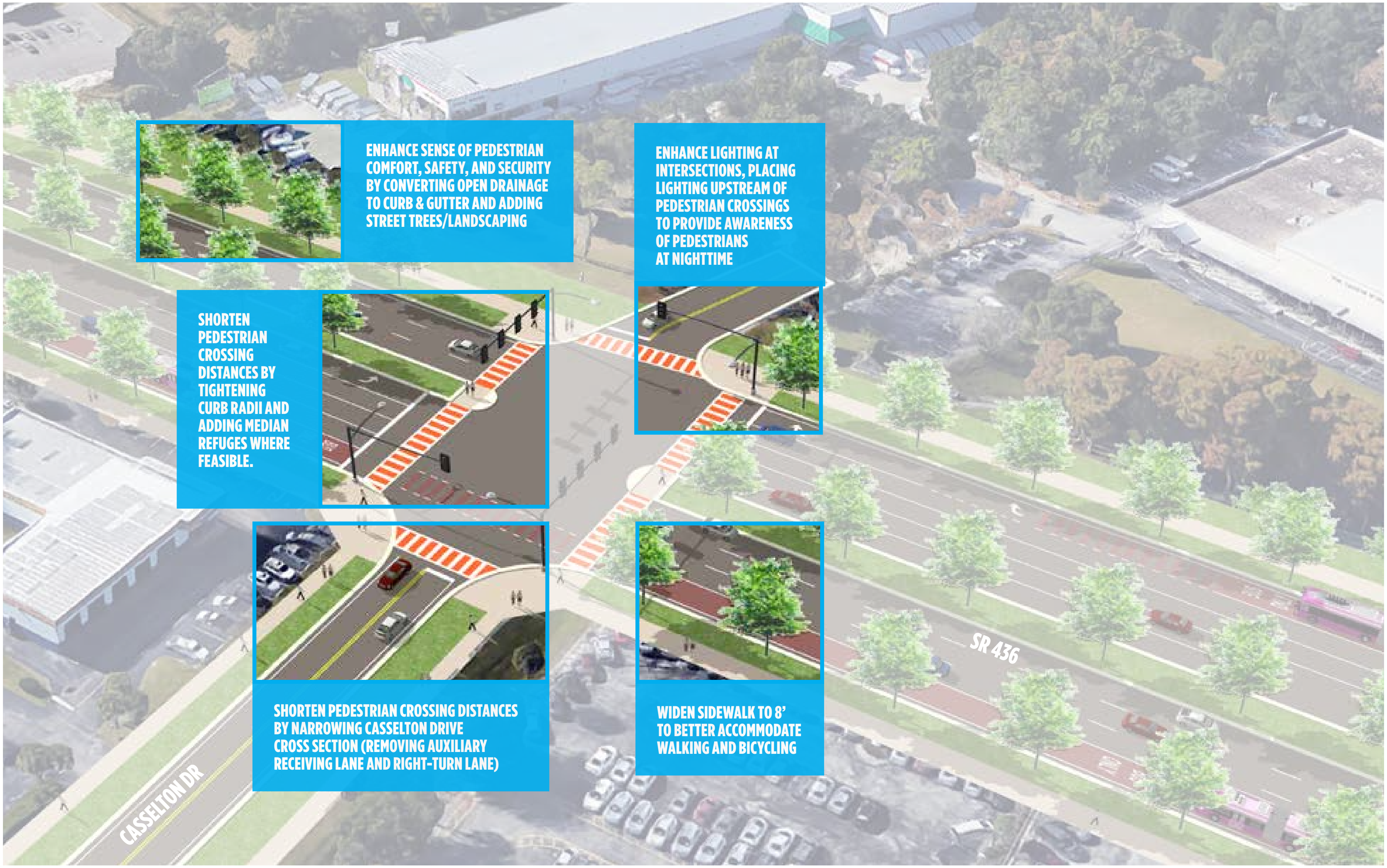
8.3 Complete Streets

Every transit trip begins as a walking, bicycling, or mobility device trip. The Study Team built on Complete Streets recommendations currently being considered by FDOT to create a comprehensive list of recommended treatments for the corridor. These include:

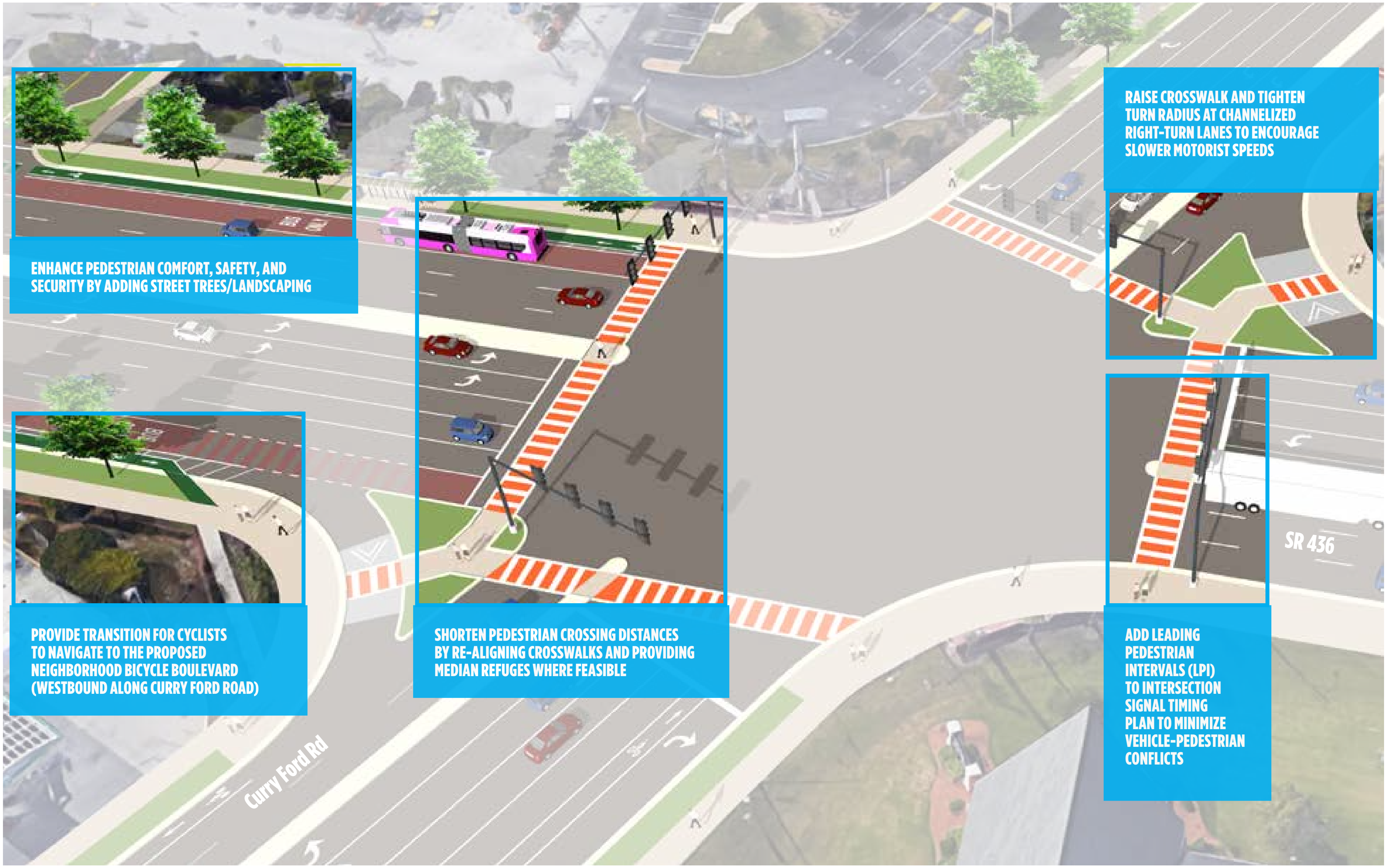
- Enhanced lighting,
- Addition of special emphasis crosswalks,
- Additional signing and marking,
- Installation of pedestrian-friendly RCUT intersections,
- Widening or enhancing (maximizing clear walking path) sidewalks,
- Installation of buffered bike lanes,
- Designation and signing of bike boulevards,
- Converting open drainage to curb-and-gutter,
- Addition of landscaping and street trees, and
- Driveway consolidation.

FIGURE 28 illustrates some of these recommendations at two example locations along SR 436. Further detail on Complete Streets recommendations can be found in the website's Recommendations page.

FIGURE 28 BICYCLE AND PEDESTRIAN MITIGATIONS AT EXAMPLE INTERSECTIONS



Intersection of SR 436 at Casselton Drive



Intersection of SR 436 at Curry Ford Road

8.4 Feeder Service

The Study Team collaborated with the LYNX Forward team to identify and advance feeder service opportunities within the SR 436 corridor. The LYNX Forward effort is currently considering a mix of transit modes that could serve as feeder service to a SR 436 trunk line. These modes align with the best-performing modes that resulted from this Study's Level 1 screening and include the following:

- NeighborLink (dial-a-ride) service
- Circulator routes
- On-demand routes, or semi-fixed transit routes that can deviate within certain service areas
- More detailed analysis of the feeder system should be conducted as the SR 436 and LYNX Forward efforts advance.

8.5 Cost Assumptions

The Study developed planning-level capital and operational costs. The capital costs are based on planning-level ROW data, representative costs from recently completed transit projects, and typical add-on percentages for drainage, utility relocation, maintenance of traffic, and other elements. Capital costs do not include ROW impacts based on potential new stormwater ponds needed as a result of roadway reconstruction. More details on this methodology are included on the website's Technical Reports page.

The expected operational costs shown in **TABLE 13** were developed using a spreadsheet model. The model considered data from existing service—including speed, dwell time, and intersection delay. Operating costs were estimated based on a cost per revenue hour of $74.41 provided by LYNX. Revenue hours are based on segment running times, along with the operational parameters described in Section 8.2.

Finally, the Study Team developed Complete Streets costs for the recommendations described in Section 8.3. The estimated capital cost is $14 million for the OIA to University Boulevard alignment and $35 million for the OIA to SunRail alignment. More details on this methodology are included on the website's Technical Reports page.

9

A PACKAGE OF RECOMMENDATIONS

9 A Package of Recommendations

The Study concluded with a package of recommendations that can be advanced with varying implementation timeframes. This package comprises the following:

ONGOING:

There were several efforts currently ongoing on SR 436 that aligned with the outcomes of this study. By including them as next steps, the Study Team recognized these current efforts and encouraged stakeholders to continue their implementation.

SHORT-TERM:

These recommendations are to be advanced with limited-stop bus service (i.e., FastLink) between OIA and SunRail. Extension of the existing Link 436S to SunRail was recommended to match the alignment of the limited-stop service.

LONG-TERM:

The key long-term recommendation is to implement BRT between OIA and SunRail (using the extents of Level 3b Alternative B). BRT stations would be substantial and have features and amenities to make waiting more comfortable and speed up boarding and alighting. The BRT service would operate on a combination of running ways including mixed-traffic and dedicated lanes. The appropriateness, benefits, and costs of each running way type are expected to vary along different segments of SR 436. This recommendation should be studied in more detail in the next stage of project development.

Other recommendations related to safety, infrastructure, operations, and land use will support the proposed short- and long-term transit solutions.

FIGURE 29 summarizes the recommended next steps by timeframe. Further detail on the recommendations can be found on the website's Recommendations page.

FIGURE 29 SUMMARY OF RECOMMENDATIONS

ONGOING:

- Enhance sidewalks on SR 436
- Enhance surrounding ped/bike network
- Improve streetscape and lighting
- Increase crossing locations

SHORT-TERM:

- Limited-stop bus from OIA to SunRail
- Reduce speeding
- Conduct ped/bike safety education and enforcement
- Implement ped-friendly signal timing
- Protect left-turns
- Optimize travel on alternative facilities through TSM&O
- Update signage at OIA
- Implement TSP and queue jumps
- Form a SR 436 Action Group
- Market health benefits of transit
- Engage community to champion transit
- Preserve affordable housing
- Advance transit supportive development

LONG-TERM:

- Bus Rapid Transit from OIA to SunRail
    - Uses stations, not "stops"
    - Runs on SR 436
    - Serves high-ridership locations & community destinations
    - Uses a combination of running ways
    - Seamless transit connections at OIA
- Build a BRT system
- Secure funding for premium transit
- Convert swale drainage to curb-and-gutter
- Expand network connectivity

Key Recommendations

10

IMPLEMENTING PREMIUM TRANSIT ON SR 436

10 Implementing Premium Transit on SR 436

The Study concluded with an exploration of the market context of the corridor, an assessment of opportunities for associated economic development, and an evaluation of potential funding approaches and next steps.

10.1 Market Conditions

The Study Team conducted a market assessment of the Study's 23 proposed station areas to understand their potential to attract future development. The evaluation rated each station area on 15 criteria that influence land use development decisions, ranging from transit accessibility to development momentum.

Key findings from the market evaluation include the following:

- Orlando is experiencing strong economic and population growth resulting in a need for new housing, particularly rental multi-family housing.
- Thoughtful, affordable transit-oriented development (TOD) along SR 436 offers an opportunity to address the corridor's affordability issues. A little over 25% of households in the SR 436 corridor are spending 50% percent or more of their income on housing. The standard for afforability is typically when households spend 30% or less of their income on housing.
- The corridor features 5,300 hotel rooms near OIA, with a very high hotel occupancy rate of 83%, indicating solid demand.
- Redevelopment offers opportunities for an office product not generally available in the corridor: a walkable pedestrian environment with a mix of commercial and residential uses.
- The corridor offers the full range of retail goods and services, with few gaps that would justify new retail construction except for locations able to achieve a critical mass of redevelopment.
- Statistics about BRT impacts on U.S. development are still emerging, but BRT has been correlated with an increase in new office development, higher office rents, an increase in multi-family development, and increased value of single- and multi-family units.

TABLE 12 summarizes the development potential of four land use types in the corridor.

TABLE 12 STUDY AREA DEVELOPMENT POTENTIAL

Land Use	2017-2025	2025-2035
Residential	3,200 to 5,100 units	1,700 to 3,500 units
Office	100,000 to 200,000 sq. ft.	100,000 to 200,000 sq. ft.
Hotel	1,600 rooms	1,000 to 2,000 rooms
Retail	10,000 to 25,000 sq. ft.	10,000 to 25,000 sq. ft.

More details on this methodology are included on the website's Technical Reports page.

10.2 Station Area Planning

Three station areas were highlighted by the market assessment: US 17/92, University Boulevard, and Curry Ford Road. An assessment of broader market conditions was developed to serve as a basis for recommending redevelopment programs for these three station areas. This station area planning effort aimed to illustrate how transit improvements could leverage new TOD that, in turn, could enhance transit ridership. **FIGURE 30** shows an illustrative and potential phased redevelopment of the station area at Curry Ford Road, as informed by the market assessment findings and stakeholder input.

FIGURE 30 CURRY FORD ROAD STATION AREA ILLUSTRATIVE LAND USE CONCEPTS

HOW CAN BETTER TRANSIT LEAD TO MORE LIVABLE COMMUNITIES?

Illustrative concept of potential transit-oriented development at SR 436 and Curry Ford Road.

SHORT-TERM POTENTIAL REDEVELOPMENT

IN THE FIRST FEW YEARS AFTER THE PROJECT

- Temporary re-use of vacant lots or underused parking lots
- Shift away from an auto-centric corridor serving through traffic
- More walking and biking to access the new service

MEDIUM-TERM POTENTIAL REDEVELOPMENT

IN TEN TO FIFTEEN YEARS

- New development concentrates around stations
- The street network becomes more connected, shortening walking and bicycling trips
- Older buildings are renovated or replaced with new, transit supportive development patterns

LONG-TERM POTENTIAL REDEVELOPMENT

THIRTY TO FIFTY YEARS INTO THE FUTURE

- Parking lots shrink, making way for dense development
- Denser mixed-use redevelopment continues near transit stations
- Higher-quality transit modes become feasible with increased ridership and economic needs

SEVERAL CONCLUSIONS BECOME APPARENT WHEN CONSIDERING STATION AREA ISSUES AND OPPORTUNITIES:

- Certain destinations in the study area will likely act as attractors for transit users.
- Understanding how destinations relate to one another and ensuring good connectivity between them can help spur economic development.
- Each municipality should continue to implement land use plans and policies to capture the maximum benefits of transit and support transit ridership.
- A healthy mix of higher-density and higher-intensity residential and commercial uses are key to the success of a station area.
- Pedestrian and bicycling routes should effectively link transit stations to important destinations.

10.3 Capital Funding Sources

Capital funding for major transit projects in the US is traditionally sought from federal or state agencies. The Federal Transit Administration (FTA) often plays a major role in funding transit projects.

As defined by FTA, bus rapid transit (BRT) falls into to two broad eligibility categories: Fixed Guideway BRT and Corridor-based BRT. **TABLE 13** summarizes the differences per FTA's guidelines.

TABLE 13 FTA BRT DEFINITIONS

Characteristic	Fixed Guideway BRT	Corridor-based BRT
Majority of runningway (51% or more) dedicated to transit use during peak hour	✓	
Substantial investment in a defined route	✓	
Substantial investment in a defined corridor		✓
Stations and signal priority	✓	✓
Weekday peak and off-peak bidirectional services	✓	✓
Weekend bidirectional services	✓	

The US Department of Transportation (USDOT) has different programs for funding new transit projects, as shown in **FIGURE 31**.

FTA provides federal funding for transit projects through the Capital Investment Grants (CIG) program:

- Core Capacity projects are substantial capital investments in existing fixed guideway systems at or near capacity.
- New Starts projects are fixed guideway projects with a total cost of $300M+ or that are seeking $100M+ in CIG funds.
- Small Starts projects are fixed guideway or corridor-based BRT projects with a total cost of less than $300M and that are seeking less than $100M in CIG funds.

FIGURE 31 USDOT TRANSIT GRANTS OVERVIEW

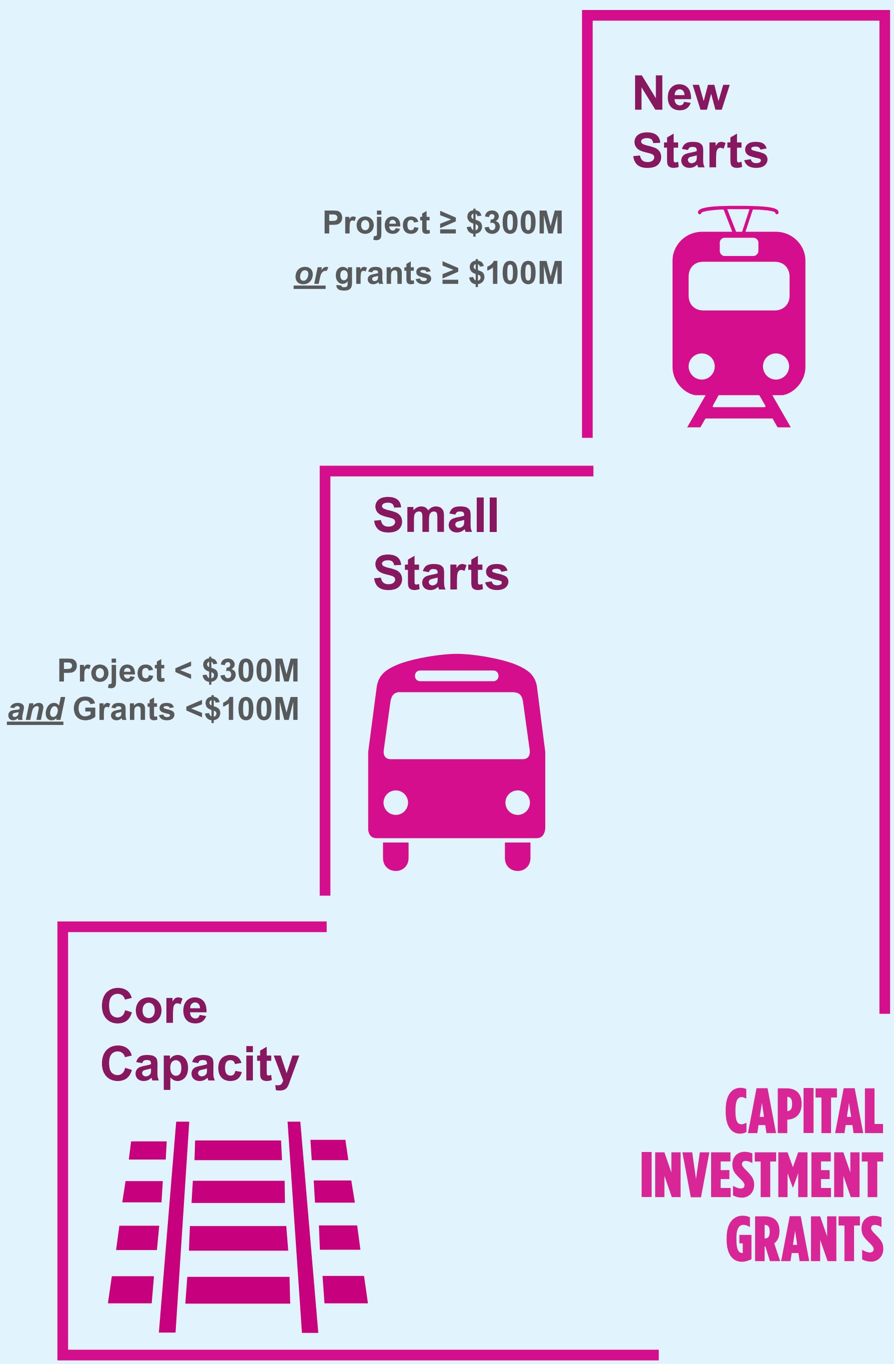
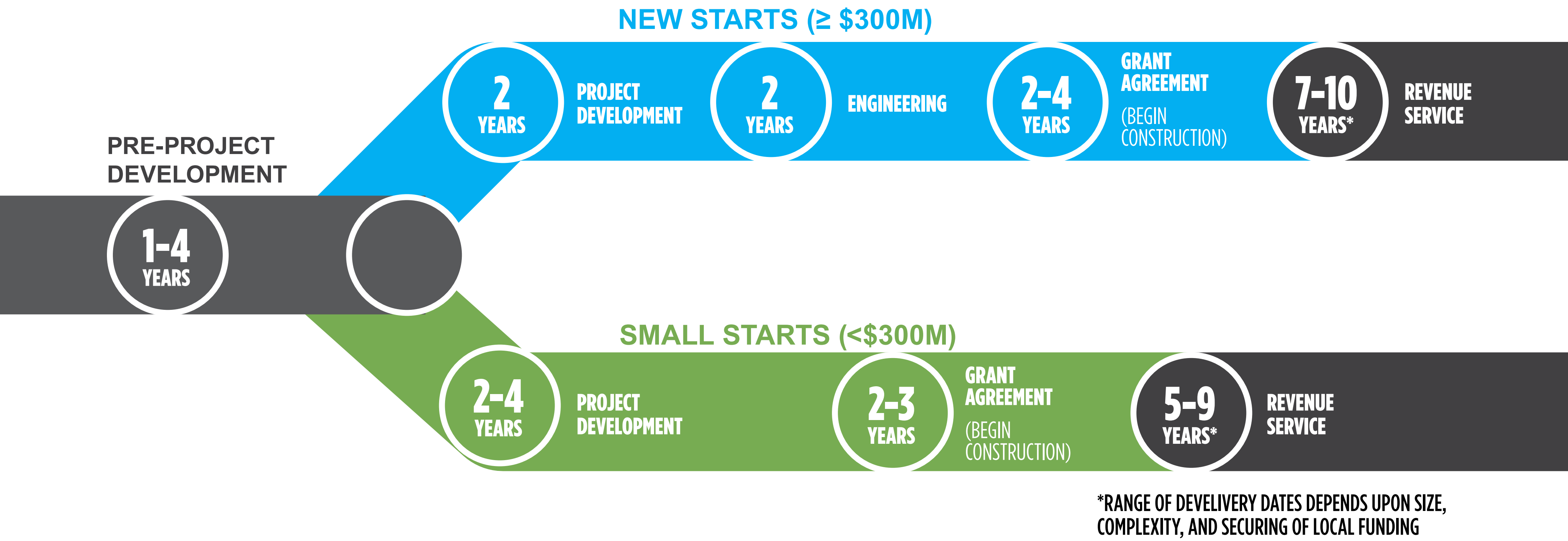


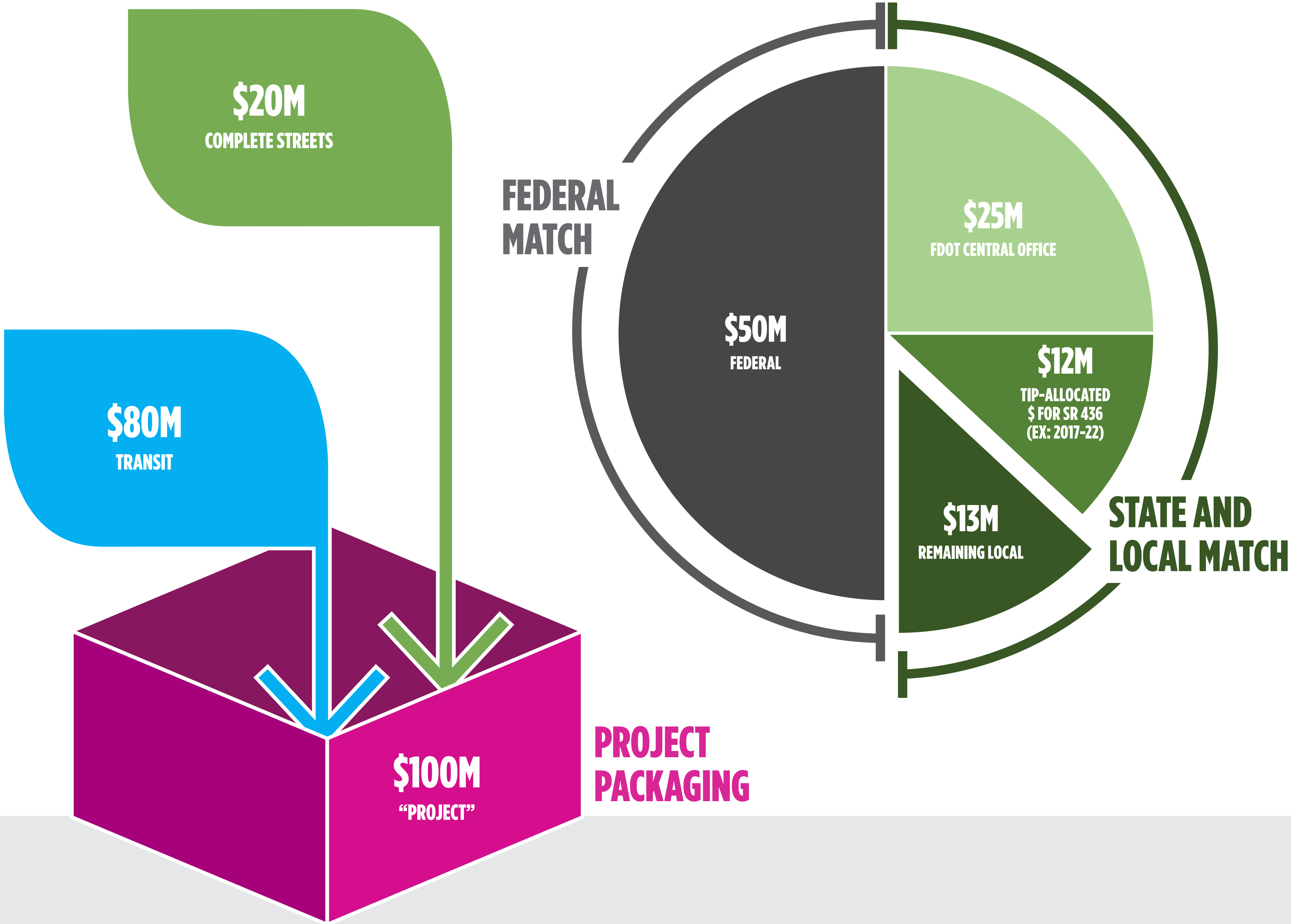
FIGURE 32 SMALL STARTS AND NEW STARTS TIMELINES



Project Development (PD) is the initial decision-step for FTA in the CIG program project development process. As shown in **FIGURE 32** New Starts and Small Starts differ in terms of the length of time in PD and what must be accomplished during PD.

Local match, or the percentage of the project's cost that would be covered with non-federal dollars, is an important consideration for obtaining CIG funding. **FIGURE 33** illustrates how local match could be used in the context of the SR 436 project. Although the numbers are only for illustrative purposes, **FIGURE 33** shows how the transit element of a project can be combined with other supporting infrastructure improvements (e.g. Complete Streets elements) to present FTA with a packaged project. State and local dollars from non-federal sources could then be leveraged as local match—including those that have been previously tagged to be spent on the corridor through the MetroPlan Orlando Transportation Improvement Program (TIP). In the end, the outstanding figure that the project lead must raise to have a competitive CIG application is only a fraction of the total project cost.

FIGURE 33 EXAMPLE PROJECT PACKAGING AND LOCAL MATCH



NOTE: All amounts shown here are only for illustrative purposes.

10.4 Operating Funding Sources

Once the transit project is built, operating costs are incurred to run and sustain the service. Whereas capital funding can often be obtained from federal or state sources, operational funding is typically funded at the local level.

Both the FDOT Service Development Grant and the MetroPlan Orlando District Dedicated Revenue (DDR) policy can help jump-start a transit project by partially funding operations in its early years. Other funding sources that may be available to LYNX to fund operations of the new service include:

- Local sales and property taxes as administered by local municipalities, e.g. a Community Redevelopment Agency (CRA)
- Contributions from local businesses and major employers through a business improvement district or similar entity
- Partnerships with large SR 436 stakeholders (e.g. universities, hospitals, employers) to provide students and staff with free transit passes

10.5 A Marathon, not a Sprint

The CIG program is very competitive nationally. It is truly "survival of the fittest" as those regions that can muster support behind a unified transit vision and that realize that the CIG process is a marathon and not a sprint are those that move forward.

Orlando is in a competition for economic development and many employers see transit as critical to attract and retain their work force. Competitive regions have unified state and local support from local elected officials, key stakeholders, the business community, universities, hospitals, and other potential funding partners.

If SR 436 is selected as one of the high priority projects for the region, then the region would start by reaching out to FTA Region IV in Atlanta to identify its support for the project(s) and request to enter into PD. This request would articulate why the project is critical to address the transportation needs of the businesses and residents in the SR 436 corridor and how the project(s) are critical first steps toward a system of high-capacity BRT network. Further, it would include a commitment to invest in PD and completion of the NEPA environmental clearance process(es).

11

UNDERSTANDING THE HEALTH BENEFITS OF ENHANCING SR 436 TRANSIT

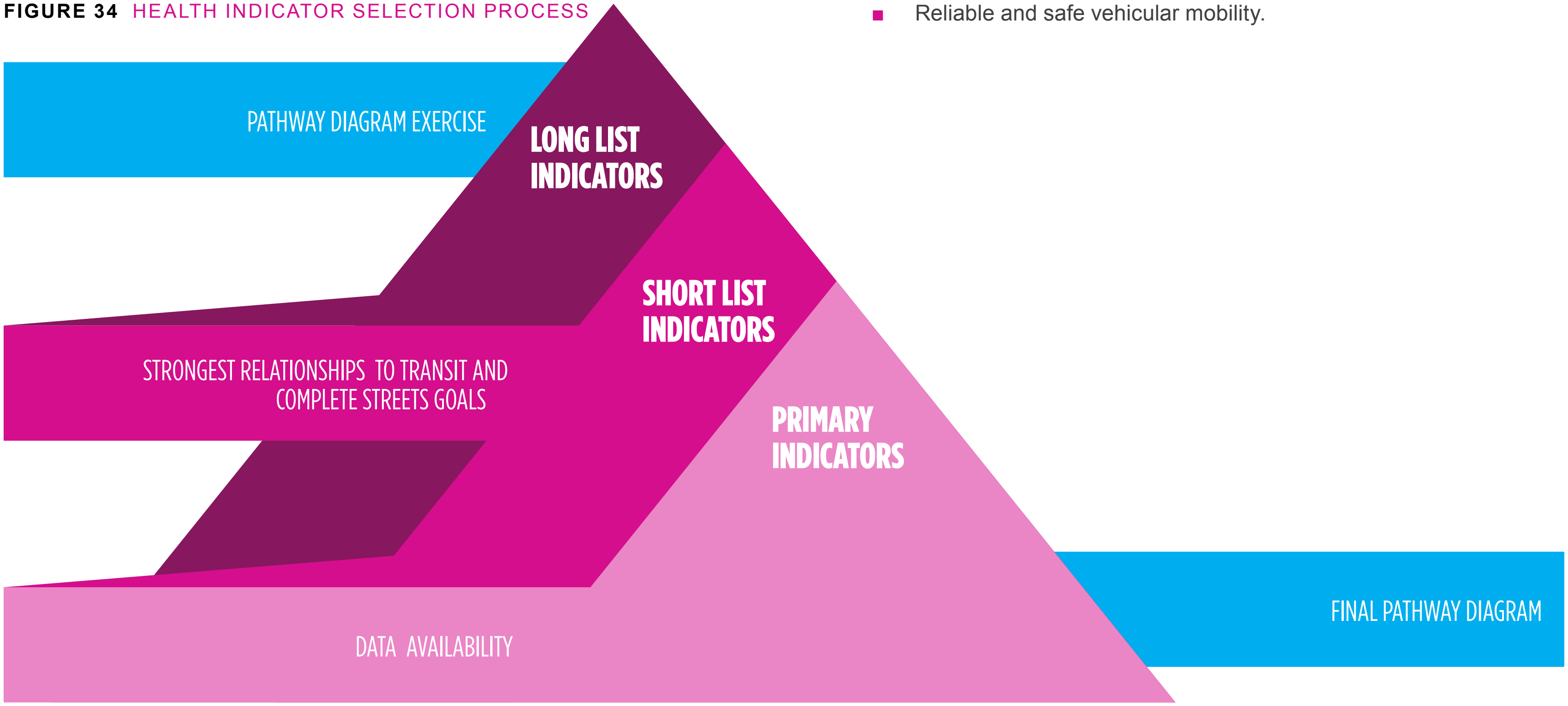
11 Understanding the Health Benefits of Enhancing SR 436 Transit

A Health Impact Assessment (HIA) was conducted to identify potential health impacts of the proposed alternatives and to develop recommendations on how to optimize the alternatives' health benefits. HIAs bring together data, health expertise, and public input to identify potential health impacts of a proposed project, program, or plan. A successful HIA generates recommendations on how to improve a project or policy and includes a monitoring and evaluation plan that tracks the changes that the project or policy catalyzes.

As part of this effort, an HIA Working Group was convened to help guide the HIA process concurrent with the overall SR 436 Transit Corridor Study.

The full HIA can be found on the project website.

FIGURE 34 HEALTH INDICATOR SELECTION PROCESS



11.1 HIA Goals

LYNX and other Study partners were interested in knowing how transit improvements could enhance the health of the communities in the SR 436 corridor. Health measures were considered throughout the broader, tiered transit screening process in Section 5. The HIA goal aligned with pertinent goals from the larger Study and had an increased focus on health.

The goal of the HIA was to better understand the impacts of the potential SR 436 transit improvements on the overall health of the communities that would be served by proposed transit and Complete Streets investments. This would include potential impacts of investments on:

- Enhanced transit experience in supporting current customers, increasing ridership from a wider range of potential users, and increasing access to community assets;
- Safe, comfortable, and accessible walking and bicycling environments;
- Transportation investments that encourage development and redevelopment consistent with community goals; and
- Reliable and safe vehicular mobility.

11.2 Primary Indicators

To better understand the health impacts of the proposed SR 436 transportation improvements, indicators were identified using the process illustrated in **FIGURE 34**. The HIA Working Group used a pathway diagram exercise to reduce a long list of health indicators to a list of eight primary health indicators connected to the HIA goal areas.

The eight primary health indicators were grouped into five general categories and are as follows:

ACCESS TO HEALTH AND EMPLOYMENT

- Transit Commute Time to Work
- Transit Access to Health

PHYSICAL HEALTH INDICATORS

- Mental Health
- Chronic Disease – Obesity, Diabetes, Hypertension

CYCLIST AND PEDESTRIAN SAFETY

- Bike and Pedestrian Injury and Fatality Crash Rates

ECONOMIC HEALTH

- Transportation and Housing Affordability
- Change in Property Values

QUALITY OF LIFE

- Quality of Life and Sense of Community

11.3 Assessment

The Study Team conducted a literature review and baseline analysis for each primary indicator and developed a transit alternatives comparison chart that showed how each of the alternatives proposed in the Study could influence health indicators related to each category.

11.4 HIA Recommendations and Implementation

The findings of the HIA supported the implementation of BRT, and supplementary recommendations in the areas of policy, programming, marketing, and infrastructure were developed to mitigate negative impacts and support positive health outcomes as the BRT project moves forward. **TABLE 14** provides a high-level summary of the recommendations, which are outlined in greater detail on the website's HIA page.

The HIA report also outlines potential funding sources, next steps for key regional partners, and a process for monitoring and evaluating the impact of the Study and HIA recommendations on each health indicator.

With the recommendations of the HIA in mind, well-planned and designed transportation investments, such as those proposed in the SR 436 Transit Corridor Study, can have a greater impact by positively influencing the future health of the corridor residents, workers, and visitors.

TABLE 14 SR 436 HIA RECOMMENDATIONS

PROGRAMMING RECOMMENDATIONS					
FACILITATE SR 436 ACTION GROUP	●	●	●	●	●
ENGAGE COMMUNITY THROUGH SOCIAL MEDIA AND INTERACTIVE STATION PROGRAMMING		●			●
IMPLEMENT HIGH VISIBILITY CROSSWALK ENFORCEMENT	●		●		
INFRASTRUCTURE RECOMMENDATIONS					
DESIGN FUNCTIONAL & ATTRACTIVE STATIONS		●	●	●	●
CREATE SR 436 WAYFINDING MASTER PLAN	●	●	●		●
DESIGN ROADWAY TO DISCOURAGE HIGH SPEEDS		●	●	●	
IMPLEMENT COMPLETE STREETS IMPROVEMENTS	●	●	●		●
CONDUCT STATION AREA BIKE AND PEDESTRIAN CONNECTIVITY ASSESSMENTS	●	●	●		●
MARKETING RECOMMENDATIONS					
MARKET HEALTH BENEFITS OF TRANSIT	●	●			
CONDUCT BIKE/PEDESTRIAN SAFETY EDUCATION IN SCHOOLS AND AT COMMUNITY EVENTS	●	●	●		
POLICY RECOMMENDATIONS					
PRESERVE AFFORDABLE HOUSING IN STATION AREAS				●	●
IMPLEMENT TRANSIT-ORIENTED DEVELOPMENT (TOD) POLICIES & LAND DEVELOPMENT REGULATIONS	●	●	●	●	●
PLAN & FUND RELIABLE TRANSIT SERVICE	●	●		●	
LOCATE JOBS, HEALTH CARE, AND KEY COMMUNITY DESTINATIONS IN BRT STATION AREAS	●	●		●	●

12

BE A CHAMPION FOR SR 436 TRANSIT!

12 Be a Champion for SR 436 Transit!

SR 436 is a critical artery connecting key economic centers of growing metropolitan Orlando. The corridor is anchored by major employment centers, including OIA, Full Sail University, and the Altamonte Mall. Regional, intercity, and international transportation connections are (or will be) available through SunRail, Megabus, Brightline (Virgin Trains USA), and OIA. SR 436 is home to Central Florida's densest census tract, located at the intersection of SR 436 and Curry Ford Road.

Through the recommendations of the SR 436 Transit Corridor Study, LYNX and its partners can advance the Study's goals and achieve a safer, more livable, and healthier SR 436 for the corridor's 200,000 residents and 100,000 workers. Furthermore, premium transit on SR 436 could be one of the catalysts for the development of a high-capacity, high-speed bus network in Central Florida.

Going from idea to reality is no easy feat. As community leaders, as transportation professionals, or as citizens of metropolitan Orlando, we can all take steps to make this project happen. Please visit https://www.lynxsr436.com/onboard/ for more details on how you can help.

EXECUTIVES/ COMMUNITY LEADERS

- Secure funds for preliminary engineering
- Contribute to the short-term alternative
- Campaign for dedicated transit funding

AGENCY STAFF

- Incorporate recommendations into your work
- Have your company/ agency fill out a letter of support

CITIZENS

- Tell your elected officials that you want better transit
- Ride LYNX and spread the word
- Follow LYNX on Facebook at golynx for updates
- Thank your bus driver

WHAT CAN SR 436 BRT ACHIEVE?

ENHANCE TRANSIT EXPERIENCE

Nearly 8,000 corridor riders a day.

BRT riders save 30 to 45 minutes each day.

SAFE WALKING & BICYCLING

Wider sidewalks, more crossings, and less speeding.

ENCOURAGE REDEVELOPMENT

Up to 19 station areas catalyzing redevelopment and economic growth.

RELIABLE AUTO MOBILITY

Reduced conflicts will result in safer and more reliable auto mobility.

IMPLEMENTABLE IMPROVEMENTS

The project is cost-effective and will be competitive when seeking Federal grants.

SUPPORT COMMUNITY HEALTH

A Health Impact Assessment identified opportunities to encourage healthier communities as part of transit investment.

Prepared for: LYNX

Prepared by: Kittelson & Associates, Inc.
225 E Robinson Street, Suite 355
Orlando, FL 32801

SR 436
TRANSIT CORRIDOR STUDY
CONNECTING COMMUNITIES