Oakland Park Boulevard
Transit Corridor Study

April 2014

Oakland Park Boulevard Alternatives Analysis

Final Report

FDOT

Financial Project ID: 4295691-22-01 ● Florida Department of Transportation District Four

For more information about the Oakland Park Boulevard Transit Corridor Study, please contact:

Khalilah Ffrench, P.E.
Florida Department of Transportation District Four
3400 W. Commercial Boulevard
Fort Lauderdale, FL 33309-3421
(954) 677-7898
Khalilah.Ffrench@dot.state.fl.us

Mr. Vikas Jain, AICP, GISP
T.Y. Lin International
1501 NW 49 Street, Suite 203
Fort Lauderdale, FL 33309
(954) 308-3353
Vikas.Jain@tylin.com

Table of Contents

List of Tables

List of Figures

Executive Summary

This Oakland Park Boulevard Transit Alternatives Analysis was led by the Florida Department of Transportation (FDOT), in partnership with the Broward MPO, Broward County Transit (BCT), and the South Florida Regional Transportation Authority (SFTRA). This Study was conducted using the general framework developed for projects seeking capital funding under the Federal Transit Administration's (FTA) New Starts/Small Starts program. An integral component of this study was to identify transportation and transit operational improvements that could be implemented in a shorter time frame (within next two (2) to five (5) years) in the Oakland Park Boulevard corridor. To that end, the Oakland Park Boulevard Transit Alternatives Analysis examined several strategies for improving transit service on Oakland Park Boulevard (SR 816), one of the more heavily traveled corridors in Broward County, and host to the second most productive bus route (Route 72) in the Broward County Transit system.

Study Area

The Oakland Park Boulevard study area stretches from the Sawgrass Expressway (SR 869) to North Ocean Boulevard (SR A1A), and extends north to McNab Road/62nd Street, and south to Broward Boulevard /Las Olas Boulevard. The study area includes all or portions of the cities of Sunrise, Lauderhill, Lauderdale Lakes, Oakland Park, Wilton Manors, and Fort Lauderdale, and includes portions of the municipalities of Tamarac, North Lauderdale, Sea Ranch Lakes, Lauderdale-by-the-Sea, Lazy Lake, Plantation, and unincorporated areas of Broward County.

Project Location

Oakland Park Boulevard (SR 816) is a six-lane east–west arterial road serving central Broward County, Florida. It stretches approximately 13 miles from its western terminus at an intersection with the Sawgrass Expressway (SR 869) in the City of Sunrise near the Sawgrass Mills Mall and BB&T Center, and an eastern terminus at an intersection with Ocean Boulevard (SR A1A) in the City of Fort Lauderdale. The eastern and western termini for the BCT Route 72, which traverses Oakland Park Boulevard (SR 816) providing local bus service is Sawgrass Mills Mall and Galt Mile respectively.

Transportation Issues and Problems

The Oakland Park Boulevard Route 72 bus moves nearly 9,000 bus passengers/day (or 7.2 percent of the BCT system's total daily ridership) and has been proposed for a Premium High-Capacity Transit service in the adopted 2035 Long Range Transportation Plan (LRTP). By the year 2035, Route 72 ridership is expected to grow to 14,750 passengers/day, or a +60 percent increase over existing conditions ridership. Very few passengers travel the Route 72 for long distances; and in fact, 60 percent of Route 72 patrons transfer to or from another route between US 1 and University Drive. Field surveys found that nearly half of all Route 72 trips arrived at bus stops too early or late (i.e., one minute ahead of schedule time to five minutes after scheduled time) due to heavy traffic congestion, particularly between US 1 and University Drive.

Oakland Park Boulevard carries a daily traffic volume between 35,000 and 62,000 vehicles. While Oakland Park Boulevard's posted speed limits are 30 to 35 mph (east of NW 21st Avenue) and 45 mph west of NW 21st Avenue, the high traffic volume and closely spaced traffic signals (a signalized intersection is located approximately every 1,537 feet) result in slower average peak hour speeds of 19 to 26 miles per hour depending on the direction and time of the day; resulting in a corresponding delay between 12 and 24 minutes per trip[1]. Significant delay occurs at signalized intersections even during off-peak hours.

Given significant travel demand (20% increase in Vehicle Miles Traveled (VMT) and 31% increase in Vehicle Hours Travelled over the next 25 years) in the study area and the lack of transportation capacity increases to accommodate it, vehicle speeds are expected to decline between 7% to 8% (from 26 MPH to 24 MPH), and vehicle hours of delay are expected to nearly double (81% increase, from 1,050 to 1,910 vehicle hours of delay). Consequently, roadway level of service will deteriorate throughout the study area including the Oakland Park Boulevard corridor.

In addition to the high traffic and transit demand on Oakland Park Boulevard, the corridor is lined with small commercial parcels many of which utilize multiple driveways. Motorists using these driveways slow traffic flow on Oakland Park Boulevard as they enter and leave these driveways, which is additionally impeded by vehicles circulating in the parking lots attached to the driveways and the pedestrians crossing the driveways as they walk to stores, offices and bus stops. Further, pedestrian activity at intersections often slows right turning vehicles. All of these activities contribute to delays on the Route 72 bus.

BCT has implemented a variety of improvements to improve operations and increase bus passenger capacity to accommodate the high demand – e.g., there are 15-minute frequencies in both directions between 6:00 am and 6:00 pm, and articulated buses are generally used over standard 40.0' buses – but the Route 72 bus continues to experience problems with regard to transit service quality and reliability, specifically schedule adherence or on-time performance issues and slow and unpredictable bus speeds, due to overall traffic conditions.

The FDOT and its partner agencies initiated this study in order to identify transit improvements along the corridor that improve on-time performance as well as improve bus stops, achieve the desired high-quality, high-capacity premium transit service envisioned in the LRTP, and to meet the route's near- and long-term ridership demand.

Purpose and Need for the Project

Based on the transportation and mobility issues in the study area, the Project Team in conjunction with the stakeholders developed the following Purpose and Need Statement. This Purpose and Need Statement served and a guide for developing the project's goals and objective which provided the foundation for conducting the Alternatives Analysis study.

1 Traffic Data Collection Report, June 2013; Base-Year Corridor-wide Model Calibration and Validation Report, October 2013.

NEED FOR THE PROJECT

A premium transit investment in the corridor must address the following needs:

- Transit Service Quality
- Potential for Passenger Crowding
- Mobility and Accessibility
- Population and Employment Growth
- Traffic Congestion and Auto Orientation
- Increase Economic Development and Land Use

PURPOSE OF THE PROJECT

Any improvements considered for the Oakland Park Corridor must meet the project's *purpose to enhance the quality of transit service* in the corridor in order by:

- *Improving travel reliability, convenience and accessibility*
- *Increasing land use and development opportunities, and*
- *Supporting regional economic activity*

Alternatives and Evaluation Methodology

The Project Team along with individuals with partner agencies, the project's Technical Advisory Committee, MPO Advisory Committees, and the general public identified the following alternatives (Tier 1) to improve transit and transportation conditions along the corridor based on the project's Purpose and Need Statement.

- No Build Alternative
- Enhanced Bus Service Alternative
- Grade-separated Transit Technology
- Business Access and Transit (BAT) Lane with Bus Alternative
- Exclusive Lane with Bus Alternative
- Business Access and Transit (BAT) Lane with Streetcar Alternative
- Exclusive Lane with Streetcar Alternative
- 'L' Shaped Route Alternative
- Prospect Road Loop Alternative
- Off-Wire Catenary Systems

A two-tiered screening process was used to evaluate these alternatives with the intent to systematically eliminate those alternatives that do not meet the stated purpose and need from further consideration (i.e., Tier 1 screening), and to provide detailed analysis of those alternatives that had merit in achieving the project's goals and objectives (i.e., Tier 2 screening).

The Tier 1 screening made use of a general qualitative assessment and a quantitative analysis based solely on readily available secondary data. The Tier 2 screening incorporated a more detailed set of quantitative analyses utilizing data sets developed specifically for the alternatives in the Oakland Park Boulevard corridor.

A comprehensive set of evaluation criteria that reflected the project goals and objectives, the FTA New Starts and Small Starts criteria (as revised under the new surface transportation legislation, Moving Ahead for Progress in the 21st Century, MAP-21) and National Environmental Policy Act (NEPA) criteria was developed for assessing the performance of the alternatives along the corridor was used during the Tier 1 and Tier 2 screening and evaluation process.

In addition, using the above data and analyses, a series of feasible and productive operational improvements along the corridor (such as, transit signal priority, queue jump lane, bus stop consolidation, and revised bus schedule) that could reasonably be implemented in a shorter time-frame (in the next two (2) to five (5) years) were analyzed in the Tier 2 screening phase.

Based on the Tier 1 evaluation results that included assessment of Tier 1 alternative against 25 separate performance measures corresponding to the project's goals and objectives, the Project Team and stakeholder advanced the following alternatives (Tier 2) to the second phase for more detailed analysis.

- Enhanced Bus Service
- Business Access and Transit (BAT) Lane with Bus
- Business Access and Transit (BAT) Lane with Streetcar
- Exclusive Lane with Bus
- Exclusive Lane with Streetcar

During phase two, the Tier 2 alternatives were defined in significant detail including development of 10 percent conceptual engineering design plans and operating plans to support the analysis of their advantages and disadvantages. This information provided the basis for developing capital cost and O&M cost estimates, ridership forecasts, and analyze the traffic, transit, social, economic, and environmental benefits and impacts of each alternative. These technical analyses provided the data for conducting a thorough and objective quantitative analysis during the Tier 2 screening and evaluation process, which used 34 different evaluation criteria corresponding to 45 performance measures relative to project goals and objectives to assess the performance of the Build alternatives as well as perform a qualitative comparative benefit cost analysis.

Recommendations

Oakland Park Boulevard is a heavily traveled corridor and is anticipated to continue to exhibit high travel demand in the future. In addition, the BCT Route 72 in this corridor has very high transit ridership and is projected to serve as an important bus route providing connections to other north-south bus routes and community buses in the foreseeable future. Further, this highly urbanized corridor is built out with constrained right-of-way east of Florida's Turnpike for roadway widening. All of the build alternatives in the corridor improve transit reliability and transit on-time performance with increased ridership in the already mature transit market along Oakland Park Boulevard.

There are differences amongst the Build alternatives in terms of the level of traffic impacts, and capital and O&M costs vis-à-vis ridership gains and environmental benefits. Based on the Tier 2 evaluation in conjunction with the comparative analysis of benefits and costs of the various build alternatives and the context of this corridor, the Project Team recommended the following short term and long term solutions to solve the transportation problems in the Oakland Park Boulevard corridor and to meet the project's Purpose and Need Statement.

RECOMMENDED SHORT TERM IMPROVEMENTS

The following improvements were found to have positive utility for all of the long term alternatives, and that they could be implemented at low-cost and in the short term (within-two (2) to five (5) years). Figure ES-1 illustrates the recommended short term improvements.

- Corridor Improvements
  - Traffic signal progression along the entire Oakland Park Boulevard corridor
  - Intersection improvements (19 locations)
- Transit Service Improvements
  - Revised schedule
  - Bus Islands (8 at five different locations)
  - Bus Transit Signal Priority (17 locations)
  - Bus Queue Jump Lanes (3 locations)
  - Bus Stop Upgrades (26 locations)
- Bicycle/Pedestrian Improvements
  - Bicycle lane continuity (44 miles of lanes connecting the bicycle lane network on Oakland Park Boulevard and within one-quarter mile north and south of Oakland Park Boulevard)
  - Complete missing sidewalk links (88 miles of sidewalk connecting the sidewalks on Oakland Park Boulevard and within one-quarter mile north and south of Oakland Park Boulevard)

RECOMMENDED LONG TERM IMPROVEMENT - BAT LANE ALTERNATIVE WITH BUS

The BAT Lane with Bus alternative was found to provide the most cost-effective and efficient set of services for factors such as ridership gains, schedule reliability and economic development opportunities, and limited traffic impact. The capital costs associated with the BAT Lane with Bus alternative is estimated to be $84 million with annual operating and maintenance costs of $5.7 million. The recommended alternative includes the following elements (see Figure ES-2):

- Business Access and Transit (BAT) Lane Bus between US 1 and University Drive
  - Using curb lane and limited to buses, emergency vehicles and vehicles making right turns from Oakland Park Boulevard
- All of the short-term improvements
- Continued Local Bus service – existing route 72 in curb lanes serving every existing bus stop
- Addition of a limited-stop service in the curb lanes – stopping at 16 stations each way between Sawgrass Mills Mall and SR A1A

The Project Team's recommendations were approved by the Technical Advisory Committee on January 9, 2014; Broward MPO Technical Coordinating Committee and Broward MPO Community Involvement Roundtable on January 22, 2014. On February 13, 2014, the Broward MPO Board formally endorsed the short-term improvements and the long-term recommendations.

Figure ES-1: Recommended Short Term Improvements

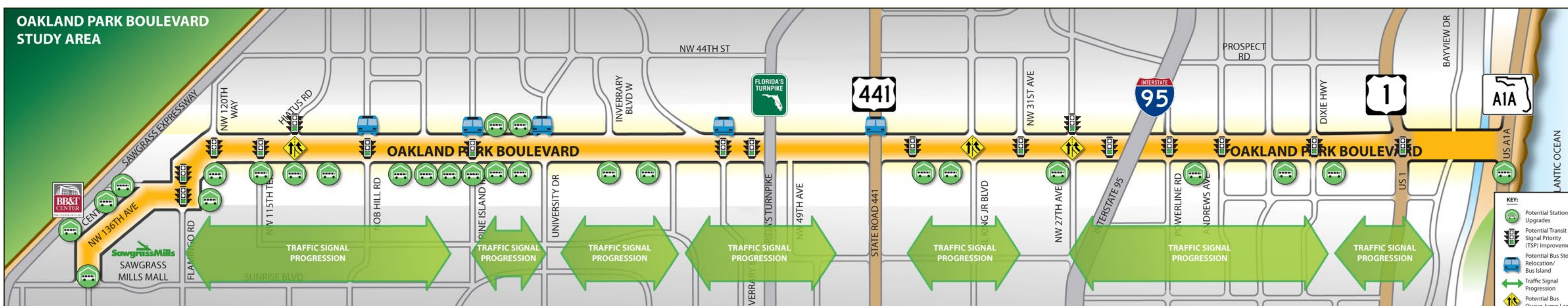


Figure ES-2: Recommended Long Term Improvements

Public Engagement

The analyses and resulting recommendations were reviewed throughout the 24-month Alternatives Analysis planning process. In total, five (5) public workshops were held, and over fifty (50) meetings were conducted with agencies, Project Technical Advisory Committee (TAC), Broward MPO Advisory Committees and community groups. The elected officials representing the six cities along Oakland Park Boulevard were also engaged via one-on-one meetings. The MPO Board endorsed the Project Team's recommendations for short term and long term solutions in the Oakland Park Boulevard on February 13, 2014. A summary of the input received through the extensive public involvement effort for this study is available in the *Public Involvement Documentation, March 2014*.

Next Steps

As of the Spring of 2014, the FDOT has initiated a corridor-level engineering analysis to refine the concept plan for the short term improvements completed under this effort. Construction and operating funds needed to implement the short term improvements have yet to be secured, but are anticipated to be programmed into future Broward MPO Transportation Improvement Plans (TIP) and FDOT Work Program. Broward County Transit has already committed an additional $500,000 in operating funds for continued operation of the Route 72 services on Oakland Park Boulevard.

At a future date, based on Broward MPO's priority and action, FDOT and its partner agencies would initiate *Project Development* for advancing the long term solution - BAT Lane with Bus alternative. The first step would be to submit an application to the FTA requesting permission and funding to enter into the *"Project Development or PD"* phase. During the *PD* phase, the FDOT would initiate preliminary engineering and environmental documentation per National Environmental Policy Act (NEPA) requirements. As part of the *PD* phase, the FDOT along with its project partners, should re-evaluate the assumptions and conduct detailed analyses to update the FTA project justification ratings appropriately. Under the new federal surface transportation reauthorization, Moving Ahead for Progress in the 21st Century (MAP-21), the *PD* phase cannot exceed two years.

1. Introduction

The Oakland Park Boulevard Transit Alternatives Analysis study examined several strategies for improving transit service on Oakland Park Boulevard (SR 816), one of the more heavily traveled corridors in Broward County, and host to the second most productive bus route (Route 72) in the Broward County Transit (BCT) system. The study was led by the Florida Department of Transportation (FDOT), in partnership with the Broward Metropolitan Planning Organization (Broward MPO), Broward County Transit (BCT), and the South Florida Regional Transportation Authority (SFTRA).

Oakland Park Boulevard moves nearly 9,000 bus passengers/day (or 7.2% of the BCT system's total daily ridership) and has been identified as a future Premium High-Capacity Transit service corridor in the adopted 2035 Long Range Transportation Plan (LRTP). The FDOT initiated this study to identify transit improvements along the corridor that achieve the desired high-quality, high-capacity premium transit service envisioned in the LRTP, as well as to meet the route's near- and long-term ridership demand.

The goal of this study was to identify short term transit operational improvement projects (i.e., improvements which could be implemented within the next two to five years) and a long term transit improvement (or Recommended Build Alternative (RBA)) which could be advanced into the Federal Transit Administration's (FTA) *Project Development* (PD) phase to compete for funds under the federal New Starts/Small Starts program.

1.1 Alternatives Analysis Report – Project Purpose and Report Organization

This Alternatives Analysis (AA) report documents the AA planning process, which under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation, is the first step is required to complete the planning, environmental assessment, design and construction of a major transit project seeking federal funding. With the passage of the current surface transportation legislation, Moving Ahead for Progress in the 21st Century (MAP-21) in July 2012, conducting an AA study is at project sponsor's discretion. However, there are several benefits in conducting an AA including streamlining the project sponsor's approach to improving mobility in the corridor, and in advancing only those alternatives that were found to both meet the project's purpose and need and enjoy community support.

This AA Report presents the project's findings in approximately the order in which they occurred, and is organized as follows:

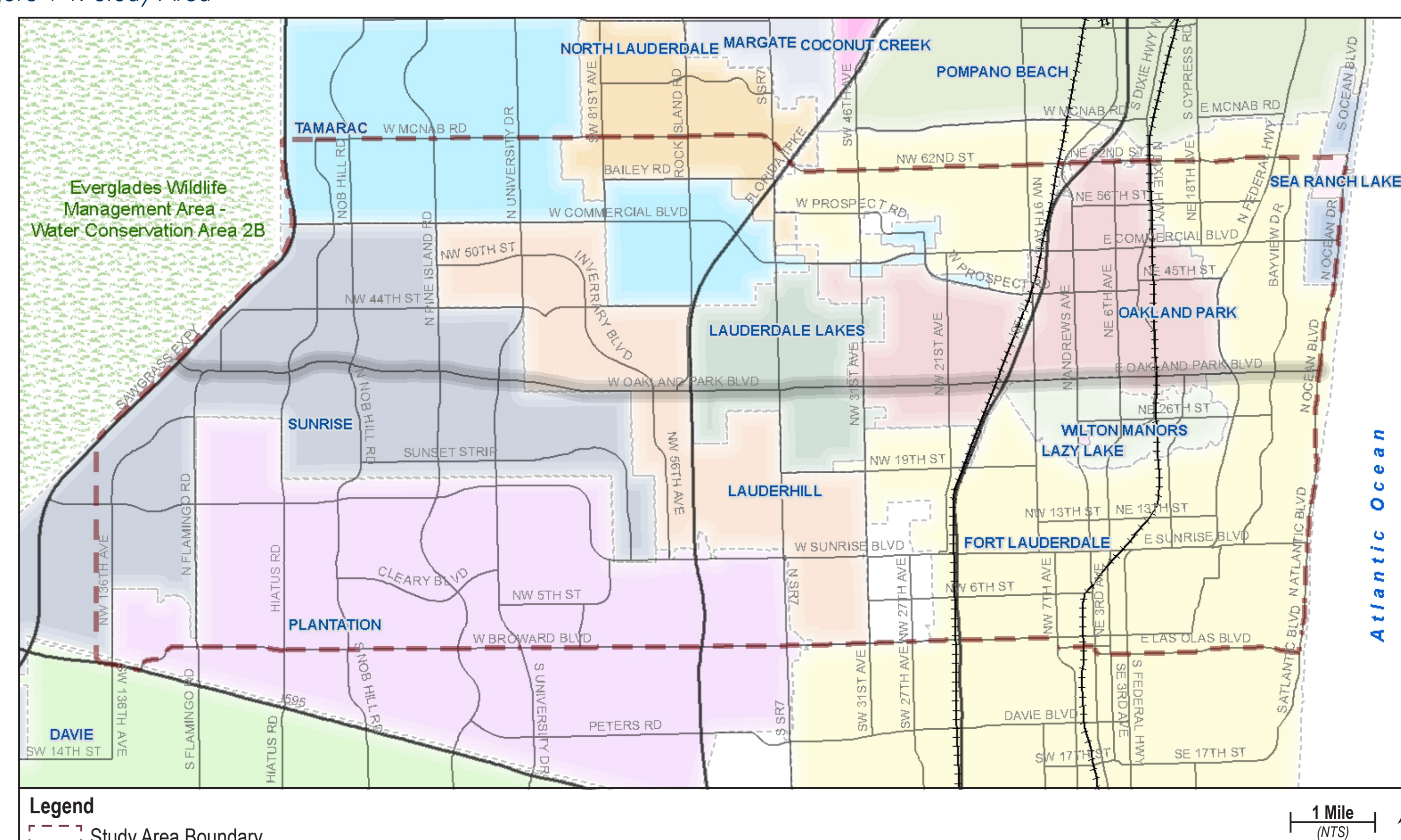
- *Chapter 1* – Introduction and Study Background.
- *Chapter 2* – Transportation Issues and Needs including study area demographics, existing and future travel demand, transportation system performance, and land use and redevelopment opportunities in the corridor.
- *Chapter 3* – Purpose and Need for the project and explains the process used to establish the goals and objectives for the project.
- *Chapter 4* – Development of Alternatives to address the purpose and need.
- *Chapter 5* – Screening of Alternatives involving a two-tiered screening process examining the constraints of transit modes, route and station combinations, and cost implications (Tier 1 Evaluation), and then compares performance between alternatives, including a benefit-cost analysis (Tier 2 Evaluation). The purpose of the screening is to narrow down the number of alternatives that are ultimately advanced to the PD phase.
- *Chapter 6* – Public Engagement; a summary of the public outreach effort conducted over the course of the study and at major project milestones.
- *Chapter 7* – Recommendations; documents the recommendations for the short term improvements and long term transit solution in the corridor as well as Broward MPO's decision.
- *Chapter 8* – Next Steps that the partner agencies could potentially take to implement the short term projects and further advance the long term transit solution to the PD phase.

1.2 Study Background

1.2.1 STUDY AREA

The Oakland Park Boulevard study area stretches from the Sawgrass Expressway (SR 869) to North Ocean Boulevard (SR A1A), and extends north to McNab Road/62nd Street, and south to Broward Boulevard /Las Olas Boulevard. The study area includes all or portions of the cities of Sunrise, Lauderhill, Lauderdale Lakes, Oakland Park, Wilton Manors, and Fort Lauderdale, and includes portions of the municipalities of Tamarac, North Lauderdale, Sea Ranch Lakes, Lauderdale-by-the-Sea, Lazy Lake, Plantation, and unincorporated areas of Broward County (see Figure 1-1).

Figure 1-1: Study Area

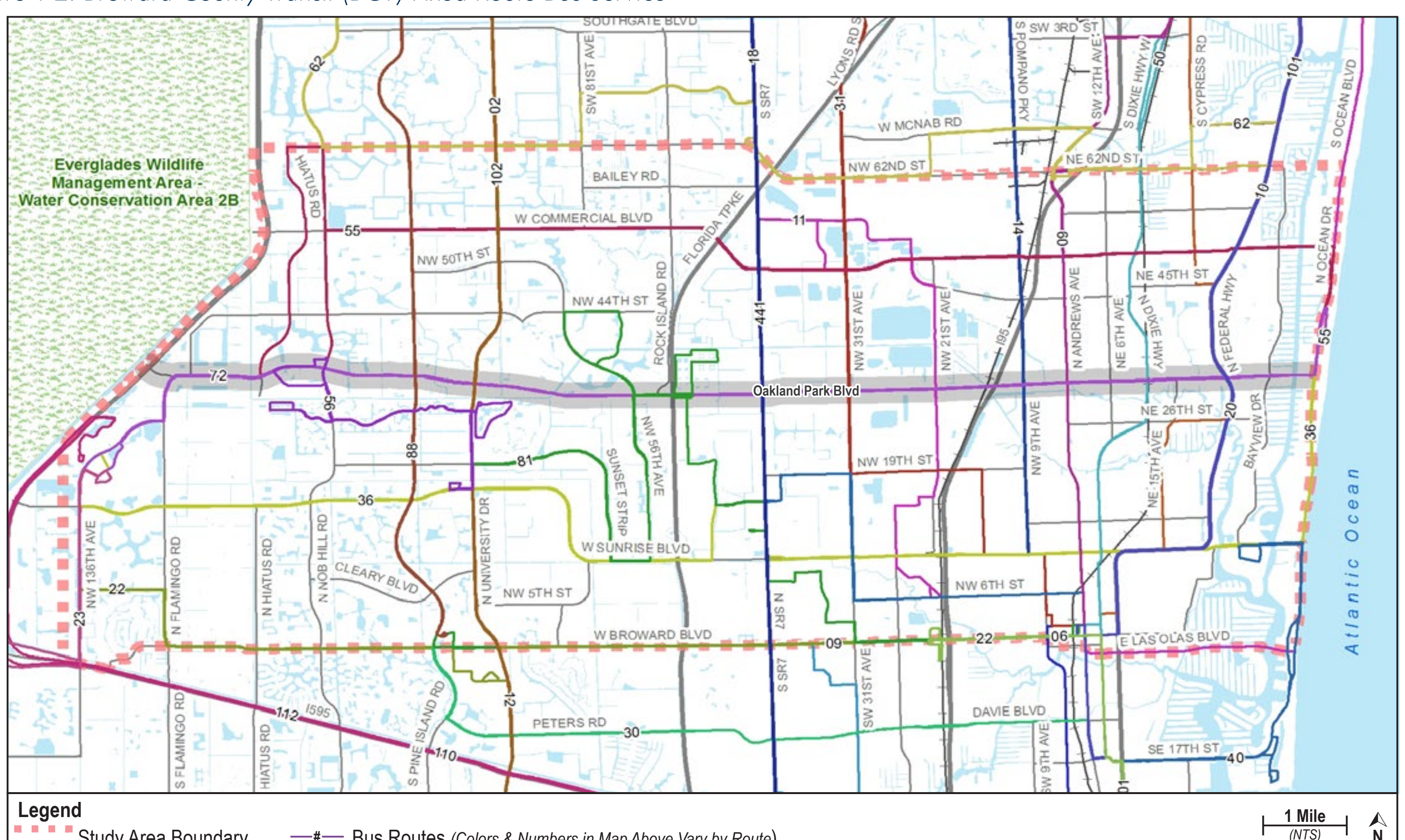


The study area boundary was defined to incorporate Oakland Park Boulevard's "travel shed" and to include competing highway facilities (Commercial Boulevard to the north and Sunrise Boulevard to the south of Oakland Park Boulevard) that facilitate similar local and regional mobility providing east-west movement within this travel shed. Oakland Park Boulevard intersects with all of the major north-south arterials (i.e. University Drive, SR 7, Andrews Avenue, Dixie Highway, and US 1), and provides direct access to Sawgrass Expressway (SR 869) and Interstate 95 (I-95) in the County. In addition, it contains small commercial parcels accommodating multiple access curbs and traffic control strategies.

The Oakland Park Boulevard corridor, which is defined as an area encompassed within a ½-mile distance north and south of Oakland Park Boulevard (SR 816)), is served by the BCT Route 72, BCT paratransit services known as TOPS – Transportation Options, and several city-run "Community Buses." The Route 72 provides weekday service between the Sawgrass Mills Mall area and SR A1A from 5:00am to 12:35am, including 15-minute service between 6:00am and 6:00pm. Weekend service is provided between 5:00am and 12:30am, with 20-minute and 30-minute service throughout the service periods on both Saturdays and Sundays.

The Route 72 provides transfer connection opportunities to 15 north-south BCT fixed routes, limited stop "Breeze" routes, and at least 10 "community" circulator bus routes (see Figure 1-2). Some of the highest performing routes in the BCT system that intersect with Route 72 include: Route 18 (SR 7), Route 2 (University Drive), and Route 1 (US 1). Community Bus services are provided across and along Oakland Park Boulevard by the cities of Fort Lauderdale, Lauderdale Lakes, Lauderhill, Sunrise, Lauderdale-by-the-Sea, and Tamarac.

Figure 1-2: Broward County Transit (BCT) Fixed Route Bus Service



The study area includes more than a quarter of Broward County's population and employment. In fact, the population and employment densities are noticeably higher in the study area compared to the rest of Broward County. The western end of the study area includes employment centers, such as Sawgrass Mills Mall and Sawgrass Corporate Park (approximately 17,500 jobs), and BB&T Center, which serves as a regional recreational hub. Besides the activity centers in the western part of the corridor, there are two other major employment centers on the periphery of the study area: the Cypress Creek commercial area around NW 62nd Street and NW 9th Avenue (Powerline Road), and Downtown Fort Lauderdale. With such a concentration of people and jobs and lack of east-west freeway north of Interstate 595 (I-595) in Broward County, Oakland Park Boulevard is heavily used for east-west travel movement (approximately 40,000 autos/day and 9,000 bus riders/day).

1.2.2 SUPPORTIVE PLANS

The following is a summary of plans and studies that have identified the need for transit improvements in the Oakland Park Boulevard corridor and central Broward County over the past 10 years.

2035 Long Range Transportation Plan (LRTP)

Adopted by the Broward Metropolitan Planning Organization (BMPO) Board in 2009, the LRTP is the blueprint for the entire Broward County transportation system with a time horizon through 2035. The Plan's Vision Statement - "Transform transportation in Broward County to achieve optimum mobility with emphasis on mass transit while promoting economic vitality, protecting the environment, and enhancing quality of life" - properly characterizes the Plan as a departure from previous LRTPs in that it seeks to provide a more balanced transportation system with priority spending for transit, bicycle, pedestrian, and smart growth policies, which integrate transportation system development with current and future land uses.

The Plan estimated that up to $8.5 billion (in 2009 dollars) would be available over the 25-year period to invest not only in maintenance of the existing transportation system, but in the development of improvement projects on I-95, I-595, Florida's Turnpike, and other roadways, establishment of premium transit services and transit mobility hubs, bicycle facilities, and pedestrian and greenway projects. The needs and desired improvements expressed by the general public and regional leaders during development of the LRTP totaled as much as $20 billion over the 25-year horizon; however, since that level of investment was not considered "cost-feasible", the MPO prioritized investments based on their $8.5 billion revenue limit. Oakland Park Boulevard is designated as a "Premium High Capacity Transit" corridor in the 2035 LRTP and ranks 2nd on the list of cost feasible projects, which was one of the primary steps in advancing this Oakland Park Boulevard Transit Alternatives Analysis Study.

Broward County Transit Development Plan (FY 2009 – FY 2018)

This ten-year strategic plan identifies the investments that Broward County Transit (BCT) will be making in its system of 37 fixed bus routes, three (3) limited-stop routes (BREEZE), para transit services, and partnership with 22 municipalities in the capital and operational costs of 48 community bus routes. The investments recommended for the Transit Development Plan (TDP) are based on a series of evaluations of the system's current performance, what future demands are expected on the system, and which investments to prioritize given the available funding over the course of the Plan. While the

2008 annual capital program had $26 million for capital projects (90% from the FTA and 10% from the BCT Concurrency Fee program), the TDP estimated that up to $388 million would be available over the 2009-2018 period. The unfunded needs in the TDP, which includes a bus rapid transit service on Oakland Park Boulevard – totaled $1.75 billion over the same period.

Strategic Corridor Study (Phase I) Oakland Park Boulevard

In 2009, FDOT District 4, BMPO, and Broward County partnered with the Florida Atlantic University (FAU) and the cities of Oakland Park and Wilton Manors to create a Strategic Corridor Plan – complete with recommended transit oriented development types and transit access facilities for the 3.5 mile long segment of Oakland Park Boulevard between NW 31st Avenue and Dixie Highway. The effort resulted in a Corridor Redevelopment Plan and a series of station prototype designs, as well as designs for pedestrian and bicycle access and park-and-ride facilities.

2010 Broward County Transit Comprehensive Operational Analysis (COA)

In 2010, BCT completed its first comprehensive assessment of its services and operations, including both its strengths and weaknesses, and recommendations for the future. This assessment was based on ride-check and on-board field surveys of every BCT fixed route and community bus route for every time period and day of the week of operations, as well as a substantial public engagement effort involving over 18 public meetings to further garner the transit needs of the current BCT users and those not yet utilizing BCT services. The final Comprehensive Operational Analysis (COA) provides a comprehensive list of suggested changes to the BCT system including updated Performance Monitoring Standards, a vastly updated BCT Service Framework, a Preferred BCT Service Plan (PSP) for the next ten years, and other recommendations for improving on-time performance, customer service, fare policy and overall transportation policy. With respect to Oakland Park Boulevard, the "Preferred Service Plan" included creation of a Rapid Route with 10 minute headways all day on weekdays and bus stops placed every 0.60 to 0.75 miles apart. The Route 72 on Oakland Park Boulevard would continue to provide local service at every current bus stop but headways would decrease from 15 and 20 minutes to 30 minutes on weekdays, and increase to 20 minutes on Saturdays, and Sunday bus service would start one hour earlier.

South Florida Regional Transportation Authority Transit Development Plan (FY 2013-2022 Update)

This highly detailed ten-year Plan covers all South Florida Regional Transportation Authority's (SFRTA) facilities and services – including their performance and costs - and describes its progress in addressing new initiatives set by the SFRTA Board, including staff participation in regional transit projects, such as the Oakland Park Boulevard Alternatives Analysis. The SFRTA is evaluating the feasibility of a future Tri-Rail station on Oakland Park Boulevard to function as a transfer station with any type of premium transit service proposed in this corridor. In the year 2011, the SFRTA evaluated eleven (11) different sites in the vicinity of Oakland Park Boulevard for locating a station that could accommodate a kiss-and-ride facility.

Strategic Regional Transit Plan, South Florida Regional Transportation Authority

The SFRTA created the Strategic Regional Transit Plan in December 2008. This plan was developed based on then current and expected growth in population and employment in the region. An initial set of alternatives was defined to best link Regional Activity Centers, to serve travel demand and travel patterns in various corridors as well as its ability to fit within the existing right of way to the maximum extent possible. Using a screening process the most promising alternatives were advanced to the next phase for further analysis. Eventually the best alternatives combined into three different transit networks – connective network, productive network, and value network each focusing on a specific element such as linking important areas in the region or increasing ridership or balancing cost and benefits of the transit system. In all the three networks, Oakland Park Boulevard was identified as premium transit (rapid bus) project consisting of two bus lines: one serving Cypress Creek and the other downtown Fort Lauderdale.

Central Broward East-West Transit Study

In addition to the Oakland Park Boulevard Alternatives Analysis, the Central Broward East-West Transit Study and the Broward Boulevard Corridor Study are other transit studies addressing east-west travel in central Broward County. Central Broward County is generally defined as - the area bounded by Oakland Park Boulevard to Griffin Road/Stirling Road, and Interstate 75-Sawgrass Expressway (SR 869) to the Intracoastal Waterway. This comprehensive evaluation has been underway since 2002 and is focused on identifying a premium transit service in Central Broward County. Multiple alternatives were reviewed and Streetcar alternative serving Fort Lauderdale Tri-Rail station, Fort Lauderdale-Hollywood International Airport, South Florida Education Center (SFEC) while providing connection to The Wave was selected at the preferred alternative in September 2012. It is anticipated that this project will enter into the NEPA process, and ultimately engineering and design in 2014-2015. The study is being led by the FDOT in partnership with BCT, SFRTA, and the BMPO.

Oakland Park Boulevard Transit Corridor Operation Improvement

This FDOT District 4 study completed in 2011 focused on transit operational improvements for a 3.7 mile segment of Oakland Park Boulevard (between NW 68th Avenue and NW 27th Avenue). The analyses relied on existing and new field data to create a subarea travel forecast model for the purposes of examining the results of three transit operational improvement strategies: 1) queue bypass lanes, 2) signal pre-emption, and 3) a combination of queue bypass lanes with signal pre-emption. The study found that all three strategies resulted in benefits to transit travel time between 2% and 6% (the highest benefits are achieved with the combination of signal pre-emption and queue bypass lanes, followed by an estimated 3%-4% benefit with signal pre-emption alone), and that queue bypass lanes also improved the travel time in general traffic lanes and the performance of intersecting streets. Due to the increased green time that would be provided on Oakland Park Boulevard with signal pre-emption treatments, the delays to intersecting streets increased by as much as 25%. In addition to these analyses, this effort demonstrated how traffic simulation tools can be used to effectively analyze alternative transit operations.

Broward Boulevard Corridor Study, Phase 1

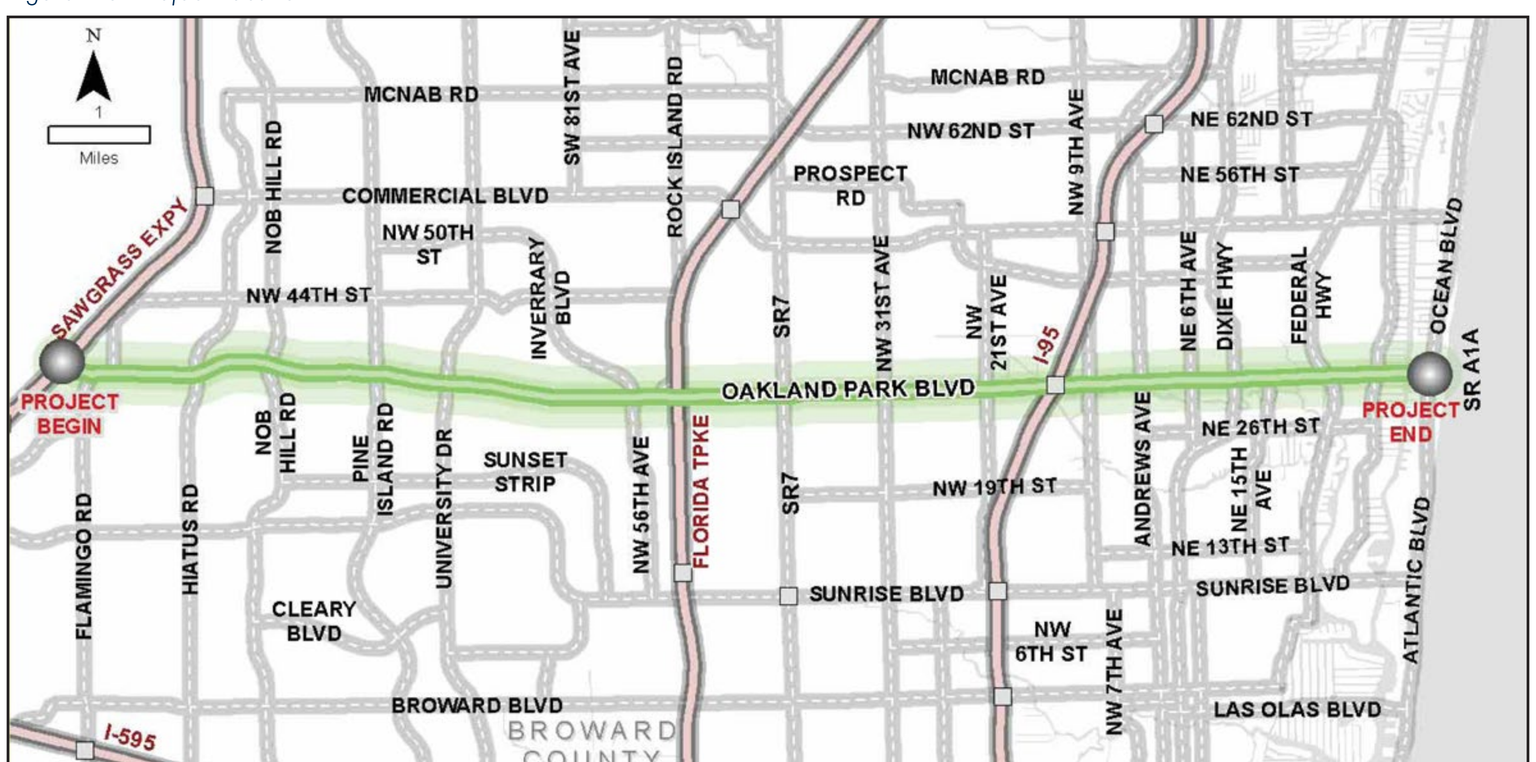
The FDOT District 4 in partnership with BCT, SFRTA, and the BMPO completed the first phase of this study in July 2012. The study area included an eight mile section between Pine Island Road and US 1 (Federal Highway) on Broward Boulevard. This study focused on identifying short term traffic and transit operational improvements that could be implemented by the year 2014 with an aim of increasing mobility, access to transit, and transit ridership in the Broward Boulevard corridor. A two-tiered screening approach was adopted to develop a short list of alternatives from a long list of strategies using evaluation criteria such as timeframe for implementing the strategy, right-of-way needs, capital cost, and compatibility with local and regional plans. The agency partners selected an alternative that includes maintaining existing transit services, providing operational improvements to the corridor, enhancing pedestrian connections to bus stops, and adding an overlay service to serve high demand bus stops. Phase 1of the study culminated with developing conceptual design for the selected alternative. The Broward Boulevard Corridor Study is one of the three studies including Oakland Park Boulevard Alternatives Analysis addressing east-west travel in the central part of the County.

1.2.3 PROJECT LOCATION

Oakland Park Boulevard (SR 816) is a six-lane east–west arterial road serving central Broward County, Florida. It stretches approximately 13 miles from its western terminus at an intersection with the Sawgrass Expressway (SR 869) in the City of Sunrise near the Sawgrass Mills Mall and BB&T Center, and an eastern terminus at an intersection with Ocean Boulevard (SR A1A) in the City of Fort Lauderdale.

The eastern and western termini for the BCT Route 72, which traverses Oakland Park Boulevard (SR 816) providing local bus service is Sawgrass Mills Mall and Galt Mile respectively. All build alternatives provide limited stop transit service from Sawgrass Mills Mall (eastern terminus) to SR A1A (western terminus). But the termini for transit guideway and bus running way vary between the various different build alternatives as described in Section 5.

Figure 1-3: Project Location



2. Transportation Issues and Needs

This chapter describes the existing and future mobility issues in the study area resulting from demographic and land use changes, future travel demand and travel markets, and economic and redevelopment opportunities. A thorough understanding of transportation problems is necessary to identify the mobility needs in the corridor and corresponding solutions to address them.

2.1 Population and Employment Growth

As shown in Table 2-1, the total 2010 population in Broward County was approximately 1,750,000 and 2010 employment was approximately 780,000 jobs. The Oakland Park Boulevard study area accounts for about 27% of the County's population (474,000 persons in 2010) and about 29% of the County's employment (232,000 jobs in 2010). In terms of population density, the study area accommodates around 5,500 people per square mile, which is nearly 33% higher than the overall density in Broward County. The employment density in the study area is approximately 2,700 jobs per square mile, 46% higher than the overall density in Broward County.

Table 2-1: Population and Employment (Job) Growth

Geography	2010		2035		% Growth	
	Population	Jobs	Population	Jobs	Population	Jobs
Corridor	474,000	232,000	616,000	288,000	30%	24%
Broward County	1,750,000	780,000	2,250,000	1,010,000	29%	29%

Source: Southeast Regional Planning Model (SERPM)

Over the next 25 years the study area's population growth will increase at the same levels expected countywide while employment growth will be slightly lower than the County employment growth (see Table 2-1). The population in the western end of Oakland Park Boulevard and around SR 7 is expected to grow at a relatively faster pace (see Figures 2-1 and 2-2). There is high employment concentration in the western, eastern and central areas of the study area. The employment along the western end of the study area is expected to grow at a slightly faster pace in comparison to rest of the study area (see Figures 2-3 and 2-4).

Overall, employment density in the study area will grow at a slower pace than population density. Nearly the entire study accommodates less than 15 employees per acre and little change is anticipated by 2035.

Figure 2-1: Pouplation Density, 2010

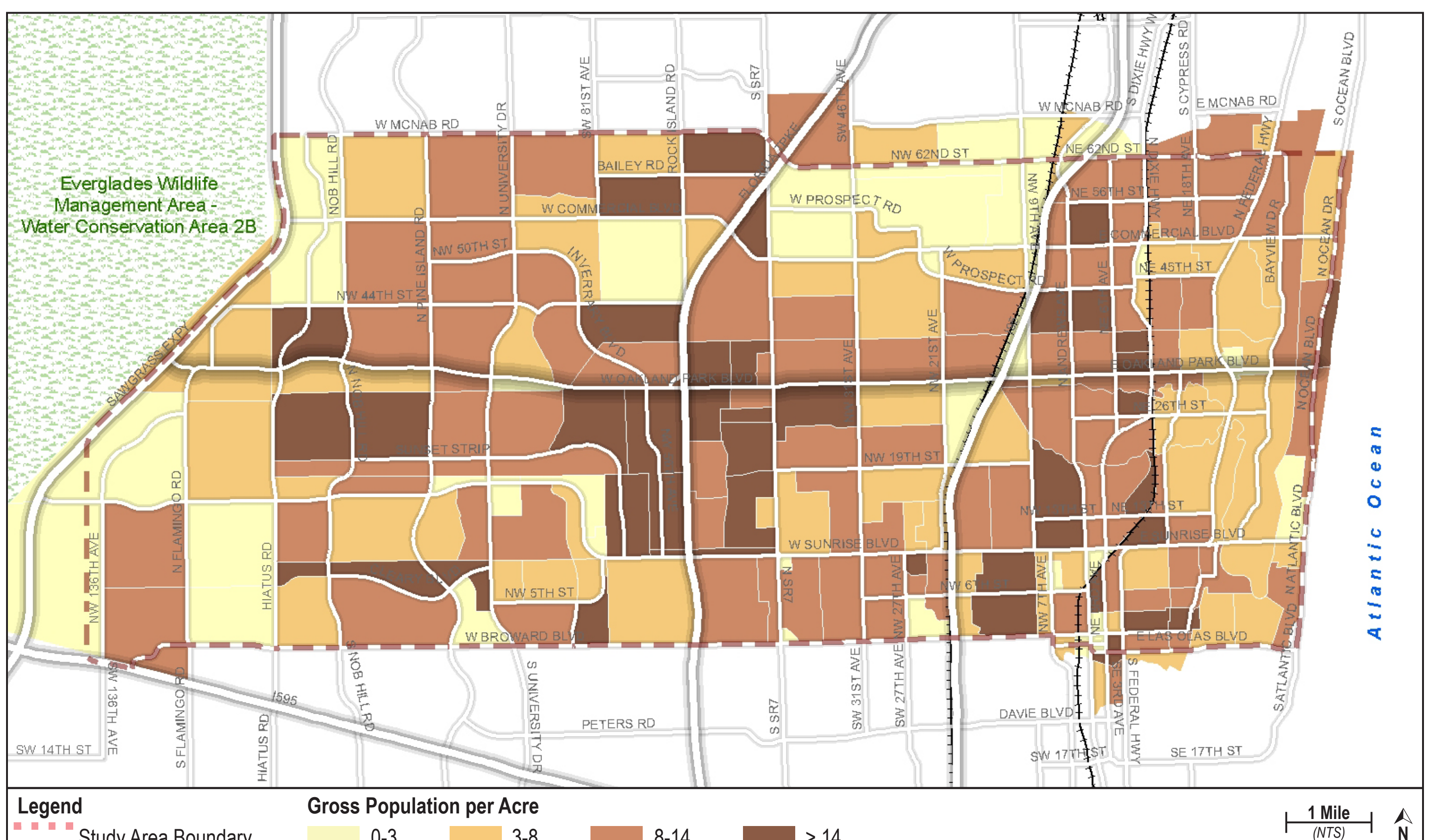


Figure 2-2: Population Density, 2035

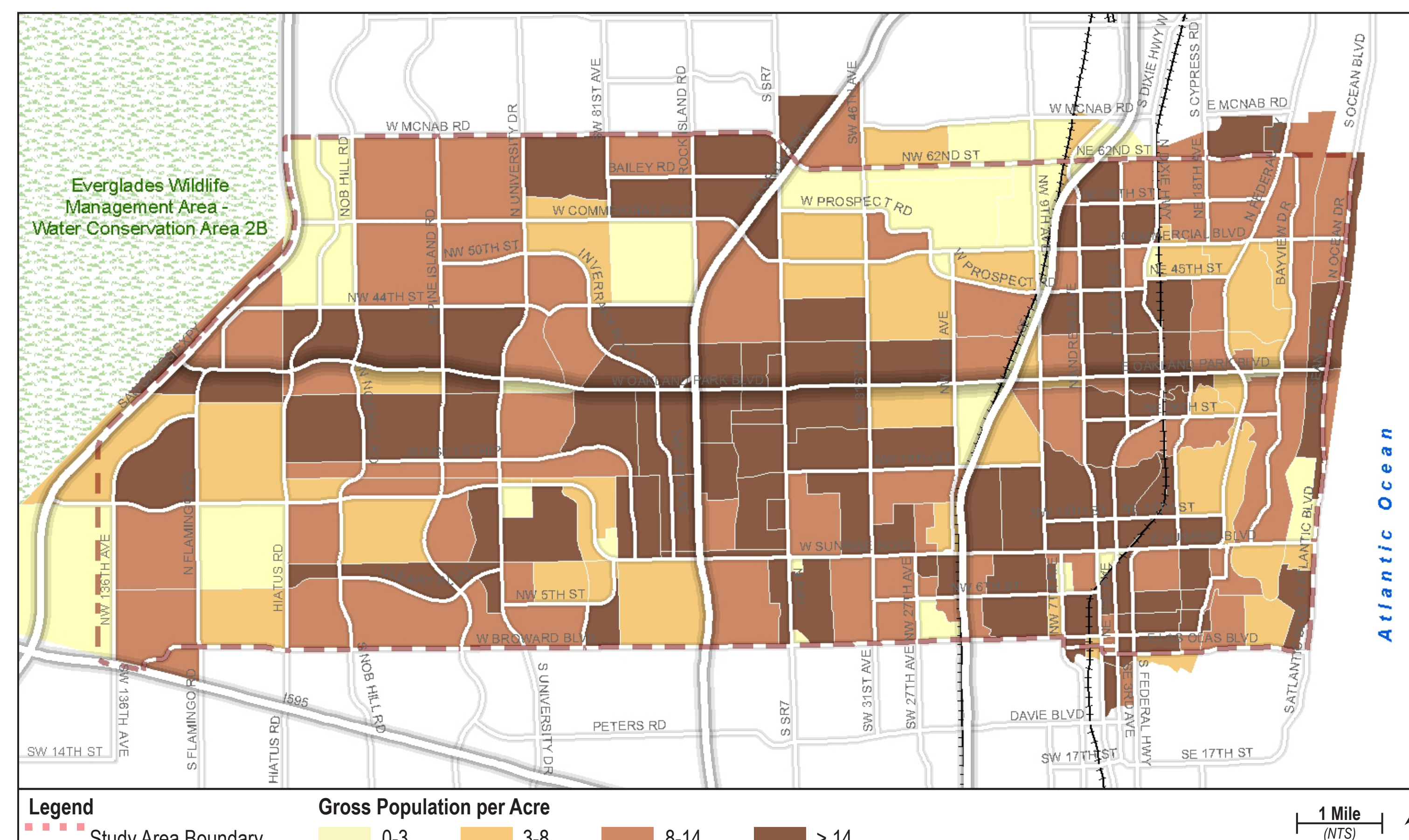


Figure 2-3: Employment Density, 2010

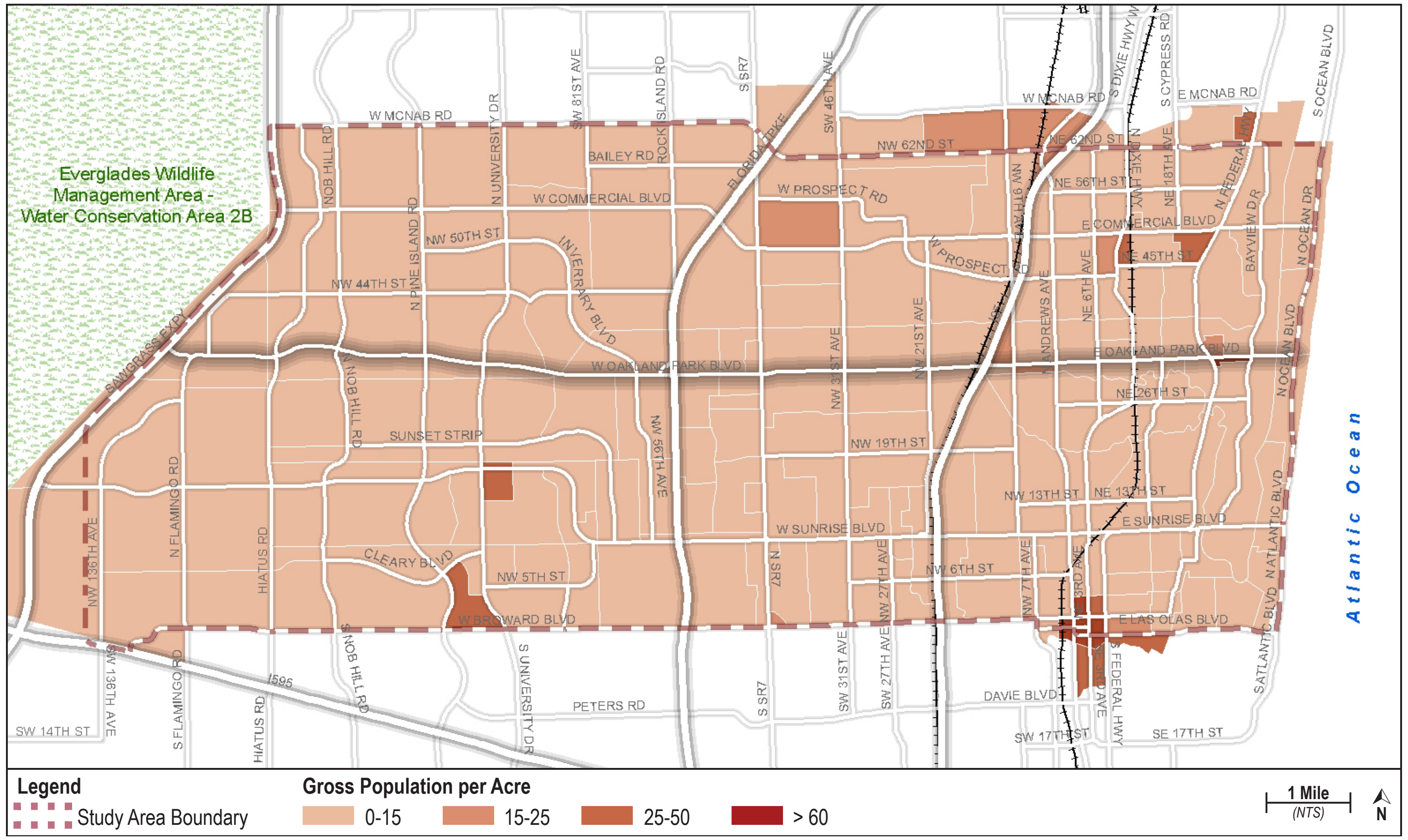
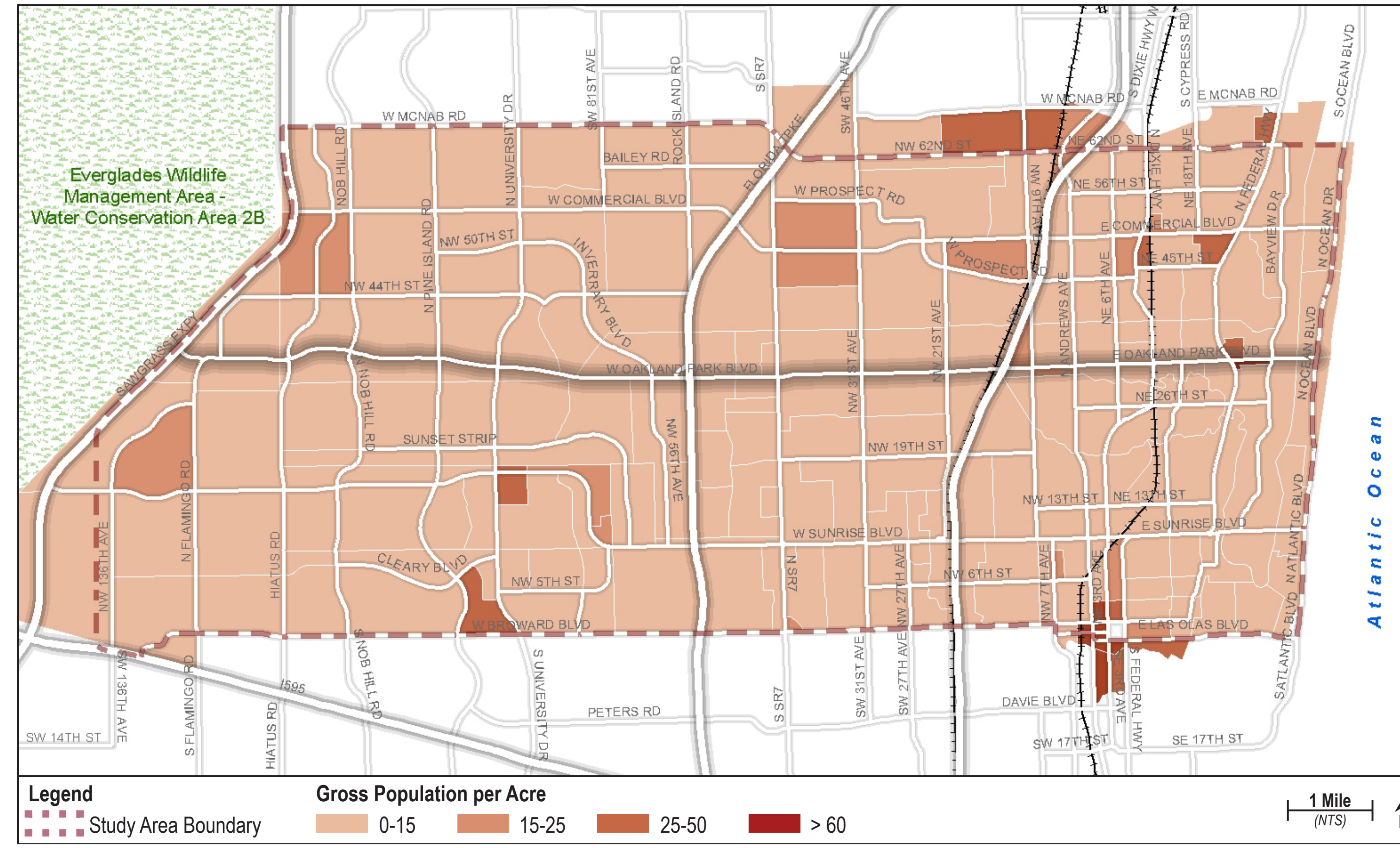


Figure 2-4: Employment Density, 2035



Moreover, areas adjacent to Oakland Park Boulevard employ less than 15 employees per acre, with the exception being near NW 9th Avenue (Powerline Road) and US 1 which will have an employment density of 15 to 25 employees per acre. In the northern part of the study area – the commercial hub between Cypress Creek Road (NW 62nd Street) and NW 9th Avenue (Powerline Road) – employment will continue to grow at a substantial rate.

In summary, significant population and employment growth (between 24% and 30%) is projected to occur between the years 2010 and 2035. Moreover, the population living within a half-mile of existing Route 72 bus stops is expected to grow by 36%, and employment within a half-mile of existing Route 72 bus stops is projected to grow by 15% in the next 25 years. The study area will continue to experience higher population and employment densities than the county as a whole. The increase in population and employment in the study area is anticipated to generate high travel demand in future on the existing transportation infrastructure.

2.2 Existing and Future Travel Demand[2]

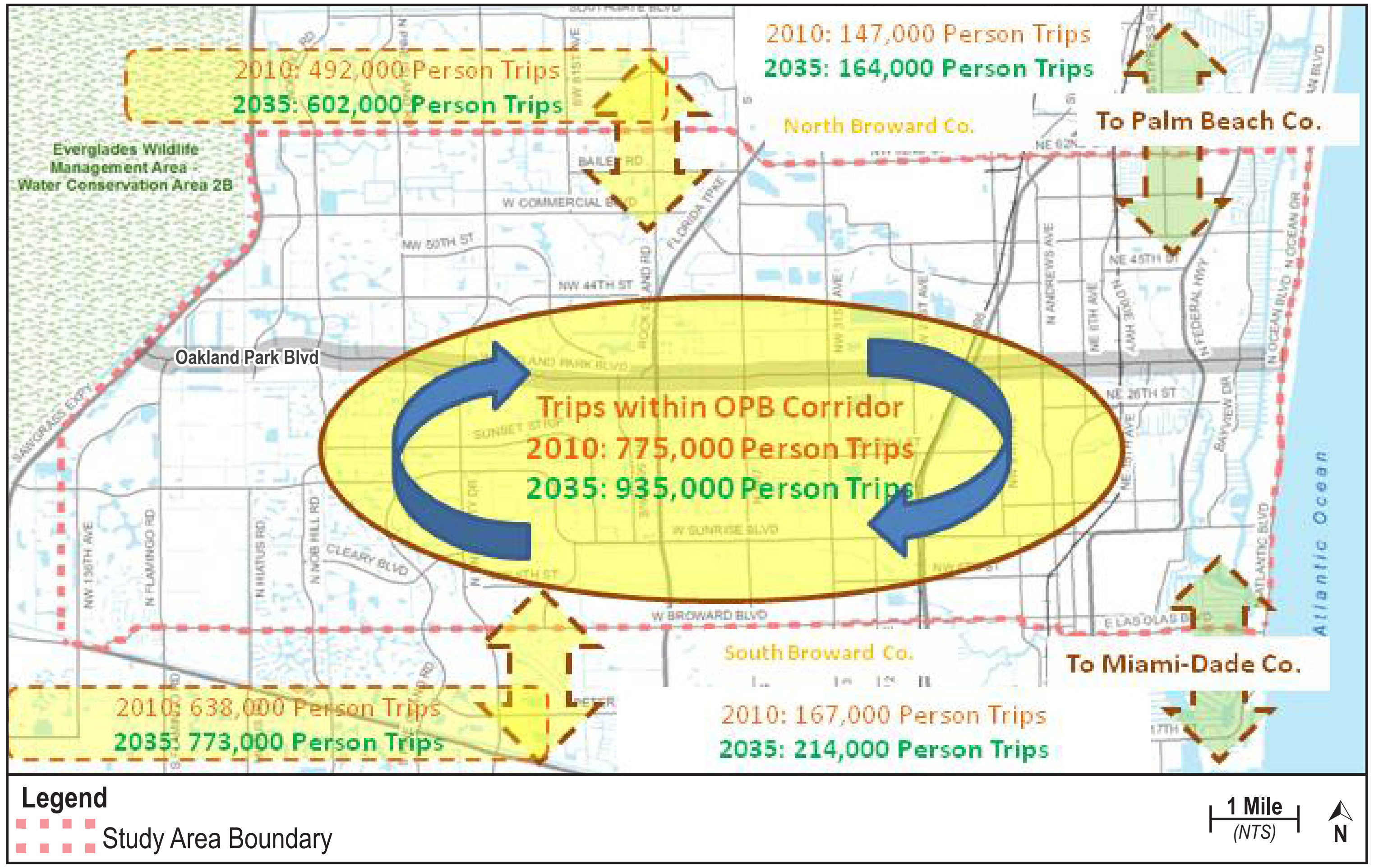
Section 2.2 discusses existing and future travel demand as well travel patterns and markets in the study area.

2.2.1 REGIONAL TRAVEL MARKET

The number of daily person trips in Broward County is expected to grow by 23% in 2035 (i.e., from 4.6 million daily person trips to 5.7 million daily person trips in 2035), which is nearly identical to growth in daily person trips in the study area (775,000 daily person trips in 2010 to 935,000 daily person trips in 2035). Approximately 17% of the total daily person trips occurring in Broward County take place within the Oakland Park Boulevard corridor. Figure 2-5 depicts regional travel patterns and magnitude of daily travel demand (person trips).

2 Travel Market Analysis, January 2013

Figure 2-5: Regional Travel Patterns, 2010 & 2035



2.2.2 OAKLAND PARK BOULEVARD STUDY AREA TRAVEL MARKET

Table 2-2 characterizes daily person trips occurring in the study area by direction and growth rate between 2010 and 2035. Approximately 41% of the total study area daily person trips are intra-district trips, where districts are defined as geographic areas comprising traffic analysis zones (see Table 2-2). Of the person trips travelling to and from the study area (i.e., inter-district trips), approximately 37% travel in the east-west direction in comparison to about 23% traveling in the north-south direction. About 46% of work trips occur in the east-west direction.

Table 2-2: Daily Person Trips by Direction within the Study Area

Trip Direction	Daily Person Trips		Absolute Growth (2010-2035)	% Growth (2010-2035 Population)	% of Total Study Area Trips (2035)
	2010	2035			
East-West Trips	286,000	343,000	57,000	20%	37%
North-South Trips	175,000	212,000	37,000	21%	23%
Intra-District Trips	314,000	380,000	66,000	21%	41%
Total Corridor Trips	*775,000*	*935,000*	*159,000*	*20%*	*100%*

Source: Southeast Regional Planning Model (SERPM)

An assessment of the magnitude and spatial distribution of travel demand in 2035 helped identify potential travel markets in the study are. The potential markets were stratified based on geographic distribution of the trips into intra-district trips and inter-district trips. Intra-district trips occurring in the study area vary from 23,000 to 78,000 per day. Figure 2-6 shows the top three (more than 25,000 person trips per day) intra-district trip movements. Inter-district trips traveling to and from the adjacent districts range from 12,000 to 62,000 per day. Figure 2-7 depicts the top seven (more than 25,000 person trips per day) markets for inter-district trips. The top five markets (more than 10,000 person trips per day) where trips pass through at least one adjacent district is shown in Figure 2-8. In 2035, about 73,000 (10%) daily person trips in the study area are anticipated to be destined for downtown Fort Lauderdale, while 21,000 (3%) daily person trips end in the Cypress Creek area. Figure 2-9 shows major trip movements (more than 5,000 person trips per day) to these two employment centers.

Figure 2-6: Intra-district Trips, 2010 & 2035

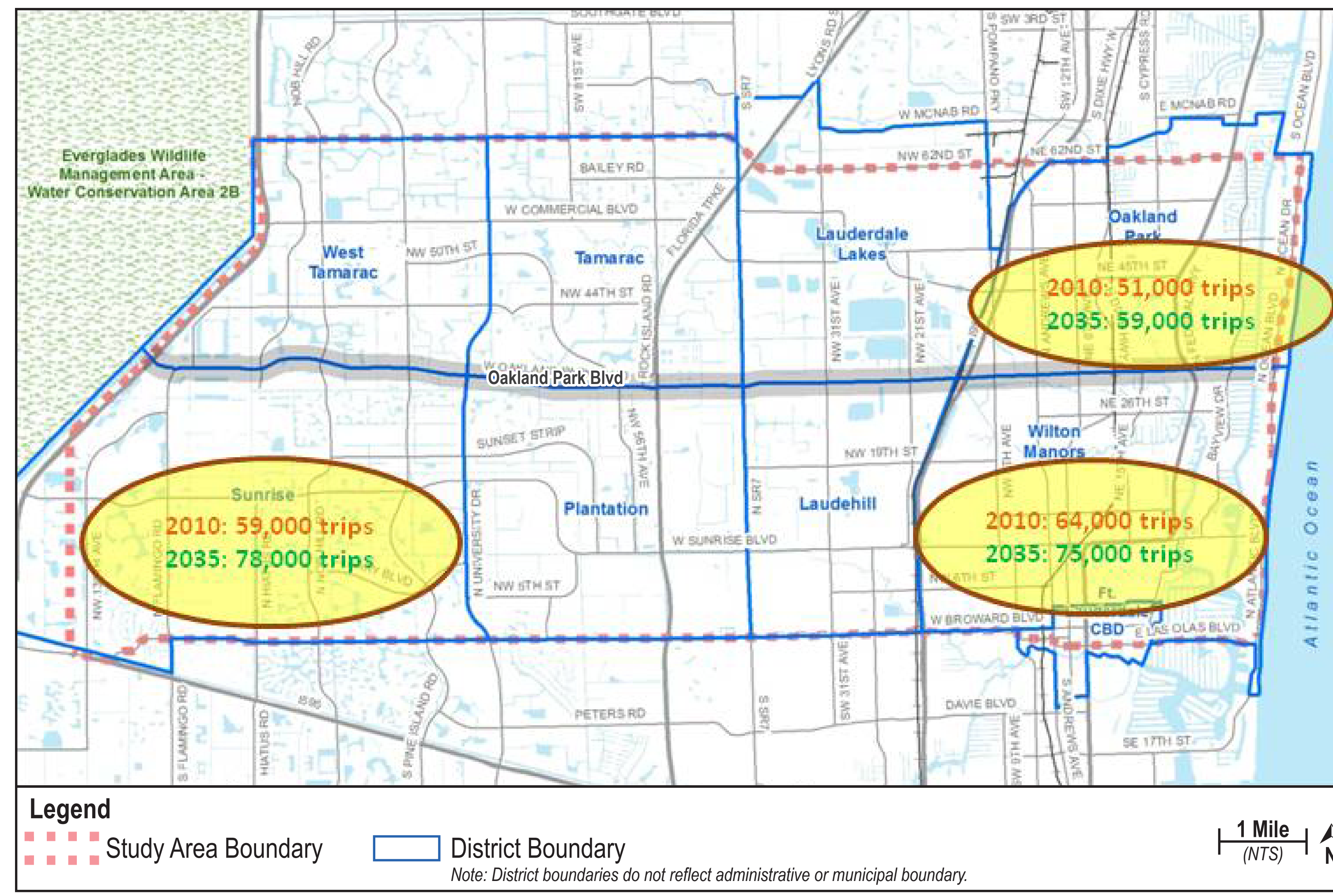


Figure 2-7: Inter-District Trips – Trips to/from Adjacent District, 2010 & 2035

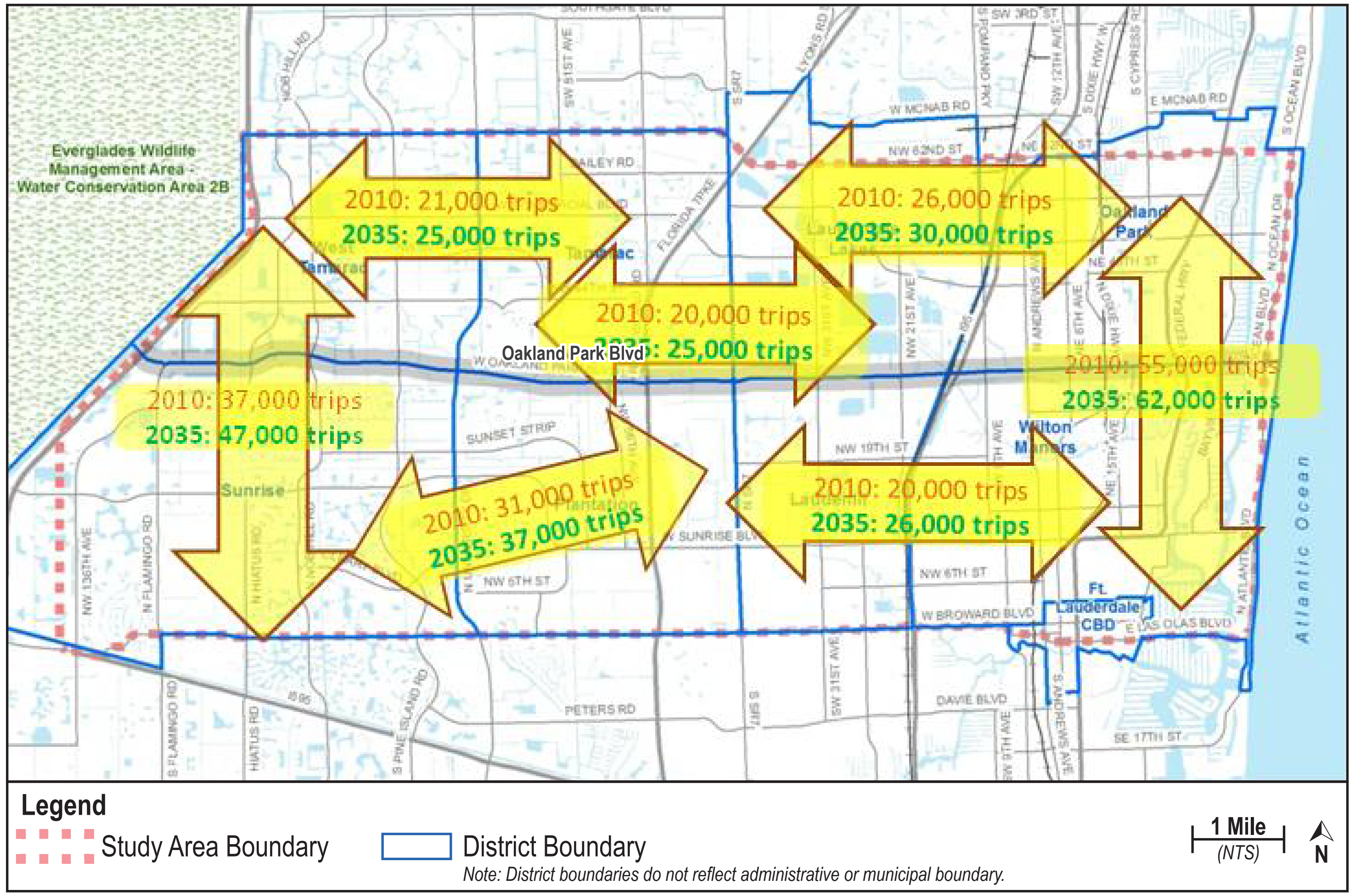
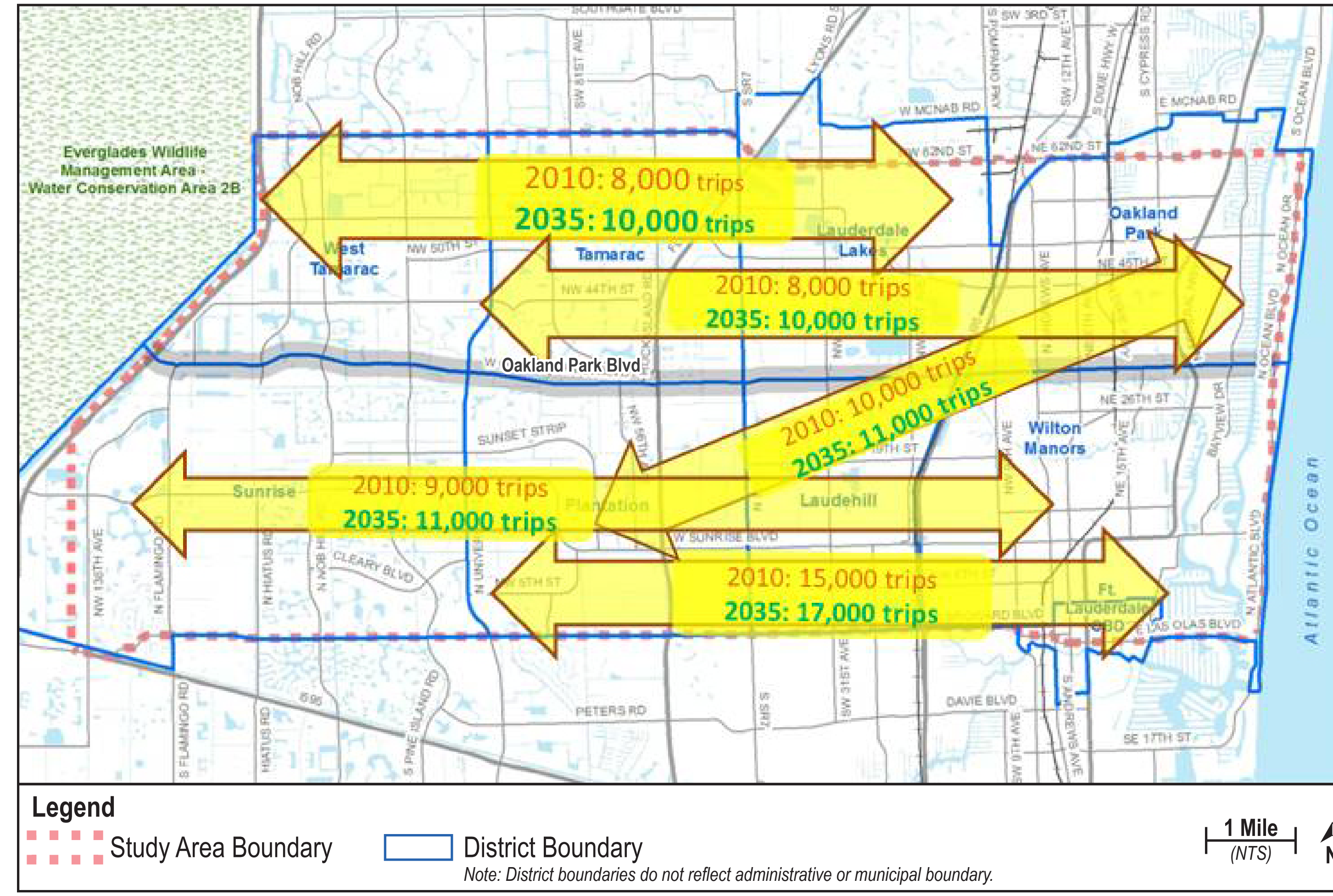


Figure 2-8: Inter-District Trips – Trips Passing through at Least One District, 2010 & 2035



2.2.3 COMMUTER MARKET

In 2010, approximately 25% of all daily person trips in the study area were work-related, 54% were other home-based related (including university and school trips), and 20% were non-home-based trips. In 2010, about one-third of the trips with either an origin or destination end in the study area were work-related trips. Table 2-3 shows the magnitude and growth in home-based work trips in the study area and throughout the County between 2010 and 2035.

Table 2-3: Home-based Work Person Trips, 2010 and 2035

Geography	Home Based Work (HBW) Trips 2010	Home Based Work (HBW) Trips 2035	Absolute Growth (2010-2035)	% Growth (2010-2035)	% Share of Broward County Trips (2035)
Study Area	195,000	233,000	38,000	19%	14%
Broward County	1,364,900	1,654,900	290,000	21%	100%

Source: Southeast Regional Planning Model (SERPM)

Approximately 14% of the total Broward County work trips occur within the study area but almost 46% of all work trips begin or end in the study area. More than 30% (70,000 daily person trips) of the total study area work trips are intra-district. In 2035, approximately 19,000 work trips from the study area will travel to downtown Fort Lauderdale each day, which is almost 39% of all Broward County work trips destined to the downtown.

2.2.4 CAPTIVE TRANSIT RIDER MARKET

Households with zero-auto ownership are considered to be a captive travel market for transit systems. Almost half of the Broward County Transit ridership resides in zero-auto households. About 20% of total Broward County zero-auto household person trips is forecast to occur in the study area. Zero-auto household person trips are anticipated to grow by 22% between 2010 and 2035 in the study area, which is slightly lower than the overall growth trend projected for the county as a whole (see Table 2-4). Almost 28% of the zero-car household person trips are produced from the city of Wilton Manors. The cities of Plantation and Lauderhill districts account for another 23% and 17% zero-car household person trips.

Table 2-4: Person Trips from Zero-auto Households, 2010 and 2035

Geography	Zero-auto Household Trips		Absolute Growth (2010-2035)	% Growth (2010-2035)	% Share of Broward County Trips (2035)
	2010	2035			
Study Area	18,000	22,000	4,000	22%	20%
Broward County	87,800	109,000	22,000	25%	100%

Source: Southeast Regional Planning Model (SERPM)

2.2.5 TRANSIT TRAVEL MARKET

Existing Transit Market

The profile of the existing transit market is based on 2010 BCT on-board survey, ridecheck data, and an interview survey to obtain the origin-boarding-alighting-destination (O-B-A-D) locations of the Route 72 riders and their transfer locations along Oakland Park Boulevard. Ridership is strong throughout the day (9,000 riders/day) with 40% of all boardings occurring during the morning and evening peak periods. Eastbound and westbound ridership is very similar with eastbound trips generating 50.5% (4,500 riders/day) and westbound 49.5% (4,400 riders/day) of total weekday ridership. Ridership boardings are generally concentrated in the center core of the route with 61% of weekday boardings occurring between University Drive and Powerline Road. Table 2-5 identifies Route 72 ridership by route segment and direction based on ridecheck data collected in April 2012.

Table 2-5: Route 72 Weekday Ridership by Route Segment

Route Segment	Eastbound Riders	Westbound Riders	Total Riders	% Daily Riders
Sawgrass Mills Mall to Hiatus Road	679	86	765	8.5%
Hiatus Road to University Drive	434	368	802	9.0%
University Drive to SR 7	1,727	1,256	2,983	33.3%
SR 7 to Powerline Road	1,221	1,261	2,482	27.7%
Powerline Road to US 1	358	1,078	1,436	16.1%
US 1 to SR A1A	105	379	484	5.4%
Full Route	*4,524*	*4,428*	*8,952*	*100.0%*

Source: April 2012 BCT Ridecheck Data

The O-B-A-D survey data reveals that Route 72 passengers typically use the bus route for short-distance trips. In fact, 70% of Route 72 passengers travel on the route for less than 5 miles. Only 3-4% of the riders use the Route 72 for distances of 10 or more miles. On-board survey results from April 2012 indicate that as much as 55% to 60% of Route 72 riders transfer to and from the corridor (see Table 2-6). Almost 25% of the all transfers are to and from the BCT Route 18 bus.

Table 2-6: Route 72 Weekday Ridership by Route Segment

Transfer Route	Transfer Boardings	% Transfer Boardings
#18 - SR 7 Local Bus	1,411	24%
#02 - University Dr Local	775	13%
#31 - NW 31st Ave Local Bus	534	9%
#81 - Lauderhill - BCT	507	9%
#14 - Powerline Road Local Bus	504	9%
#60 - Andrews Ave Local Bus	484	8%
#50 - Dixie Highway Local Bus	314	5%
#10 - US 1 Local Bus	276	5%
#11 - Commercial Boulevard and US 1	261	4%
All Other Routes	846	14%
Total Transfers	*5,912*	*100%*

Source: Origin-Boarding-Alighting-Destination Survey, April 2012

At the study area level, the 2010 BCT on-board survey indicates that almost 25% of all transit trips in Broward County occur in the study area. The top two transit trip movements occur in the Wilton Manors and Plantation areas. The Plantation area is the top generator of transit trips in the study area. In terms of attractions, Wilton Manors attracts almost 23% of all transit trips within the study area.

Future Transit Market

Transit trips are expected to grow by 25% between 2010 and 2035 in the study area. This is comparable to an expected 26% increase at the county-level. Table 2-7 provides the relative increase in daily boardings between 2010 and 2035 estimated by the Southeast Regional Planning Model (SERPM). The boardings to the Route 72 bus on Oakland Park Boulevard and is expected to increase by almost 43% by 2035. Most of the expected increase can be attributed to the increase in the amount of person trips in the corridor. Part of the increase in the boardings is due to the increase in off-peak frequency from 20 minutes in 2010 to 15 minutes in 2035. High transit demand will impact the level and quality of service in future.

Table 2-7: Estimate Increase in Transit Boardings, 2010 - 2035

Route Orientation	BCT Route #	Route Name	% Increase in Transit Boardings 2010-2035
East-West Routes	72	Oakland Park Boulevard	43%
	36	Sunrise Boulevard	13%
	22	Broward Boulevard	65%
	55	Commercial Boulevard	29%
	62	Cypress Creek Rd/W McNab Road	39%
	56	Sunrise to Lauderdale Lakes	-83%
	81	West Tamarac to BCT Terminal	227%
North-South Routes	14	Powerline Road	46%
	60	Andrews Avenue	34%
	50	Dixie Highway	28%
	10	US 1 North	26%
	1	US 1 South	18%
	1 Breeze	US 1 Breeze	-1%
	11	A1A	11%
	31	BCT Terminal to Hillsboro Boulevard	48%
	2	University Boulevard	25%
	2 Breeze	University Boulevard Breeze	46%
	18	US 441/SR 7	46%
	441 Breeze	US 441 Breeze	69%
	88	Pines Island Road	39%
Regional Routes	Tri-Rail	Tri-Rail	58%

Source: Southeast Regional Planning Model (SERPM)

The travel market analysis indicates significant growth within the study area. Travel by all modes will increase by 21%, or from 775,000 trips per day in 2010 to 935,000 trips per day in 2035, which is consistent with the population and employment growth (24% and 30% respectively) in the region. The increased travel in the study area is forecast to be spread uniformly throughout the study area with no dominant destination. Transit dependent riders will continue to represent a significant portion of the transit market.

2.3 Transportation System Performance

2.3.1 HIGHWAY/ROADWAY CONGESTION[3]

East-west travel in Broward County is heavily reliant on its east and west arterials, including Oakland Park Boulevard, which carries a daily traffic volume between 35,000 and 62,000 vehicles. While Oakland Park Boulevard's posted speed limits are 30 to 35 mph (east of NW 21st Avenue) and 45 mph west of NW 21st Avenue, the high traffic volume and closely spaced traffic signals result in slower average peak hour speeds of 19 to 26 miles per hour depending on the direction and time of the day; resulting in a corresponding delay between 12 and 24 minutes per trip. Significant delay occurs at signalized intersections even during off-peak hours. The intersections at SR 7 and University Drive are the two busiest intersections in Broward County in terms of traffic volumes.

As shown in Table 2-8, traffic volume on Oakland Park Boulevard is expected to grow by as much as 18% by the year 2035, with adjacent east-west arterials growing between 12% and 22%, and north-south arterials and freeways growing by as much as 53% (i.e., on Florida's Turnpike).

Table 2-8: Estimated Percent Increase in Traffic Volume on Major Roadways - Study Area

Direction	Roadway	Location	Increase in Traffic Volume
East-West	Cypress Creek Road/W McNab Road	Just east of SR 7	12%
	Commercial Boulevard	Just east of SR 7	14%
	Oakland Park Boulevard	Just east of SR 7	18%
	Sunrise Boulevard	Just east of SR 7	17%
	Broward Boulevard	Just east of SR 7	22%
	Sawgrass Expressway	Just north of Oakland Park Blvd interchange	36%
	Nob Hill Road	Just north of Oakland Park Blvd	20%
North-South	Pines Island Road	Just north of Oakland Park Blvd	47%
	University Boulevard	Just north of Oakland Park Blvd	11%
	Florida's Turnpike	Between Sunrise Blvd and Commercial Blvd	53%
	US 441/SR 7	Just south of Oakland Park Blvd	17%
	NW 31st Avenue	Just south of Oakland Park Blvd	31%
	I-95	Just north of Oakland Park Blvd interchange	5%
	Powerline Road	Just north of Oakland Park Blvd	8%
	Andrews Avenue	Just south of Oakland Park Blvd	39%
	Dixie Highway	Just south of Oakland Park Blvd	38%
	US 1	Just south of Oakland Park Blvd	16%
	SR A1A	Just north of Oakland Park Blvd	4%

Source: Southeast Regional Planning Model (SERPM)

3 Traffic Data Collection Report, May 2012 & Travel Market Analysis, January 2013

The 2035 travel demand will result in a 20% increase in vehicle miles travelled (VMT) and a 31% increase in vehicle hours travelled (VHT) over the next 25 years) in the study area. With no major roadway capacity expansion programmed for the study area, vehicle speeds are expected to decline between 7% to 8% (from 26 mph to 24 mph), and vehicle hours of delay are expected to nearly double (81%, from 1,050 to 1,910 vehicle hours of delay) (see Table 2-9). Consequently, roadway level of service will deteriorate throughout the study area performance including along Oakland Park Boulevard (see Figures 2-9 and 2-10).

Table 2-9: Comparison of Travel Conditions in the Study Area

Travel Demand/Supply Characteristics	2010	2035	% Increase or Decrease
Vehicle Miles Traveled (in millions)	10.5 million	12.6 million	+ 20%
Vehicle Hours of Travel (in '000s)	288	377	+ 31%
Roadway Lane Miles	1,170	1,180	+ 1.4%
Peak Hour Speed (mph)	26 mph	24 mph	- 7%
Vehicle Hours of Delay(in '000s)	56	102	+ 81%

Source: Southeast Regional Planning Model (SERPM)

Figure 2-9: Volume to Capacity Ratio, 2010

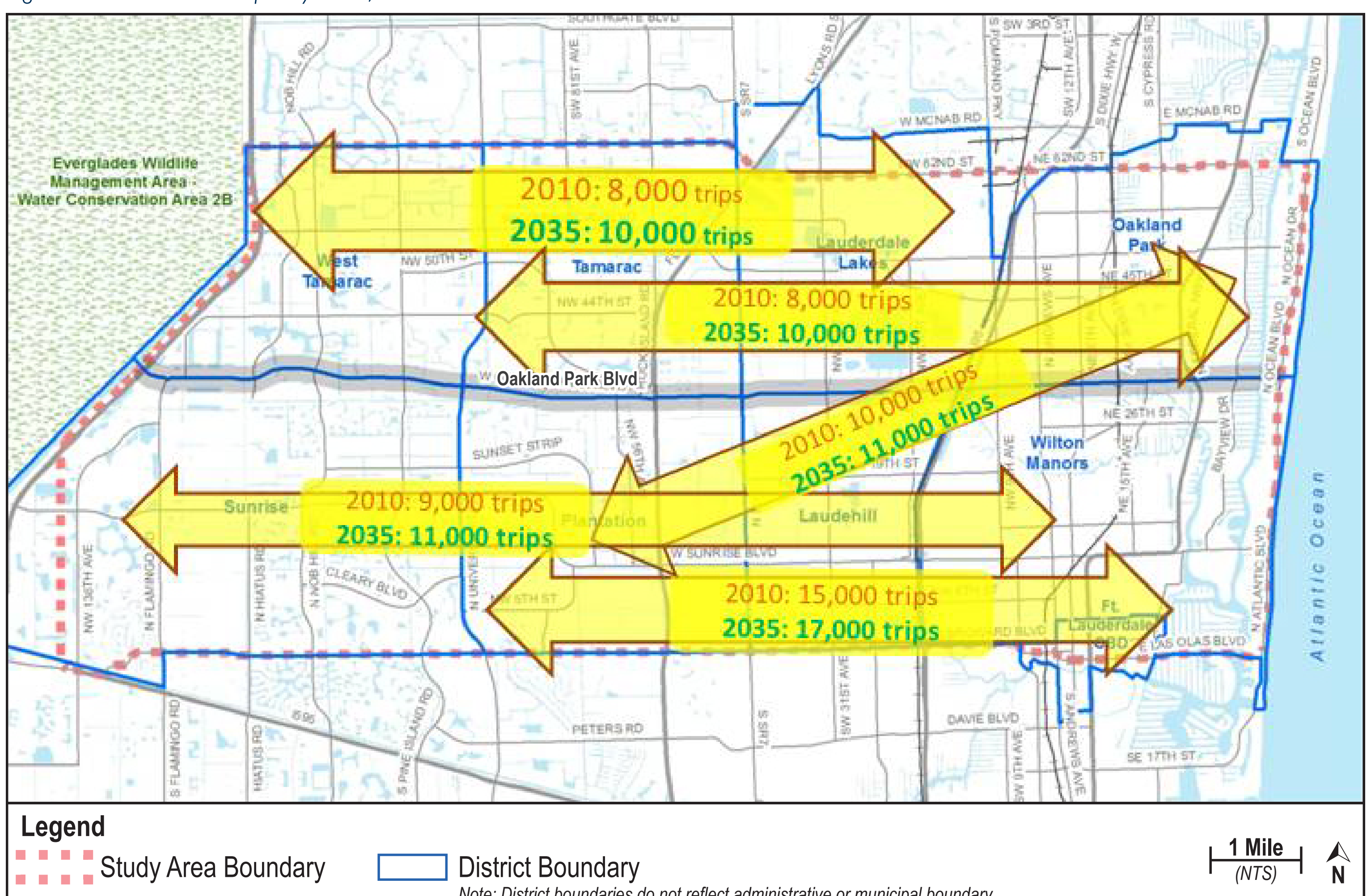
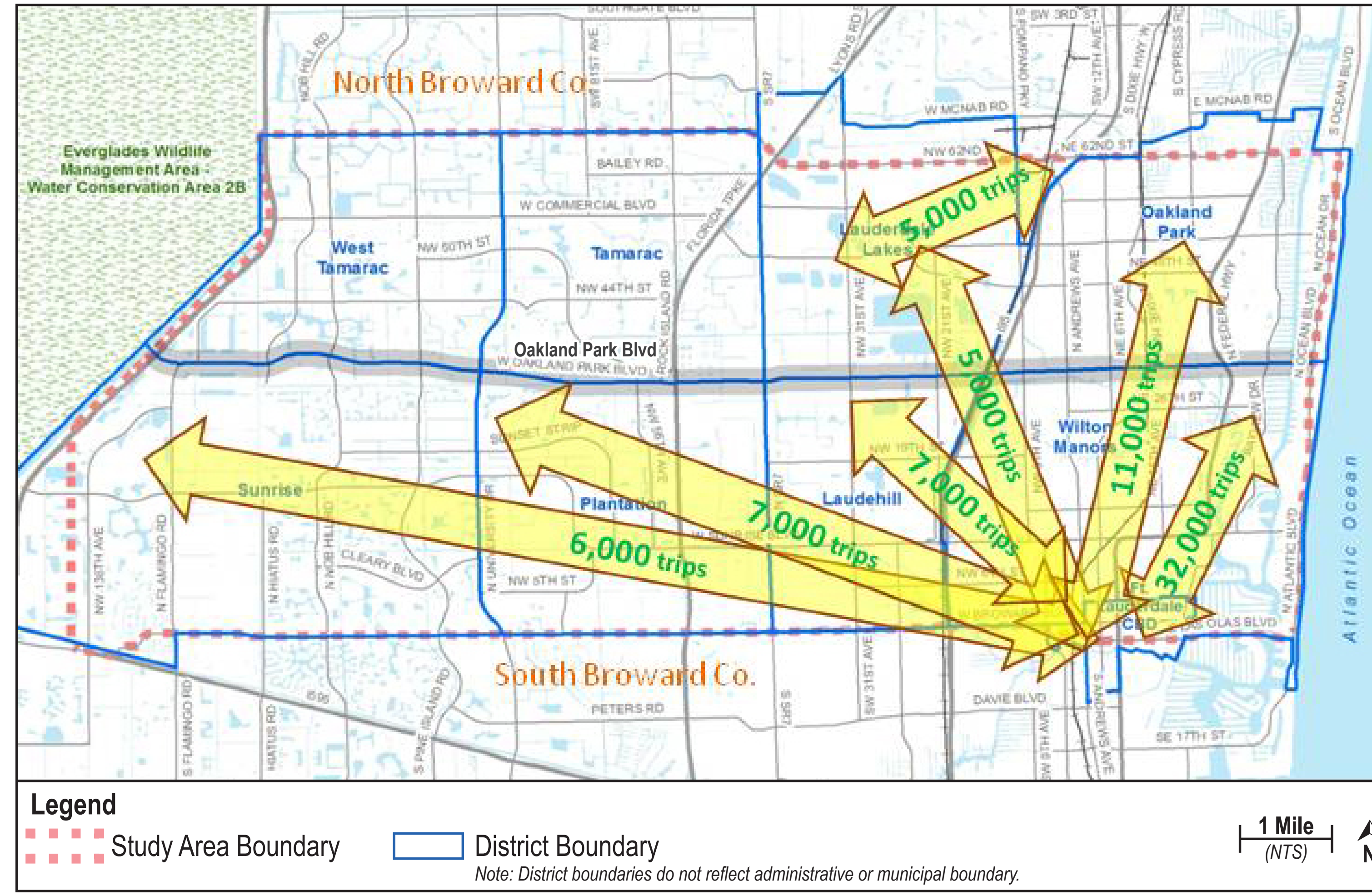


Figure 2-10: Volume to Capacity Ratio, 2035



2.3.2 TRANSIT OPERATIONS[4]

Below is a discussion of the current and future (year 2035) BCT Route 72 performance as it relates to transit service quality and reliability.

Transit (Bus) Speeds

Due to high levels of traffic congestion on Oakland Park Boulevard, the overall speed and the on-time performance of Route 72 is below average compared with the BCT system as a whole. The average peak period Route 72 bus travel speeds on Oakland Park Boulevard (from end to end) are 13.9 mph eastbound and 13.0 mph westbound; and crawls down to a low of 10.4 mph (westbound between US 1 and SR A1A in the PM peak period). The existing BCT system-wide speed is 15.5 mph during weekdays.

4 Short Term Improvements Technical Memorandum, June 2013

On-time Performance

Overall, 51% of all Route 72 buses are on schedule, which is defined as between zero (0) and one (1) minute early and less than five (5) minutes late from their scheduled bus stops. As shown in Table 2-10, in the eastbound direction, 54% of buses are on schedule, with 31% arriving early and 14% arriving late; while 49% of westbound buses are on schedule, but 37% arrive early and 13% are late.

Table 2-10: Sampled On-Time Performance

Direction	Time Points Checked	>1 minute early	6-9 minutes early	2-5 minutes early	On-Time -1 to +5 minutes	6-9 minutes late	10-14 minutes late	>15 minutes late
Eastbound	308	2	23	71	165	22	14	11
		1%	7%	23%	54%	7%	5%	4%
Westbound	367	5	27	108	180	23	11	13
		1%	7%	27%	49%	6%	3%	4%
Total Route	*675*	*7*	*50*	*179*	*345*	*45*	*25*	*24*
		1%	*7%*	*27%*	*51%*	*7%*	*4%*	*4%*

Source: April 2012 BCT Ridecheck Data

Potential for Passenger Overcrowding

BCT measures passenger loads based on seating capacity plus the number of standees to evaluate service utilization. Total capacity is measured as 150 percent of the available seats in the vehicle or a 1.5 load factor. Route 72 generally operates with articulated 60-foot buses, however, sometimes standard 40-foot buses are mixed into the daily operations during non-peak periods. The April 2012 ridecheck identified only one trip exceeding total capacity of 90 riders on-board. Overall load volume statistics indicated that 4% bus trips (5 out of 127 trips) experience maximum loads greater than articulated bus seated load. Passenger loadings on the Route 72 is very high with 24% bus trips (30 of 127 trips) having more than 90 passenger boardings. With transit ridership forecast to grow over the next 25 years, transit capacity and passenger overcrowding issues will likely garner more attention.

Transit Passenger Experience

The 2010 BCT on-board survey indicated that walk-access is the predominant mode for accessing the Route 72 bus service. Walking and bicycling are invariably the modes that transit riders use to get from their origin to their final destination. Oakland Park Boulevard has sidewalks and bicycle lanes along most of its length in both the eastbound and westbound directions; however, sidewalk and bicycle lane connections into businesses and residential neighborhoods to access bus stops are incomplete and need significant improvements.

The Route 72 has 151 stops along Oakland Park Boulevard. Only 36 stops (24%) have transit shelters, 53 stops (35%) do not have a bench, 54 stops (35%) lack ADA signage, and about half (78 stops) of the stops have poor signage. Approximately 52 stops (34%) do not have a shelter and a bench. The lack of bus stop amenities adversely impacts passenger experience.

The provision of safe transit service boarding and alighting locations is critical to the success of any transit service. Many transfer locations along the corridor experience high transfer ridership volumes emphasizing the need for safe pedestrian environments. Although the recent improvements in accessibility to bus stops and the passenger amenities installed at bus stops has improved the overall safety in the corridor, continued improvements are needed.

2.3.3 BICYCLE/PEDESTRIAN CONNECTIVITY

It is essential for successful transit service quality to have a dense and connected network of sidewalks and bike lanes in the corridor since walking and bicycling are the predominant travel modes used by transit riders to reach their final destination. Several gaps exist in the sidewalk and bicycle network in the Oakland Park Boulevard corridor; while existing sidewalk coverage is extensive on Oakland Park Boulevard, there is a lack of connectivity to businesses and neighborhood and cross streets along the Oakland Park Boulevard. Undesignated bicycle and non-contiguous bicycle lanes exist on Oakland Park Boulevard west of Interstate 95 while there are no bicycle lanes east of Interstate 95. Except major arterials crossing Oakland Park Boulevard, very few cross streets have bicycle lanes. Overall, there is a significant need to build the missing sidewalk and bicycle lanes to complete the bicycle/sidewalk network in the corridor to enhance multimodal connectivity and increase accessibility to bus stops.

2.4 Land Use and Redevelopment Opportunities[5]

According to future land use designations, mixed use and transit-oriented development is expected to increase in the study area, and there is a medium to high potential for development and redevelopment to occur along Oakland Park Boulevard. Investment in premium transit service could provide impetus for such redevelopment projects along the corridor. Private sector investment is likely to be drawn toward mobility hubs along the corridor's eastern portion. Implementing the right mix of policy initiatives and site development incentives coupled with investment in premium transit service may transform mobility hubs in the western part of the corridor into more attractive opportunities to private developers.

5 Socioeconomic, Land Use and Redevelopment Analysis, January 2013 & Purpose and Need Statement, January 2013

3. Purpose and Need for the Project

3.1 Need for the Project

Transit system/service improvements identified in the Oakland Park Boulevard corridor must supplement highway capacity, improve east/west connectivity, and improve the quality of transit service especially for those who are dependent on transit. This project must also accommodate the anticipated robust future growth in population and employment consistent with regional land use objectives, improve mobility for shorter trips, and provide direct access to existing and planned development along the entire corridor. Based on the transportation and mobility issues in the study area, a premium transit investment in the corridor must address the following needs:

- Transit Service Quality
- Potential for Passenger Crowding
- Mobility and Accessibility
- Population and Employment Growth
- Traffic Congestion and Auto Orientation
- Increase Economic Development and Land Use

3.2 Purpose of the Project

Any improvements considered for the Oakland Park Corridor must meet the project's *purpose to enhance the quality of transit service in the corridor* in order by:

- *Improving travel reliability, convenience and accessibility*
- *Increasing land use and development opportunities, and*
- *Supporting regional economic activity*

3.3 Goals and Objectives

The purpose of the project is derived from project needs, which in turn are based on existing transportation problems in the study area. The Purpose and Need Statement for the project will be used to develop and define the alternatives that will be considered for evaluation purposes. The goals and objectives for the Oakland Park Boulevard Alternatives Analysis Study are based on the project's Purpose and Need Statement, the Broward Metropolitan Planning Organization's (BMPO) 2035 Long Range Transportation Plan (LRTP), and the Sustainable Communities Initiative's Livability Principles. Further, they are also consistent with the goals and objectives of the 2035 Regional Long Range Transportation Plan (RLRTP) and the Regional Vision and Blueprint effort spearheaded by Southeast Florida Regional Partnership (SFRP). The goals and objectives will guide the development of evaluation criteria and performance measures for assessing alternatives. Performance measures selected will include the Federal Transit Administration's (FTA) New Starts and Small Starts evaluation criteria.

Local and Regional Accessibility and Mobility Goal

A primary goal of this project is to enhance the mobility and accessibility of public transportation service in the Oakland Park Blvd corridor.

Objective 1: To increase transit ridership in the corridor.

Objective 2: To improve schedule reliability.

Objective 3: To improve transit speeds and decrease corridor travel time.

Objective 4: To enhance access to current and projected employment centers and residential neighborhoods.

Objective 5: To increase mobility for transportation disadvantaged populations.

Objective 6: To better integrate transit service in the corridor with the regional system and improve connectivity with routes which intersect with the corridor's transit service.

Objective 7: To provide more opportunities for seamlessly interfacing with non-motorized forms of transportation.

Land Use and Economic Development Goal

The public transportation service in the corridor must serve and complement existing and planned land uses, and help the corridor communities achieve the high quality of life they are seeking to achieve.

Objective 1: To be compatible with land use policies and plans along the corridor.

Objective 2: To promote equitable, affordable housing and energy efficient housing choices.

Objective 3: To further the goals of transit-oriented developments in the corridor and for those planned for the corridor.

Objective 4: To increase the number of jobs both within the corridor and throughout the region.

Environmental Goal

A key goal of the project is to provide a positive contribution to the social and environmental quality of the corridor.

Objective 1: To enhance and preserve the social and physical environment, and keep potential impacts to sensitive resources to a minimum.

Objective 2: To reduce the level of greenhouse gases and other motor vehicle-related emissions in the corridor.

Community Values Goal

The operational and physical improvements of this project must be consistent with the needs and desires of the residents and employees of the corridor.

Objective 1: To maximize community acceptance and support for transit improvements in the corridor.

Finance and Economic Competitiveness Goal

The project must be feasible in terms of its capital and operational costs, and must be structured in a manner that results in a competitive FTA grant application.

Objective 1: To efficiently use available financial resources by leveraging funding from different transportation agencies in the region at all levels of government.

Objective 2: To be cost effective in terms of capital cost and operations and maintenance costs.

Objective 3: To reduce annual operating cost per passenger mile.

4. Development of Alternatives

This chapter describes the technical analyses that were conducted of the potential options and improvements that were considered in development of both short term improvements and long term build alternatives for improving mobility and accessibility in the Oakland Park Boulevard corridor. These analyses included ridership and transit travel time benefits, impact of short term transit operational improvements, and incorporation of mobility hubs in the corridor. The analyses were completed in an iterative manner to test for validation, reasonableness and refinement before being developed into build alternatives. A brief discussion of these technical analyses and results follows.

4.1 Mobility Hubs

The Broward MPO 2035 Long Range Transportation Plan (LRTP) calls for "Mobility Hubs" as a means of linking the transportation system with surrounding land uses. Mobility hubs are places where the transportation system can be directly connected with concentrated activity areas (e.g., residences, commercial uses, offices, and entertainment venues) as well as to facilitate access to and between transit lines and other modes of travel.

Three types of mobility hubs are envisioned by the LRTP (see Figure 4-1), and at least two of each type are identified by the LRTP for the Oakland Park Boulevard corridor:

Figure 4-1: Mobility Hub Locations along Oakland Park Boulevard, 2035 LRTP

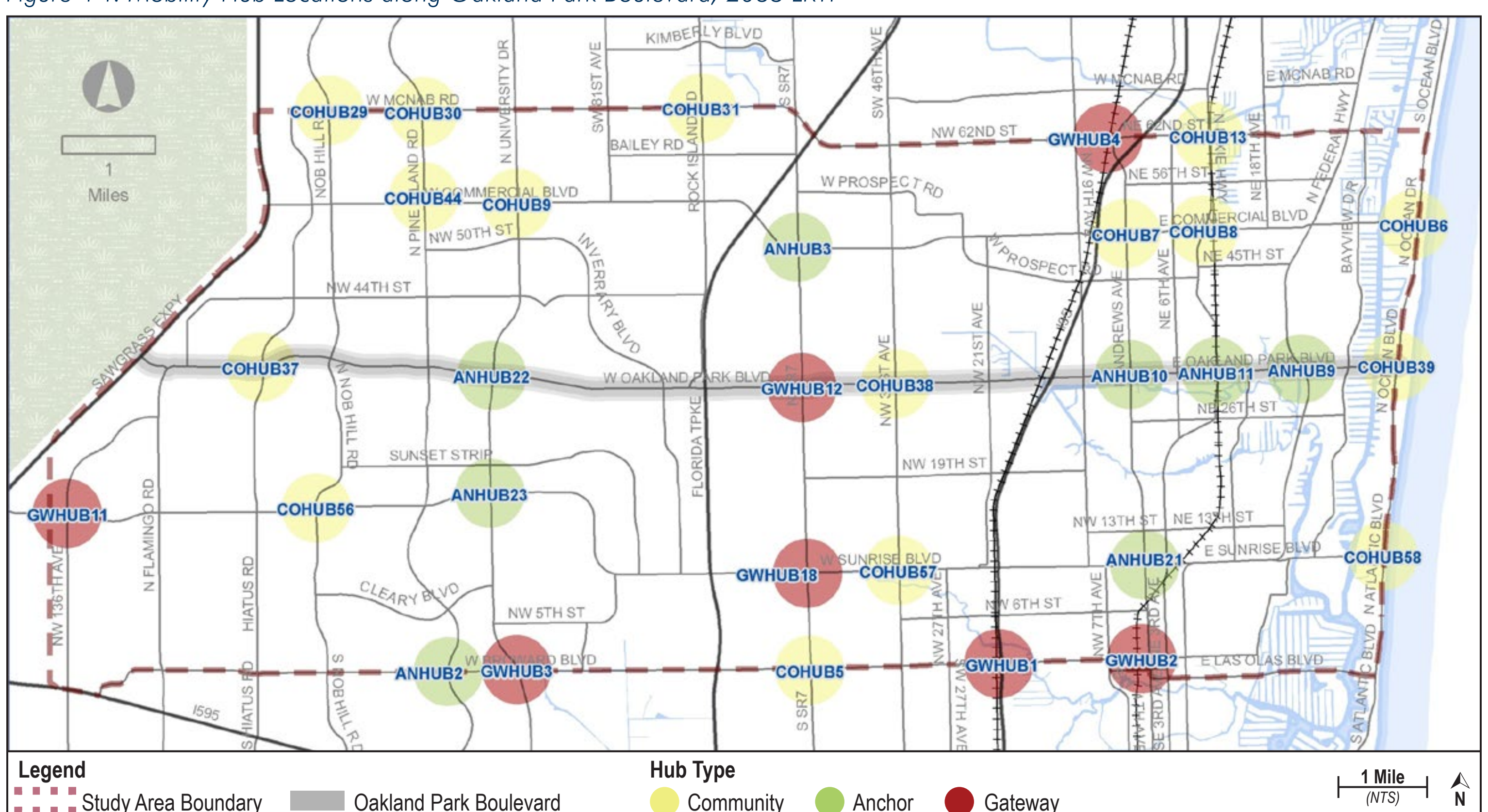


Figure 4-2: Examples of Mobility Hub Concept

Similar Examples to the Mobility Hub concept can be found (clockwise from left): Vancouver, BC – direct premium transit to local bus connections, Kenmore Square, Boston – sheltered bus waiting area integrated with surrounding urban fabric; and Denver, CO – parking, bus, and joint development integrated into hub.

- ***Gateway Hubs*** are identified at locations with high transit boardings/alightings in an area surrounded by higher density mixed or multi-use environments (e.g., downtowns, Transit-oriented Corridors, Transit-oriented Developments), and provide connections to two or more high capacity transit lines. The LRTP proposed Gateway Hubs on Oakland Park Boulevard at Sawgrass Mill Mall and SR 7.
- ***Anchor Hubs*** are identified at locations with moderate to high transit boardings/alightings, located near local and/or regional activity centers with the potential to accommodate new transit and pedestrian-oriented development, and provide connections to at least one high capacity transit line. Along the Oakland Park Boulevard corridor, the LRTP proposed Anchor Hubs at University Drive, Andrews Avenue, US 1, and Dixie Highway.
- ***Community Hubs*** are identified at areas that are served by rapid bus services and attract more local trips than regional trips. Along the Oakland Park Boulevard corridor, Community Hubs were identified in the LRTP at Hiatus Road, NW 31st Avenue and SR A1A.

In consideration of mobility hubs, the project team conducted land use/redevelopment and transit operational analyses with the intent of providing a proof of concept for mobility hubs in the corridor and to derive principles and guidelines that could be expanded upon as system design and urban planning advance. Within the corridor, mobility hub locations would coincide with proposed stations identified in the build alternatives.

Further, these mobility hubs would be incorporated into the design of the corridor as places where people interact with the transportation system, with a better way of linking the transportation system to the surrounding land uses through direct connections to more significant concentrations of activities and facilitated access to and between transit lines and other travel modes (see Figure 4-2).

Below is a summary of the technical analyses and resulting findings and planning principles for mobility hubs in the Oakland Park Boulevard corridor. The *Mobility Hubs Analysis Technical Memorandum, September 2013* provides a detailed discussion of these analyses and includes documentation of the design principles and guidelines as well as concept design for both a Gateway Hub and an Anchor Hub within the corridor.

4.1.1 LAND USE AND REDEVELOPMENT ANALYSIS

The potential for incremental change in land use and building patterns in the corridor is influenced by four elements: investment potential driven by economics and demographics, the inventory of vacant or redevelopeable land, the future land use designations of the land, and the parcelization pattern. An extensive development potential analysis was performed for each of these nine Mobility Hubs as well as for other identified mobility hub locations in central portions of Broward County. The methodology used in conducting the land use and redevelopment analysis is documented in the *Mobility Hubs Analysis Technical Memorandum, September 2013*.

Table 4-1 summarizes the composite results of four critical analysis components together: private sector development potential, vacant/redevelopment analysis, future land use, and parcel size assessments. Mobility hub study areas that received a check (○) in Table 4-1 are noted as having a moderate or strong performance in that category. Mobility hub study areas standing out in two or more categories are:

- Oakland Park Boulevard and Andrews Avenue
- Oakland Park Boulevard and NW 31st Avenue
- Oakland Park Boulevard and SR 7
- Oakland Park Boulevard and University Drive

Table 4-1: Land Use Assessment Overview

Mobility Hub Study Area	Development Potential	Vacant/Redevelopable	Future Land Use	Parcel Size
Oakland Park Blvd/SR A1A			○	
Oakland Park Blvd/Federal Highway	○			
Oakland Park Blvd/Dixie Highway	○			
Oakland Park Blvd/Andrews Avenue	○	○		
Oakland Park Blvd/NW 31st Avenue		○		○
Oakland Park Blvd/SR 7		○	○	○
Oakland Park Blvd/University Drive		○	○	○
Oakland Park Blvd/Hiatus Roaq				○
Sunrise Blvd/NW 136th Avenue			○	

4.1.2 TRANSIT OPERATIONS ANALYSIS

The most critical challenges in transit operations is striking the balance between unlimited access, cost effectiveness and the provision of attractive and competitive transit travel times. For example, if not carefully evaluated, a mobility hub might improve access to transit at the expense of transit travel time. A number of transit operational challenges, such as, decreasing transit travel speeds, significant transfer activity, bus transfer stop locations, transit rider safety, limited passenger amenities, lack of integration/ connectivity of transit amenities and services including community buses, were encountered along Oakland Park Boulevard. Many of these challenges helped refine the location and design of mobility hubs along the corridor.

Based on the land use and redevelopment analysis, more precise locations were identified to conceptualize mobility hub configurations and analyze physical and operational impacts. These locations presented the possibility of locating the mobility hub either away from the intersection (e.g., Anchor Hubs at University Drive and US 1 locations), or at the intersection (e.g., Gateway Hub at SR 7) with mainline transit service deviating off the main route alignment to serve an off-line transit facility. Mobility hubs were also considered at available parcels off of Oakland Park Boulevard.

Operational analysis was performed for the University Drive, SR 7, and US 1 mobility hub locations because of their high ridership and transfer activity. A detailed discussion of the site specific operational analyses, see the *Mobility Hubs Analysis Technical Memorandum, September 2013).* Mobility Hubs located at University Drive and US 1 (both Anchor Hubs) also include the potential for ending or turning buses around, which would result in higher service frequencies between these two locations, which corresponds with the highest ridership segment of the corridor Each of these mobility hub locations were chosen for the operational analysis based on the high ridership and transfer activity. Following are the conclusions from the operational analysis.

- Locate the transit stops within mobility hubs as close as possible to the intersection (through queue jumps or bus islands) in order to:
  - Reduce mid-block pedestrian crossings
  - Reduce walk distance required to make transfer to crossing route
  - Ensure timed transfer connections between transit routes
  - Improve pedestrian crossing safety using pedestrian signalization and cross walks
- Keep mainline transit routes in the roadway to maintain faster travel times and service quality while maintaining cost effectiveness
- Place the transit stops within the mobility hubs at the near or far side of intersections to reduce the number of street crossings required for transit transfers (i.e., majority should not have to cross the street)
- Deviate Community Circulator bus routes into the transit facility within the mobility hub
- Place mobility hub transit facilities in close proximity to the intersection and mainline bus stops to minimize walking distances between local bus and community circulator bus routes

4.1.3 MOBILITY HUB PLANNING PRINCIPLES

The observations from the 2035 LRTP guidance, the land use and redevelopment analysis, and the transit operations analysis, form the basis of the planning principles outlined below.

Mobility Hubs Must Improve Pedestrian Safety

Transit passengers making transfers between routes and accessing surrounding destinations are a primary source of pedestrian activity along Oakland Park Boulevard. As with many urban and suburban corridors, transit stops are frequently placed at mid-block locations in order to keep them out of right-turning lanes and/or driveways to land uses at intersections. Pedestrians prefer line of site access, even when this means making dangerous and illegal crossings between intersections. At mobility hubs, where large numbers of pedestrians are expected, bus stop locations should be moved as close as is feasibly possible to intersection locations to take advantage of safe and controlled crossing locations.

Mobility Hubs Should Keep Premium Transit Premium

Having mainline service leave the roadway to access mobility hubs removes the speed and efficiency gains made elsewhere in the corridor and should be avoided.

Differentiation within the Environment is Needed and Important

In order to create improvement in both land use and transportation as envisioned by the LRTP, the design of the mobility hubs should provide an identity within the surrounding area through architecture and infrastructure improvements such as streetscape improvements.

Design of Mobility Hubs Must be Mindful of Right-of-Way Impacts

The footprint of the mobility hub elements that cannot be accommodated within the existing road right-of-way should be minimized in order to keep costs down as well as to keep land available for development proximate to the hub.

Planning Approach Should be Scalable Based on Surrounding Development Conditions

As shown in the land use and redevelopment analysis, certain locations are more advantageous for redevelopment, and the design and delivery of the mobility hub should be able to fit within community redevelopment plans.

Design of Mobility Hubs Should Drive Positive Development Impacts

Instead of being perceived as a liability, mobility hubs should be viewed by surrounding property owners as assets that reflect the community's investment in infrastructure. This idea should be reinforced through design, materials, and finishes utilized at the mobility hub.

4.2 Transit Operations

It became evident during the development of the build alternatives that there are several smaller improvements which could address existing accessibility, mobility and travel time challenges within the corridor. These improvements could be advanced on a separate path pursuing short-term funding opportunities through the FDOT work program. These improvements would require minimal or no right-of-way, minimal operating resources, and capital investment requirements that could be funded within projected or reasonably obtainable short-term financial resources.

Given these assumptions, several physical and operational improvements have been identified that can be implemented in a shorter time (i.e., next two to five years) to address some of the transportation and transit mobility and accessibility issues included in all of the build alternatives. These improvements include:

1. Revised schedule to improve the Route 72 on-time performance;
2. Bus stop consolidation;
3. Transit signal priority;
4. Queue jump lanes;
5. Bus islands;
6. Traffic signal progression;
7. Enhancing existing bus stops (i.e. shelters, benches); and
8. Bicycle/pedestrian improvements to provide better accessibility to stops.

The *Short Term Improvements Technical Memorandum, June 2013* describes the assumptions and methodology used for identifying these short term improvements, initial results, and the next steps for determining the most effective short term transit solutions in the corridor.

4.2.1 REVISED ROUTE 72 BUS SCHEDULE

Utilizing the data collected from the ride check survey, discussions with BCT bus operators, and professional judgment, a new Route 72 bus schedule was developed. The revised schedule is designed to reduce the occurrence of buses operating ahead of schedule as well as minimizing late arriving buses; however, it will not fully correct existing on-time performance issues because:

- BCT Bus operators (each having some level of variance in driving styles and skills) are each trying to make adjustments in an attempt to operate the service on time. Some may be slowing down to make sure they do not run ahead of schedule while others may be speeding up to make schedule times at time points. This may be different by driver, time of day, and traffic conditions. Nonetheless, adjustments are being made on the existing schedule and will likely occur again with an initial revised schedule.
- BCT conducts a bus operator bid or shift selection process on a routine basis (every three to four months). This activity results in bus operators potentially selecting different work shifts (and routes) to operate the bus; thus, a rotation of bus operators between bus routes. The net impact is that different bus operators, again with some variance in driving styles and skills make adjustments which may lead to some degree of difference in schedule adherence.

- Lastly, passenger volumes may shift from one trip to another with a revised schedule based on arrival times at points along the corridor influencing transfer connections times with crossing routes and passenger trip selection.

Because adjustments are occurring both by bus operators and the riding passengers, the initial schedule rewrite may correct a significant portion of the on-time performance, however, additional adjustments to refine the schedule even further to achieve desirable on-time performance results may be required in the future. Making extreme travel time adjustments to a schedule may result in continued on-time performance issues as buses may shift from operating ahead of schedule to operating behind schedule (i.e., the pendulum effect). Therefore, the project team envisions the following three phases of rewrites of the Route 72 schedule to fully implement schedule adherence improvements and short-term corridor improvements.

- *Phase 1* – Eliminate early departures by removing time where it is currently occurring, monitoring, and supervision.
- *Phase 2* – Minor adjustments to continue to improve on-time performance (further BCT monitoring and schedule adjustments).
- *Phase 3* – Implement the short-term improvements (TSP, queue jump lane, bus island, traffic signal progression, bus stop upgrades) to reduce overall passenger travel times.

4.2.2 BUS STOP CONSOLIDATION

Eliminating a bus stop is a challenging task for a bus operator trying to best serve their customers, and for customers who may have to walk further when their stop is eliminated.

The Project Team considered whether eliminating and/or consolidating Route 72 bus stops along Oakland Park Boulevard in order to improve bus travel time would have merit. Eliminating bus stops could increase bus travel speeds in two ways; 1) eliminate the time associated with the bus decelerating to the stop location and acceleration from the stop location versus normal speeds along the same roadway segment; and 2) reducing dwell time at the stop associated with passenger boardings and alightings. Dwell time savings are typically not achieved as bus riders walk to adjacent bus stops which would incur increased dwell time delays at those locations, thus a net zero sum of dwell time delay. Therefore, travel time savings would only be achieved by eliminating the additional time associated with bus deceleration and acceleration at a bus stop.

The Project Team determined that only one stop - located at the Sports Park in Lauderhill (stop ID #2076) - should be eliminated. There are currently four stops serving the Sports Park within close proximity to each other. Three of these stops have existing capital improvements, while the fourth stop does not. Elimination of the fourth stop would not impact access to the Sports Park nor would it impact opposing street side stops. Given the high ridership activity along the corridor, high route performance, short trip distances exhibited by the transit users along the corridor (i.e., based on on-board survey results), and the minimal benefits achieved through stop consolidation along this corridor, no additional stops are recommended for removal/consolidation.

4.2.3 TRANSIT SIGNAL PRIORITY (TSP)

Transit Signal Priority (TSP) can be defined as signal prioritization provided to a transit vehicle at a given intersection through which additional, expedited or extended green time is provided to allow the transit vehicle to travel through the intersection within a short amount of time. There are two types of TSP systems: unconditional and conditional. Unconditional TSP provides the bus with priority every time the bus approaches the intersection. In contrast, with Conditional TSP priority is only provided to the bus if it is behind schedule by some predetermined amount of time or if the headway between buses is longer than desired.

All of the signalized intersections along Oakland Park Boulevard were identified and analyzed for potential application of unconditional TSP. An initial qualitative assessment was performed to identify those intersections with: 1) the probability of TSP application – given existing intersection LOS and green time as percent of cycle time, and 2) the value or benefit of applying TSP at the intersection – e.g., would the TSP reduce intersection delay.

The *Short Term Improvements Technical Memorandum, June 2013* contains the results of the qualitative assessment illustrating the probability of TSP application and value/benefit of applying TSP at a given intersection. Based on the traffic analysis results from VISSIM and SYNCHRO, seventeen intersections (NW 136th Avenue, Flamingo Road, NW 120th Way, NW 115th Terrace, Hiatus Road, Nob Hill Road, Pine Island Road, NW 56th Avenue, Rock Island Road, NW 36th Terrace, NW 31st Avenue, NW 27th Avenue, NW 21st Avenue, Powerline Road /NW 9th Avenue, Andrews Avenue, Dixie Highway, and US 1) were identified and recommended for TSP improvements, and six required intersection modifications to improve traffic flow.

4.2.4 QUEUE JUMPER LANES

Queue jump or bypass lanes are methods by which buses can bypass traffic queues at intersections. The bus would enter a right-turn lane or a separate lane developed for buses only between the through and right-turn lane and then stop on the near-side of the intersection. A separate, short bus signal phase would be provided to allow the bus an early green indication to move into the through lane ahead of traffic (Source: *TCRP Report 118, Bus Rapid Transit Practitioner's Guide, 2007)*. Typically, green time from the parallel general traffic movement is reduced to accommodate the special green phase, which is usually no more than three to four seconds. Generally, bypass lanes do not have a special green phase but utilize the bypass lane to continue through the intersection and enter a far-side bus stop bay.

Analysis of Queue Jumpers along Oakland Park Boulevard

Both directions of the Oakland Park Boulevard corridor were analyzed to determine if application of queue jumper lanes would be beneficial. The criteria used to determine this potential include:

- Intersections with existing right-turn lanes.
- Intersections with sufficient right-of-way to accommodate a right-turn/queue jumper lane.
- Intersections with significant existing and projected queuing traffic at intersections.

- Intersections where near-side bus stops are currently located far from the intersection due to lengthy right-turn lanes and transit riders are crossing mid-block from this stop location creating a pedestrian safety concern.
- Intersections where future mobility hubs may be located on the adjacent intersection quadrant enforcing the need for a near-side bus stop to reduce walk distances to the mobility hub.
- Intersections where high transfer rates exist and where crossing route far-side stop locations are within close proximity of the intersection allowing minimal walk distances between transferring buses.

Utilizing these criteria, eight intersections were identified as locations with the potential to apply queue jumper lanes; however, after completing traffic analyses with queue jumper lanes, only three locations are recommended for their application: Hiatus Road, NW 31st Avenue, and NW 21st Avenue.

4.2.5 BUS ISLANDS

Bus islands or boarding islands are defined transit stops located between travel lanes, generally between a through lane (and in some cases a bicycle lane) and a right-turn lane, and are designed to allow the bus to serve a near-side bus stop and remain in the through traffic lane to cross the intersection. Bus islands are utilized in locations where queue jumpers and TSP are not possible due to restricted green time for the bus route through movement. Bus islands require a larger intersection footprint as existing right-turn lanes are needed to shift outward to accommodate the bus island requiring the use of additional right-of-way. Pedestrian safety issues must be addressed when considering the use of bus islands. Bus islands are currently utilized in Washington D.C. and San Francisco.

Analysis of Bus Islands along Oakland Park Boulevard

The Oakland Park Boulevard corridor was analyzed in the eastbound and westbound directions to determine potential use of the bus island concept using the following criteria:

- Intersections with near-side bus stops.
- Intersections where TSP is unlikely given cross street volumes and existing and future intersection LOS.
- Intersections where queue jumpers within the right turn lane is unlikely given cross street volumes and existing and future intersection LOS.
- Intersections where near-side bus stops are currently located at the far side of an intersection due to lengthy right turn lanes and transit riders are crossing mid-block from this stop location creating a pedestrian safety concern.
- Intersections where future mobility hubs may be located on the adjacent intersection quadrant enforcing the need for a near-side bus stop to reduce walk distances to the mobility hub.
- Intersections where high transfer rates exist and where crossing routes use far-side stop locations that are within close proximity of the intersection allowing minimal walk distances between transferring buses.

Figure 4-3 illustrates the bus island concept.

Figure 4-3: Bus Island Illustration, Isometric View

Utilizing these criteria the following five intersections were identified as locations with the potential for using the bus island design.

- *Nob Hill Road* – Westbound, northeast intersection quadrant.
- *Pine Island Boulevard* – Westbound, northeast intersection quadrant.
- *University Drive* – Westbound, northeast intersection quadrant, and eastbound southwest intersection quadrant.
- *Inverrary Boulevard* – Westbound, northeast intersection quadrant, and eastbound southwest intersection quadrant.
- *State Road 7* – Westbound, northeast intersection quadrant, and eastbound southwest intersection quadrant. Note bus island can also be placed along the crossing BCT Route 18 for the southbound service, northwest intersection quadrant and the northbound service at the southeast intersection quadrant.

Conceptual engineering plans for each of these locations on aerial maps and typical sections for bus islands with handrail and barrier wall options are included in the *Short Term Improvements Technical Memorandum, June 2013*.

4.2.6 BUS STOP UPGRADES

Broward County Transit (BCT) uses a threshold of 25 boardings per day for a stop to qualify for a shelter. Currently, BCT uses three different shelter designs on Oakland Park Boulevard: 4’-0” shelter roof (minimum sidewalk dimension: 7’-0”); 5’-0” shelter roof (minimum sidewalk dimension: 8’-0”); and 8’-0” shelter roof (minimum sidewalk dimension: 10’-0”). The shelter designs are generally selected based on the available right of way. Based on the status of BCT’s Shelter Program as of May 2013 as well as their ridership threshold and right of way availability, approximately 25 bus stops locations were identified and recommended for bus stop upgrades. These bus stop locations are shown in the *Short Term Improvements Technical Memorandum, June 2013*. In addition, bus stop locations where right of way is required to build or install bus shelters and such right of way can be potentially obtained through easements or negotiations for joint use with property owners have also been identified and are included in the *Short Term Improvements Technical Memorandum, June 2013*.

4.2.7 BICYCLE AND PEDESTRIAN IMPROVEMENTS

To enhance the overall mobility and accessibility in the corridor the missing sidewalk links and bicycle lane gaps were identified within one-quarter mile of the Oakland Park Boulevard corridor based on visual analysis using *Desktop Planning* tools such as GIS and Google Earth. The analysis of potential sidewalk and bicycle lane improvement projects was shared with local jurisdictions along the corridor to validate the missing links and refine the project list as well as to reconcile it with the Broward MPO’s 2040 LRTP Needs Assessment projects. Based on the input received from local jurisdictions, the project sidewalk and bicycle lane project list and maps were updated.

The bicycle lane and sidewalk projects have been segregated in three (3) tiers. Tier I includes improvements included in the Broward MPO’s 2040 LRTP Needs Assessment, while Tier II comprises improvements on state/county/city’s facilities, and Tier III incorporates improvements within communities or homeowner’s association. It should be noted that Tier I improvements have corresponding construction costs that were provided by local jurisdictions. The sidewalk and bicycle improvement projects list map is available in the *Short Term Improvements Technical Memorandum, June 2013*.

4.2.8 SIGNAL WARRANTY STUDY

Currently, there are 45 signalized intersections on Oakland Park Boulevard (13.1 miles long), which translates into an average signal density of approximately 1,537 feet/signalized intersection. A preliminary evaluation was conducted to identify possible intersections for signal warrants study with the idea that removing unwarranted signals could possibly improve traffic flow on Oakland Park Boulevard.

A level of service (LOS) analysis was performed along Oakland Park Boulevard from the Sawgrass Expressway to SR A1A using VISSIM. The intersections that were not operating at acceptable LOS (LOS D) along the corridor were identified. For 2018 traffic operations, a preliminary SYNCHRO LOS was performed for these failing intersections to determine whether any improvements could be implemented. Based on review of the right-of-way (ROW) information, 2011 traffic counts, roadway functional classifications, and local knowledge, the following 12 intersections along the study corridor were recommended for further study:

- NW 33rd Street
- NW 84th Avenue
- NW 64th Avenue
- NW 48th Avenue
- NW 47th Terrace
- North of NW 46th Avenue
- NW 46th Avenue
- South of NW 46th Avenue
- NW 43rd Avenue
- NW 33rd Avenue
- NW 18th Avenue
- NE 20th Avenue

Based on the input received from local jurisdictions and the Technical Advisory Committee (TAC), this list of intersections was refined to remove the NW 33rd Street and NW 84th Avenue locations in the City of Sunrise.

4.2.9 TRAFFIC SIGNAL PROGRESSION

Currently, all of the traffic signals on Oakland Park Boulevard from Flamingo Road to SR A1A are coordinated under the County's Green Light Program, with signals east of I-95 using an Advanced Traffic Management System (ATMS), and signals west of I-95 using the Urban Traffic Control System (UTCS) (which operates under on older analog communications protocol). Since the summer of 2012, BCTED has implemented a new signal progression pattern between University Drive and US 1 to improve signal coordination and reduce delay.

For the purposes of providing for transit signal priority (TSP) functionality, the ATMS platform is required.

To further enhance the traffic flow and increase traffic signal efficiency, as well as incorporate TSP capabilities, traffic signal progression was used as a short term strategy. The intent was to optimize traffic signal timing using VISSIM and SYNCHRO to minimize delay and ensure uninterrupted traffic flow to the maximum extent possible. The intersection LOS analysis was performed based on the Broward County traffic signal plans for the existing traffic conditions. For traffic signal progression along the corridor, the offsets for each zone (from one intersection to another) obtained from the BCTED were utilized. The analysis culminated in identifying eight segments along Oakland Park Boulevard for implementing traffic signal progression. These segments are identified in Chapter 7.

4.3 Travel Demand Forecasting

Travel demand forecasts were used to understand transportation problems and travel markets in the corridor. Further, travel demand forecasts helped refine the build alternatives. The Project Team used two travel demand models – the South Florida Simplified Transit Model (SFSTM 1.0) and the Southeast Florida Regional Planning Model (SERPM 6.7 and SERPM 6.7.1) during the alternatives development and evaluation process.

The SFSTM 1.0 model was used for performing sensitivity tests to help refine the alternatives, develop current year ridership forecasts for the corridor alternatives, and serve as a source for independent forecasts in the quality check of the estimates obtained from the regionally calibrated and validated travel demand models. The SERPM 6.7 and SERPM 6.7.1 models were used to analyze travel markets, understand transportation system performance, develop detailed traffic impacts and future year ridership projections. The *Travel Demand Forecasting Methodology Technical Memorandum, October 2013* provides detailed documentation of the data sources and model development process along with the ridership numbers and traffic impact results. A brief discussion of the travel markets analysis and sensitivity tests conducted for refining the build alternatives follows.

Travel Market analysis

As described in Chapter 2, a detailed market analysis was conducted in order to gain insights about existing and future travel patterns and behavior in the study corridor. In addition, mobility and accessibility issues in the corridor were identified through transportation and transit system performance evaluations based on the existing and future travel demand in the corridor. An understanding of the travel markets in conjunction with the transportation problems identified in the corridor helped define the purpose and need for the project, which in turn helped develop conceptual alternatives (i.e., Tier 1 alternatives).

Sensitivity Analysis

The SFSTM 1.0 was utilized for estimating the impacts of operational and facility improvements, such as, reduced headway, transit signal priority, queue jump lanes, transit guideway or bus running way, transit technology and service type, and number of stations along the corridor on ridership in the corridor through sensitivity tests. The *Tier 2 Forecasting Methodology Report, April 2013* documents all of the tests that were performed using SFSTM 1.0, including the results which informed the detailed definition of alternatives (i.e., Tier 2 alternatives). The sensitivity tests helped the Project Team identify the importance of the underlying local bus, the optimum headway on the limited stop transit service, and the locations of limited stop stations. Specifically, the following insights helped develop and refine the build alternatives:

- The underlying local bus service is critical in the corridor and should continue to provide robust service even in the future.
- The corridor travel market and the corridor characteristics suggested that travel time improvements due to transit signal priority and queue jump lanes would result in reduced corridor travel time and improved schedule reliability, but might not generate much new ridership.
- The rapid service is important but should have regular stops at various locations to make it accessible to the most riders.
- A rapid service with 16 stops optimized accessibility while improving the travel time.
- Approximately 60 percent of Route 72 passengers get on and off the bus between University Drive and US 1 while 80 percent of them either get on and/or off in this segment along the corridor.

4.4 Concept Design, Capital Cost and O&M Cost

Preliminary capital costs and O&M costs were estimated for all of the Tier 2 alternatives using the bus and streetcar capital cost and O&M cost models. These models are described in detailed in the *Capital Cost Methodology Technical Memorandum, March 2013* and *Operations &Maintenance Cost Methodology Technical Memorandum, March 2013,* respectively. The initial capital cost assumed that the transit guideway or bus running way in the build alternatives would extend from the Sawgrass Mills Mall to SR A1A. Based on these initial cost estimates, as well as the ridership forecasts, conceptual engineering effort, and operational constraints, the Project Team identified the most optimal transit guideway or bus running way configuration in the Oakland Park Boulevard corridor for different build alternatives.

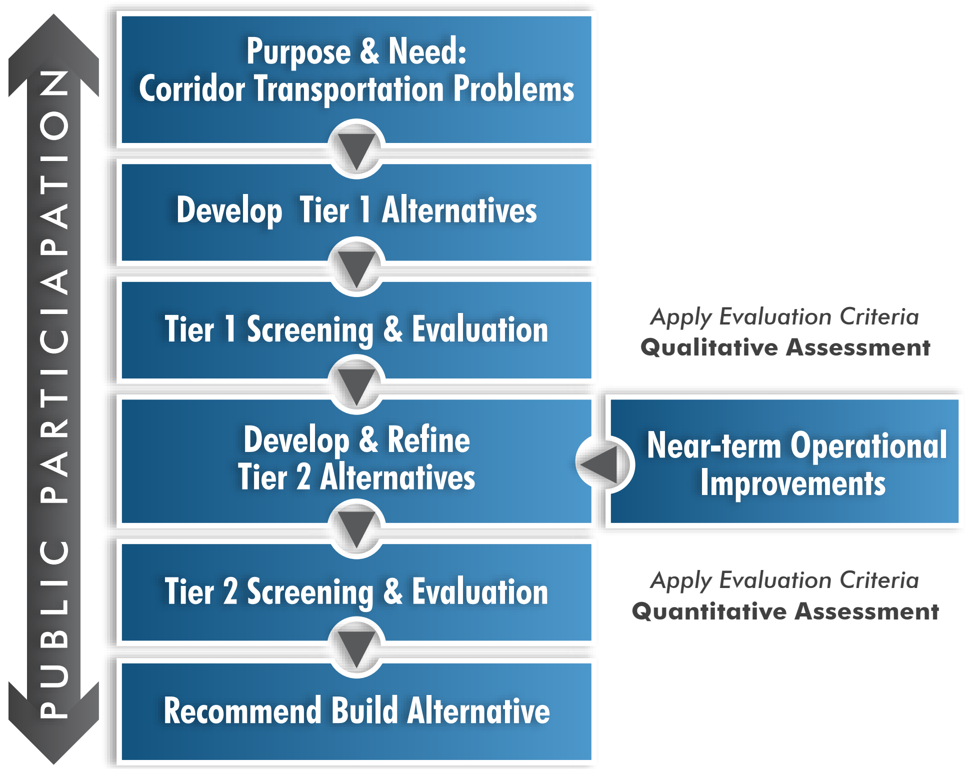
5. Screening of Alternatives

This chapter describes the process that was utilized for refining and evaluating the build alternatives relative to the no build alternative with regard to transportation, socioeconomic, and environmental impacts, as well as for estimating the benefits and costs in order to identify the most promising transit solution (i.e., build alternative) in the Oakland Park Boulevard corridor.

5.1 Evaluation Framework

A two-tiered screening process was used to evaluate alternatives developed for the Oakland Park Boulevard corridor (see Figure 5-1). The intent of using a two-tier screening approach is to systematically eliminate those alternatives that do not meet the stated purpose and need from further consideration (i.e., Tier 1 screening), and to provide detailed analysis of those alternatives that had merit in achieving the project's goals and objectives (i.e., Tier 2 screening).

Figure 5-1: Alternatives Evaluation Framework



The Tier 1 screening made use of a general *qualitative* assessment and a *quantitative* analysis based solely on readily available secondary data. The Tier 2 screening incorporated a more detailed set of quantitative analyses utilizing data sets developed specifically for the alternatives in the Oakland Park Boulevard corridor. The evaluation criteria developed for assessing the performance of the alternatives along the corridor was used during the Tier 1 and Tier 2 screening and evaluation process.

In addition, using the above data and analyses, a series of feasible and productive operational improvements along the corridor (such as, transit signal priority, queue jump lane, bus stop consolidation, and revised bus schedule) that could reasonably be implemented in a shorter time-frame (in the next two (2) to five (5) years) were analyzed in the Tier 2 screening phase.

5.1.1 EVALUATION CRITERIA AND PERFORMANCE MEASURES

The project's goals and objectives identified in the Purpose and Need Statement provided the foundation for developing the evaluation criteria for the two-tier screening process (see Table 5-1). In addition to the evaluation criteria established for this project, Table 5-1 includes both the FTA New Starts and Small Starts criteria (as revised under the new surface transportation legislation, Moving Ahead for Progress in the 21st Century, MAP-21) and National Environmental Policy Act (NEPA) criteria. Given that the specific criteria identified in these evaluation frameworks are in many cases redundant, the evaluation criteria established for this project represents a combination of the criteria that correspond to all three frameworks without being duplicative.

Table 5-1 correlates the goals and objectives associated with the evaluation criteria to corresponding performance measures that were used during the two-tier screening process to analyze and compare each of the alternatives to the project's Purpose and Need and ability to address the corridor's identified transportation problems. Table 5-1 also illustrates which performance measures were applied in evaluating the alternatives during the Tier 1 and Tier 2 screens. The detailed methodology for calculating and generating performance measures is explained in the *Analysis Methodology Report, April 2013*.

Table 5-1: Goals and Objectives vis-à-vis Evaluation Criteria and Performance Measure

Goals	Objectives	Evaluation Criteria	Performance Measures	
			Tier One	Tier Two
Local and Regional Accessibility and Mobility: To enhance the mobility and accessibility of public transportation service in the Oakland Park Boulevard corridor	To increase transit ridership in the corridor.	Number of transit trips	Horizon year total trips per year	Horizon year total trips per year
	To increase mobility for transportation disadvantaged populations.	Number of transit dependent trips	N/A	Trips by zero auto households per year
	To improve schedule reliability.	Inclusion of ITS and bus running way or transit guideway improvements.	Number of intersections with TSP capabilities, queue jump lanes, and type of bus running way or transit guideway with regard to level of exclusivity	Number of intersections with TSP capabilities, queue jumper lanes, and type of bus running way or transit guideway with regard to level of exclusivity
	To improve transit speeds and decrease corridor travel time.	Travel time savings	End-to-end travel time (change between existing and build alternative)	End-to-end travel time (change between existing and build alternative)
	To enhance access to current and projected employment centers, residential neighborhoods.	Workers within one-half mile of potential stations	Year 2010 # of people within one-half mile of potential stations	Year 2010 # of people within one-half mile of potential stations
			Year 2035 # of people within one-half mile of potential stations	Year 2035 # of people within one-half mile of potential stations
		Jobs within one-half mile of potential stations	Year 2010 # of jobs within one-half mile of potential stations	Year 2010 # of jobs within one-half mile of potential stations
			Year 2035 # of jobs within one-half mile of potential stations	Year 2035 # of jobs within one-half mile of potential stations
	To better integrate transit service in the corridor with the regional system and improve connectivity with routes that intersect with the corridor's transit service.	Mode split	Mode Split in the study area (existing v/s build alternative)	Increase in mode split within the study area (existing v/s build alternative)
		Reduction in VMT	N/A	Daily VMT in the study area (existing v/s build alternative)
		Reduction in delay	N/A	Daily Vehicle hours of delay in the study area (existing v/s build alternative)
		Traffic Impacts	N/A	Number of intersections operating below level of service 'D' on Oakland Park Boulevard (Year 2035)
			N/A	Queuing and Delays at major intersections on Oakland Park Boulevard (Year 2035)
			N/A	Auto Travel Time on Oakland Park Boulevard (Year 2035)
			N/A	Severity of traffic impact vis-à-vis bus running way or guideway configuration (Change in volume/capacity ratio on parallel facilities - 2035 no build v/s build alternative)
			Severity of traffic impact vis-à-vis bus running way or guideway configuration	Severity of traffic impact vis-à-vis bus running way or guideway configuration (Change in auto travel time on parallel facilities - 2035 no build v/s build alternative)
	To provide more opportunities for seamlessly and safely interfacing with non-motorized forms of transportation.	Connectivity and safety of non-motorized transportation systems	Pedestrian/bicycle access to businesses and residential neighborhoods in the corridor in a safe manner	Pedestrian/bicycle access to businesses and residential neighborhoods in the corridor in a safe manner

N/A – Not Applicable (or applied)

Table 5-1: Goals and Objectives vis-à-vis Evaluation Criteria and Performance Measure (Continued)

Goals	Objectives	Evaluation Criteria	Performance Measures: Tier One	Performance Measures: Tier Two
Land Use and Economic Development: To serve and complement existing and planned land uses, and help the corridor communities achieve the high quality of life they are seeking to achieve.	To be compatible with land use policies and plans along the corridor.	Future land use plan and policy	Tools to implement land use plan and policies	Tools to implement land use plan and policies
	To promote equitable, affordable housing and energy efficient housing choices.	Publicly supported housing within one-half mile of the project	Number of affordable housing projects within one-half mile of potential stations	Number of affordable housing projects within one-half mile of potential stations
		Minority population within one-half mile of potential stations	Year 2010 # of minority population within one-half mile of potential stations	Year 2010 # of minority population within one-half mile of potential stations
		Transit dependent population within one-half mile of potential stations	Year 2010 # of zero-auto households within one-half mile of potential stations	Year 2010 # of zero-auto households within one-half mile of potential stations
		Low-income population within one-half mile of potential stations	Year 2010 # of low income households within one-half mile of potential stations	Year 2010 # of low income households within one-half mile of potential stations
		School and college/university enrollment within one-half mile of potential stations	Year 2010 and Year 2035 student enrollment within one-half mile of potential stations	Year 2010 and Year 2035 student population within one-half mile of potential stations
	To further the goals of transit-oriented developments in the corridor and for those planned for the corridor.	Transit-supportive corridor policies	Presence of RAC, LAC, TOD or TOC land use, CRA within station areas and station area land use planning initiatives	Presence of RAC, LAC, TOD or TOC land use, CRA within station areas and station area land use planning initiatives
	To increase number of jobs both within the corridor and throughout the region.	Economic development potential	Private sector perception of investing with regard to transit infrastructure (stations and transit guideway)	Performance of land use and community development policies
				Potential impact of transit project on regional land use
				Plans and policies to maintain or increase affordable housing in corridor
				Estimated # of US jobs for design, construction and operation
Environmental: To provide a positive contribution to the social and environmental quality of the corridor.	To enhance and preserve the social and physical environment, and keep potential impacts to sensitive resources to a minimum.	Wetlands within the transit envelope	Wetland areas (in acres) contiguous to the project	Wetland areas contiguous to the project
		Parks within the transit envelope	Number and acreage of parks contiguous to the project	Number and acreage of parks contiguous to the project
		Community facilities within quarter-mile of the project	Number of community facilities within one-quarter-mile of the project	Number of community facilities within one-quarter-mile of the project
		Noise sensitive receptors within 300 feet of the project	Number of parcels within 300 feet of the project	Number of parcels within 300 feet of the project
		Listed contaminated sites within one-quarter mile of the project	Number of FDEP regulated sites within one-quarter-mile of the project	Number of FDEP regulated sites within one-quarter-mile of the project
		Threatened and endangered species within one-quarter mile of the project	Number of wildlife, habitat, environmental consultation areas within one-quarter-mile of the project	Number of sites within one-quarter-mile of the project
		Historical and archeological sites within quarter-mile of the project	Number of potential sites within one-quarter-mile of the project	Number of potential sites within one-quarter-mile of the project
		Change in energy use	N/A	Annual energy consumption (in million Btu)
		Change in safety	N/A	Annual cost of disabling injuries and fatalities
	To reduce the level of greenhouse gases and other motor vehicle-related emissions in the corridor.	Reduction in GHG emissions	N/A	Tons of CO_2e per year (existing vs. build alternative)
		Air Quality - Change in carbon monoxide (CO), Nitrous Oxide (NOx), Particulate Matter (PM2.5), and Volatile Organic Compounds (VOC) levels	N/A	Estimated healthcare cost per year (existing vs. build alternative)

N/A – Not Applicable (or applied)

Table 5-1: Goals and Objectives vis-à-vis Evaluation Criteria and Performance Measure (Continued)

Goals	Objectives	Evaluation Criteria	Performance Measures	
			Tier One	Tier Two
Community Values: To be consistent with the needs and desires of the jurisdictions within and adjacent to the corridor.	To maximize community acceptance and support for transit improvements in the corridor.	Community vision	Level of support	Level of support based on public comment (HOA/ condo meetings, public workshops, website) and Technical Advisory Committee (TAC) input
Finance and Economic Competitiveness: To be feasible in terms of its capital and operational costs, and must be structured in a manner that results in a competitive FTA grant application.	To efficiently use available financial resources by leveraging funding from different transportation agencies in the region at all levels of government.	Short term operational goals and long term vision of transportation agencies	Level of support (improvements included in agencies work program and/or long term plans such as TDP/ LRTP)	Level of support (improvements included in agencies work program and/or long term plans such as TDP/ LRTP)
	To be cost effective in terms of capital cost and operations and maintenance costs.	Capital Cost	Estimated capital cost	Annualized capital cost and O&M cost per trip
			N/A	Estimated annualized capital cost per trip
			N/A	Estimated annualized capital cost per passenger mile
		Annual O&M cost	Estimated annual O&M cost	Estimated annual O&M cost
			N/A	Estimated annual O&M cost per trip
			N/A	Estimated annual O&M cost per passenger mile
	To reduce annual operating cost per passenger mile.	Annual operating cost	N/A	Estimated annual operating cost per passenger mile

N/A – Not Applicable (or applied)

5.2 Tier 1 Alternatives: Conceptual Definition of Alternatives

The project team along with individuals from the partner agencies, the project's Technical Advisory Committee, MPO Advisory Committees, and the general public identified the following alternatives to improve transit and transportation conditions along the corridor based on the project's Purpose and Need Statement.

5.2.1 NO BUILD ALTERNATIVE

For this project, the No Build alternative represents a scenario that includes the existing transit service levels and a highway network comprised of the existing roadways, committed projects, and transportation projects identified in the adopted 2035 LRTP. The Build alternatives will be compared to the No Build alternative to evaluate whether they would result in improved corridor mobility, in particular, transit service operations and ridership. Given current Broward County Transit (BCT) future funding program levels, the No Build alternative includes the existing Route 72 service levels of a 15-minute frequency between 6:00 am and 6:00 pm and 20-30 minute services for the rest of the day. Under the No Build alternative, the other study area transit services (i.e., intersecting BCT routes and Community Shuttles) will continue to offer services at their existing levels. Roadway improvements within the study area are limited largely due to the 'built-out' nature of this corridor. Key roadway projects within the study area included in the No Build alternative are (see Figure 5-2):

- Two additional lanes on Pine Island Boulevard (from 4 lanes divided to 6 lanes divided) between Oakland Park Boulevard and W. McNab Road. This project is under construction.
- Extension of the I-95 Express lanes from Golden Glades in Miami-Dade County to Yamato Road in Palm Beach County (identified in 2035 LRTP).
- Signal progression on Oakland Park Boulevard by 2035 (identified in 2035 LRTP).
- Interchange modifications at Commercial Boulevard and Sunrise Boulevard on Florida's Turnpike (identified in 2035 LRTP).
- Two additional lanes on NW 21st Avenue (from existing 2 lanes to 4 lanes divided) between Oakland Park Boulevard and Commercial Boulevard (identified in 2035 LRTP).
- Intersection improvements at SR 7 and I-95 along Oakland Park Boulevard (identified in 2035 LRTP).

Other programmed projects included in the 2035 No Build scenario include:

- Public transportation shelter improvements along the corridor.
- Resurfacing Oakland Park Boulevard at a point east of NW 31st Avenue and a point east of I-95.
- Traffic signal improvements in the vicinity of the Oakland Park Boulevard and the NW 56th Avenue intersection.

Figure 5-2: No Build Alternative

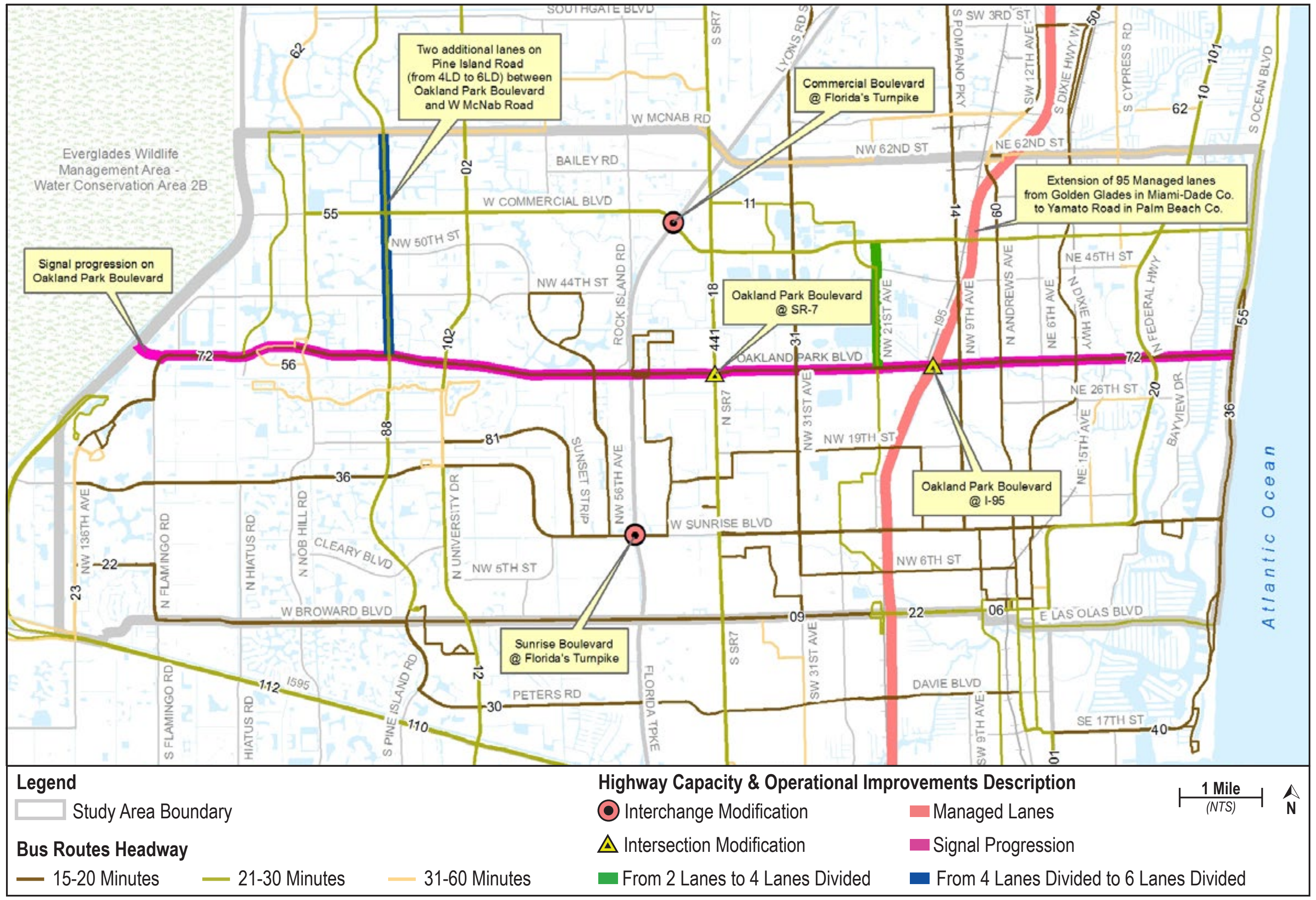
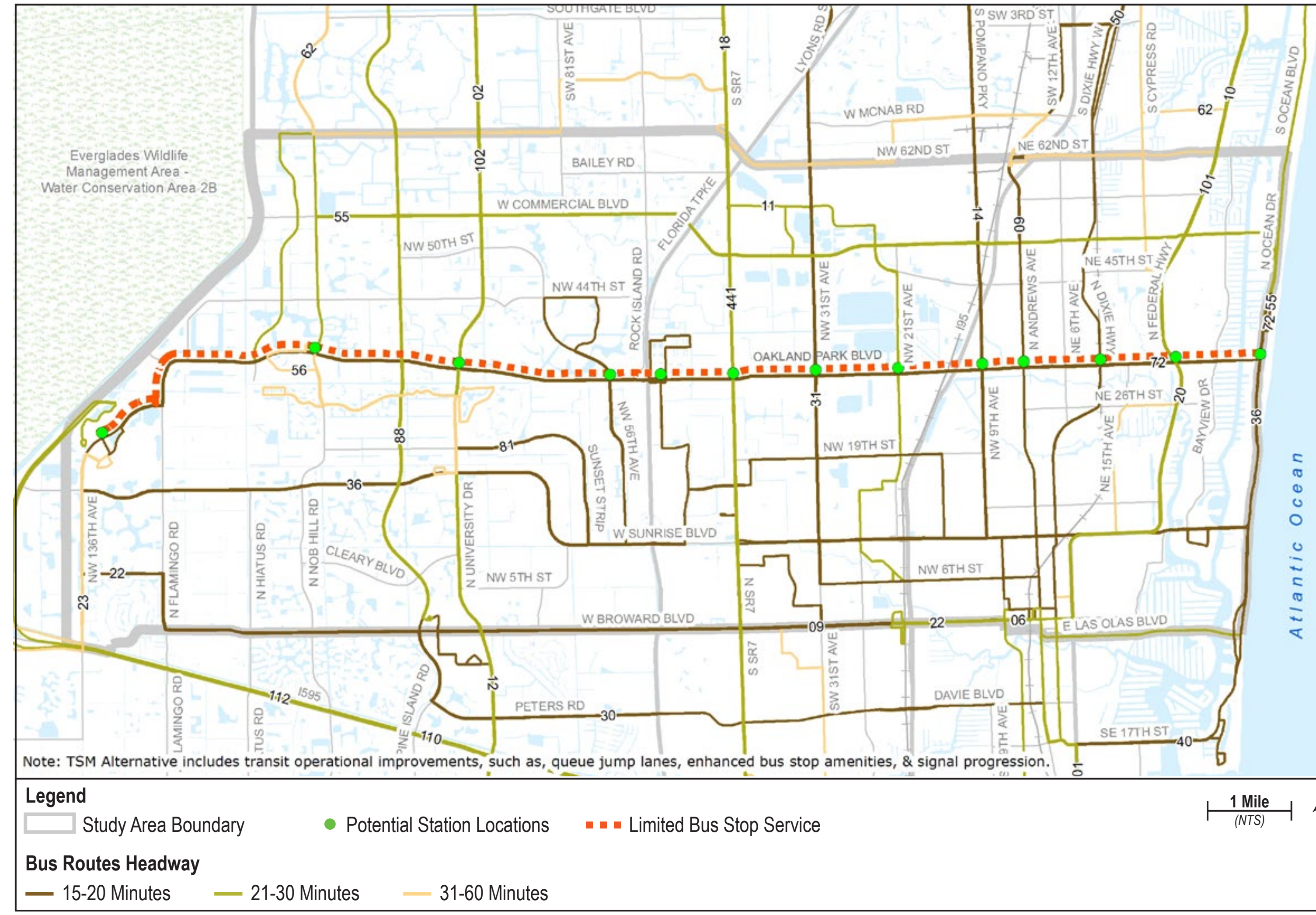


Figure 5-3: Enhanced Bus Service Alternative



5.2.2 ENHANCED BUS SERVICE ALTERNATIVE

The Enhanced Bus Service alternative represents what can be done to address transportation problems and needs along the corridor without a major capital investment. This alternative is comparable to the transportation system management (TSM) alternative against which all the transportation benefits were evaluated per the FTA's guidelines under the SAFETEA-LU requirements for developing New Starts/Small Starts projects. With the implementation of the new surface transportation legislation – Moving Ahead for Progress in the 21st Century (MAP-21) - the FTA no longer requires project sponsors to consider a TSM alternative.

All roadway improvements considered in the No Build alternative are also included in the Enhanced Bus Service alternative. Some of these improvements can be introduced in a shorter time frame (within the next two to five years) with a relatively low capital cost investment. The Enhanced Bus Service alternative includes the following transit service improvements:

- Introduction of a limited stop express bus service along Oakland Park Boulevard between the Sawgrass Mills Mall and US 1 in addition to the local bus service which serves all of the bus stops in the Route 72 bus schedule today. The limited bus stop service would provide faster and higher quality transit service between high passenger activity and transfer bus stops in the corridor, which are identified as potential station locations (Figure 5-3). In addition, limited stop service has the potential to capture latent transit demand that may be present in the corridor and is anticipated to attract choice riders.
- Introduction of an updated bus schedule to improve the on-time performance of the bus route.
- Introduction of bus bays and bus islands for improved bus operations that will provide better access and interaction with the surrounding traffic.
- Possible modifications to traffic signals to improve transit travel time. The improvements include the identification of unwarranted signals and signal progression.
- Enhanced bus stop amenities including shelters, benches, pedestrian access, etc.

- Improvements in transfer connections with connecting routes, including the identification and introduction of mobility hub locations.
- Introduction of queue jump lanes to improve the mobility, travel time and on-time performance of Route 72 buses.

The existing Route 72 bus service on Oakland Park Boulevard would continue to serve all of the bus stops along the corridor in this alternative. The bus fares for the local and the limited stop buses are the same as they are for existing fares in both the No Build and Enhanced Bus Service alternatives. Figure 5-3 illustrates some of the transit service related improvements in the Enhanced Bus Service alternative.

5.2.3 GRADE-SEPARATED TRANSIT TECHNOLOGY

Either an above grade or below grade light rail (i.e., streetcar), commuter rail (heavy rail), monorail, personal rapid transit, or bus rapid transit alignment that would provide direct connections with intersecting bus (and potentially, future Tri-Rail) services, mobility hubs, and pedestrian facilities, may require additional roadway right-of-way for station areas. Potential terminal station locations include the Sawgrass Mills Mall and the intersection of Oakland Park Boulevard and SR A1A. In addition, several other stations would be located along the corridor (see Figure 5-4). These potential station locations are conceptual and identified within major intersections along Oakland Park Boulevard. The existing Route 72 bus service on Oakland Park Boulevard would continue to serve all of the bus stops along the corridor under this alternative.

Figure 5-4: Grade-Separated Transit Technology

5.2.4 BUSINESS ACCESS AND TRANSIT (BAT) LANE WITH BUS ALTERNATIVE

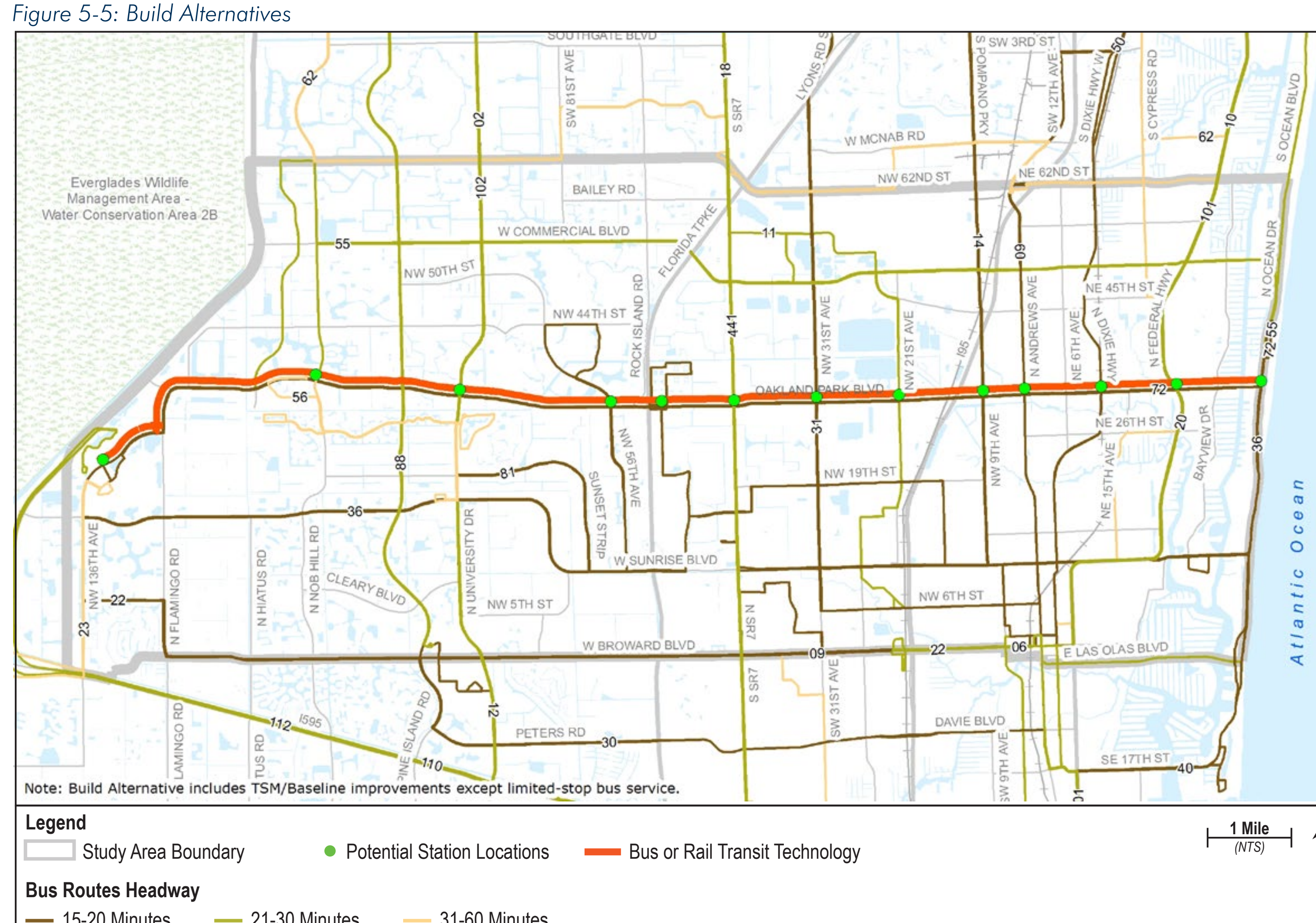
Using a standard or an articulated bus, the alignment might operate over the entire length of Oakland Park Boulevard (i.e., between Sawgrass Mills Mall and SR A1A), over a portion of the busiest segment of the corridor (i.e., between University Drive and US 1), or a combination of the two during different time periods. It should be noted that this alternative's bus service would require re-purposing a general purpose travel lane, but would also include several operational and physical changes for bus service, and would be provided at-grade level. Under this alternative, buses would operate in the curb lane, which would be designated as a BAT lane, which allows for buses, emergency vehicles, and right-turning vehicles only.

Potential station locations along the corridor include the Sawgrass Mills Mall, Nob Hill Road, University Drive, 56th Avenue, SR 7, 49th Street, NW 31st Avenue, NW 21st Avenue, Powerline Road, Andrews Avenue, Dixie Highway, US 1, and SR A1A (see Figure 5-5). This alternative would include limited stop transit in addition to the existing Route 72 bus service on Oakland Park Boulevard. Transit patrons are anticipated to realize travel time and schedule reliability benefits stemming from transit signal priority, traffic signal progression, and bus islands. Amenities to be provided at stations could include real time passenger information boards, map display panels, covered shelters, benches, trash cans, bicycle racks, etc.

5.2.5 EXCLUSIVE LANE WITH BUS ALTERNATIVE

Using a standard bus or an articulated bus traveling in a lane reserved for buses only, the alignment might operate over the entire length of Oakland Park Boulevard (i.e., between Sawgrass Mills Mall and SR A1A), over a portion of the busiest segment of the corridor (i.e., between University Drive and US 1), or a combination of the two during different time periods. The alignment may require additional right-of-way or removal of a travel lane in both directions (eastbound and westbound) in some segments along Oakland Park Boulevard, and would be provided at-grade level.

Figure 5-5: Build Alternatives



Potential station locations along the corridor include Sawgrass Mills Mall, Nob Hill Road, University Drive, 56th Avenue, SR 7, 49th Street, NW 31st Avenue, NW 21st Avenue, Powerline Road, Andrews Avenue, Dixie Highway, US 1 and SR A1A (see Figure 5-5). This alternative would include a limited stop transit service in addition to the existing Route 72 bus service on Oakland Park Boulevard. Operational improvements such as transit signal priority and traffic signal progression, and physical improvements such as, station amenities (real time passenger information, map display panel, shelter, benches, trash cans, bicycle racks) would be an integral part of this alternative.

5.2.6 BUSINESS ACCESS AND TRANSIT (BAT) LANE WITH STREETCAR ALTERNATIVE

Using either a standard or articulated Light Rail Vehicle (LRV) or a streetcar, the alignment might operate in the median lanes over the entire length of Oakland Park Boulevard (i.e., between Sawgrass Mills Mall and SR A1A), over a portion of the busiest segment of the corridor (i.e., between University Drive and US 1), or a combination of the two during different time periods. This alternative's transit service would require re-purposing a general purpose a travel lane, but would include several operational and physical changes for bus service, and would be provided at-grade level. Under this alternative, transit vehicles would operate in the curb lane, which would be designated as a BAT lane – which allows for LRVs or streetcars, emergency vehicles, and right-turning vehicles only.

Potential station locations along the corridor include the Sawgrass Mills Mall, Nob Hill Road, University Drive, 56th Avenue, SR 7, 49th Street, NW 31st Avenue, NW 21st Avenue, Powerline Road, Andrews Avenue, Dixie Highway, US 1 and SR A1A (see Figure 5-5). This alternative would include a limited stop transit service in addition to the existing Route 72 bus service on Oakland Park Boulevard. Transit patrons are anticipated to realize travel time and schedule reliability benefits stemming from transit signal priority, traffic signal progression, and bus islands. Amenities to be provided at stations could include real time passenger information boards, map display panels, covered shelters, benches, trash cans, bicycle racks, etc.

5.2.7 EXCLUSIVE LANE WITH STREETCAR ALTERNATIVE

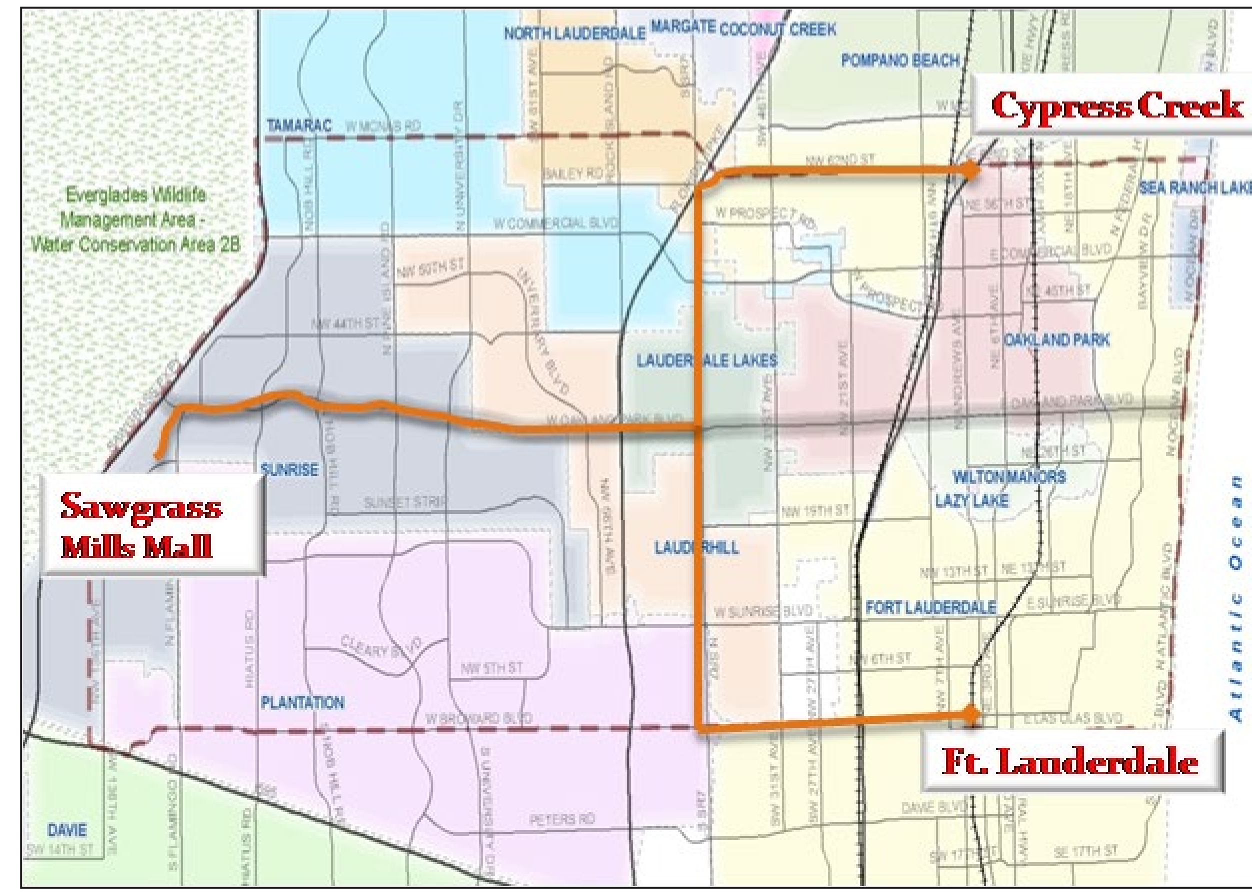
Using either a standard or articulated LRV or a streetcar traveling a lane limited to LRVs or streetcars, the alignment might operate in the median lanes over the entire length of Oakland Park Boulevard (i.e., between Sawgrass Mills Mall and SR A1A), over a portion of the busiest segment of the corridor (i.e., between University Drive and Andrews Avenue), or a combination of the two during different time periods. The alignment may require additional right-of-way or removal of a travel lane in both the directions (eastbound and westbound) in some segments along Oakland Park Boulevard, and would be provided at-grade level.

Potential station locations along the corridor include Sawgrass Mills Mall, Nob Hill Road, University Drive, 56th Avenue, SR 7, 49th Street, NW 31st Avenue, NW 21st Avenue, Powerline Road, Andrews Avenue, Dixie Highway, US 1 and SR A1A (see Figure 5-5). This alternative would include a limited stop transit service in addition to the existing Route 72 bus service on Oakland Park Boulevard. Operational improvements such as transit signal priority and traffic signal progression, and physical improvements such as, station amenities (real time passenger information, map display panel, shelter, benches, trash cans, bicycle racks) would be an integral part of this alternative.

5.2.8 'L' SHAPED ROUTE ALTERNATIVE

Modify the Route 72 bus alignment configuration from an east-west service along Oakland Park Boulevard to a service that leaves Oakland Park Boulevard for more direct connections to passenger origins and destinations and/or serve commuter market given large employment centers in the study area, such as, Cypress Creek area and downtown Fort Lauderdale or Lauderhill Mall, which are important BCT transfer points. Figure 5-6 illustrates possible 'L' shaped route configurations.

Figure 5-6: 'L' Shaped Route



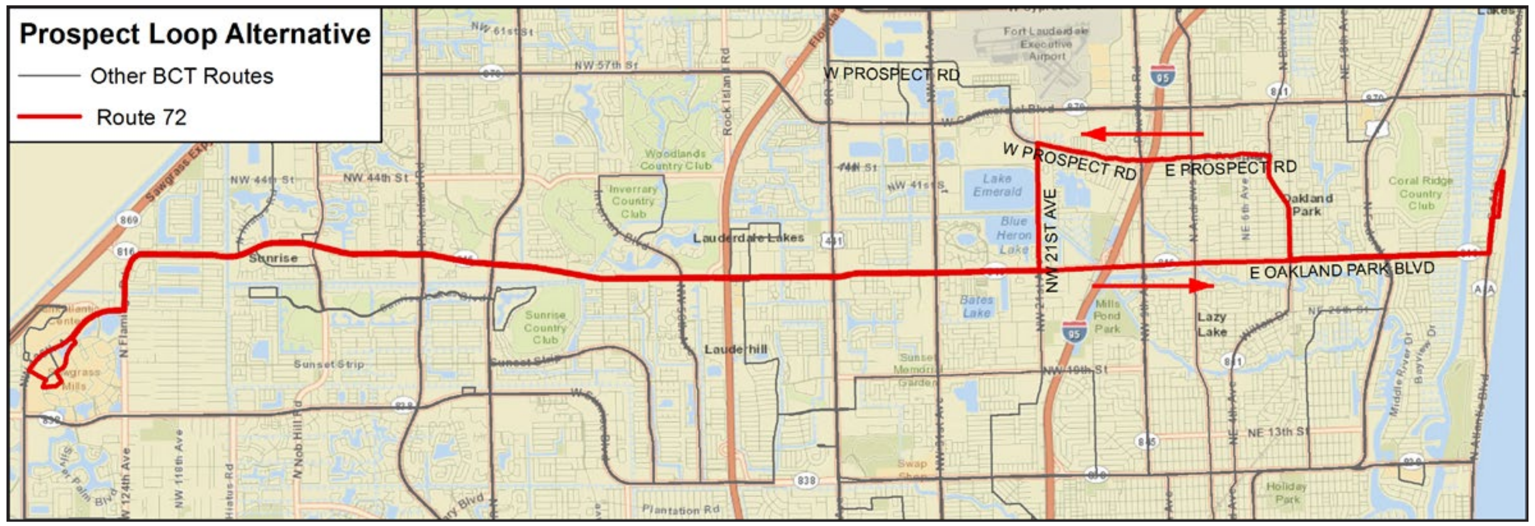
5.2.9 PROSPECT ROAD LOOP ALTERNATIVE

This alternative re-routes one of four Route 72 buses per hour in the westbound direction on Oakland Park Boulevard. Under this alternative, buses traveling west from Galt Mile/SR A1A would:

- Turn right (northbound) onto Dixie Highway,
- Turn left (or travel westbound) onto West Prospect Road,
- Turn left (or southbound) onto NW 21st Avenue, and
- Turn right onto Oakland Park Boulevard and continue westbound to Sawgrass Mills Mall.

The eastbound Route 72 service routing would not change from the existing service provided under this alternative. Along the new alignment off of Oakland Park Boulevard, bus stops would be spaced every 900 feet to 1100 feet to maintain average existing bus stop spacing. Figure 5-7 illustrates the deviated bus route alignment for the Prospect Road Loop alternative.

Figure 5-7: Prospect Road Loop Alternative



5.2.10 OFF-WIRE CATENARY SYSTEMS

Provide limited stop transit service using wireless or off-wire catenary systems for streetcar technology (see Figure 5-8). The streetcars could operate in either the BAT lanes or exclusive lanes on Oakland Park Boulevard between Sawgrass Mills Mall and SR A1A. This alternative is identical to the BAT Lane with Streetcar and Exclusive Lane with Streetcar alternatives described in Sections 5.2.4 and 5.27 except for the wireless technology.

Figure 5-8: Off-Wire Catenary Systems

5.2.11 10-MINUTE HEADWAY: LOCAL BUS

This alternative considers increasing the local bus Route 72 headway from 15 minutes to 10 minutes with the existing route termini, which are the Sawgrass Mills Mall to the west and the Galt Mile area to the east. Operational improvements such as queue jump lanes, transit signal priority, and upgraded shelters are integral parts of this alternative. It should be noted that this alternatives would modify the existing Route 72 bus service on Oakland Park Boulevard. Further, this alternative does not include provision of limited stop bus service on Oakland Park Boulevard.

5.3 Tier 1 Screening and Evaluation Process

Tier 1 Evaluation

The Tier 1 evaluation was a high-level qualitative assessment along with a high-level quantitative analysis that was based only on readily available data. Of the ten (10) Tier 1 alternatives, three alternatives were eliminated based on several analyses described below, while the Off-Wire Catenary Systems alternative was integrated with the streetcar alternatives. The following six alternatives were advanced into the Tier 1 screening analysis.

- Enhanced bus service
- Grade-separated transit technologies
- BAT lane with bus
- Exclusive lane with bus
- BAT lane with streetcar
- Exclusive lane with streetcar

'L' Shaped Route Alternative

The 'L' Shaped Route alternative, which would provide direct access between the Oakland Park Boulevard corridor and the major employment areas in the Cypress Creek area (which generates between 5,000 and 6,000 work trips/day) and downtown Fort Lauderdale, (which generates between 18,000 and 19,000 work trips/day) were screened out based on a relatively low level of increased ridership. The travel market analysis, transit survey data, and the existing profile of transit riders on Route 72 indicates that the Oakland Park Boulevard corridor accommodates a small employee commuter market (less than 3% of daily person trips), and this trend is anticipated to continue into the future. Such a small commuter market would not warrant a one-seat ride from the western suburbs to either the Cypress Creek area or downtown Fort Lauderdale. A detailed discussion of travel markets in the corridor is included in the *Travel Market Analysis Report, January 2013.* In addition, study area trips are spread across the corridor with no dominant designations that would suggest route deviations from the existing Route 72 alignment.

Prospect Road Loop Alternative

Based on the results of preliminary ridership analysis indicated below, the Prospect Road Loop Alternative was screened out due to the following:

- The added length of this new routing is approximately two (2) miles longer than the existing westbound Route 72 service, leading to
  - Increased travel time (additional 9 minutes end-to-end in the westbound direction for the deviated buses).
  - Requirement for one or more additional buses to the current Route 72 fleet.
  - Increased O&M cost.

- Negatively impact the existing Route 72 riders (from 4 buses/hour to 3 buses/hour)
  - Approximately 100 passengers boarding and alighting at the stops between Dixie Highway and NW 21st Ave (in the eastbound direction) would experience a reduction in service.
  - Approximately 250 riders who board east of Dixie Highway and alight between Dixie Highway and NW 21st Avenue would experience a reduction in service.
  - Approximately 1,700 riders who board east of NW 21st Avenue and travel in the westbound direction would be adversely impacted because of the increased travel time and some would experience a reduction in service.
- The Prospect Loop rerouting would accommodate less than 100 riders per day.
- There is no significant reduction in traffic volume due to the removal of buses.

In summary the deviation would increase travel time, mileage, likelihood of bus bunching, without the net increase in ridership.

10-minute Headway: Local Bus

The analysis of the 10-minute headway operation indicated that the more frequent service would generate between 1,600 and 2,600 new passengers/day (or an increase between 18% and 29%) compared to the existing local bus ridership. It should be noted that increasing the bus frequency by 33% (i.e., by increasing headways from 15-minutes to 10-minutes) would add approximately 10% to 20% more riders.

The added bus service hours and mileage would increase Route 72 operating costs by 42% and 47% (approximately $2 million over existing O&M cost), and the increased fleet needed to maintain the 10-minute frequencies would be $7.6 million, while another $5 million to $8 million are estimated for operational improvements such as queue jump lanes, transit signal priority, and upgraded shelters, and intersection modifications.

In conclusion, the analysis indicates that increasing the bus frequency would result in net ridership gains on the Route 72, and the implementation of short term operational improvements would likely improve the on-time performance to some extent. However, in the longer term, the added bus service in combination with increasing traffic congestion levels would potentially lead to bus bunching and would adversely impact the transit quality of service (including on-time performance and schedule adherence).

Tier 1 Evaluation Methodology

The performance of the six Tier 1 alternatives was analyzed against 25 separate evaluation criteria corresponding to the project's goals and objectives. The Tier 1 evaluation was primarily a high-level qualitative assessment with some quantitative analysis based on readily available data. Desktop planning tools such as Geographic Information Systems software and spreadsheet analysis were used to conduct Tier 1 socioeconomic, land use and environmental analyses. The *Tier 1 Screening Report, May 2013* provides comprehensive documentation of the evaluation criteria, corresponding performance measures, and raw data for each alternative vis-à-vis specific criterion and the evaluation results. Based on the raw data or qualitative performance, a rating was assigned to each alternative illustrating how it compared with other alternatives for a given corresponding evaluation criterion. The ratings were classified into five categories and symbolized as shown below:

- *Very Poor:* '- -'
- *Poor:* '-'
- *Neutral:* 'O'
- *Good:* '+'
- *Very Good:* '++'

The composite results of each alternative's performance with respect to project goals and objectives determined the final outcome of the Tier 1 evaluation process.

Tier 1 Evaluation and Performance Assessment

Since the Tier 1 analysis was highly qualitative and the alignments for all Tier 1 alternatives are nearly identical, only a few evaluation criteria show differentiation in performance from one alternative to another. With regard to the Land Use and Economic Development Goal and the Environmental Goal, ratings were driven by proximity to the alignment or bus stop. Performance measures relative to the Local and Regional Mobility and Accessibility Goal and the Financial and Economic Competitiveness Goal, and to some extent the Community Vision Goal, proved to demonstrate substantial differentiation between the alternatives. Table 5-2 shows the comparison of the build alternatives' performance corresponding to the evaluation criterion.

5.3.1 TIER 1 EVALUATION RESULTS

The final scoring was established using a combination of the following approaches:

1. Based on the evaluation criterion that is directly related to the *project's purpose and need* and at the same time differentiates the alternatives, and/or
2. Based on the overall performance of an alternative corresponding to a project goal, which is a sum total of the ratings received for different evaluation criteria under a given project goal. The regional mobility and accessibility goal and the land use and economic development goal use the first approach while the other three project goals use the second approach.

The grade-separated transit technology did not meet the community values goal nor did it score well on the finance and economic competitiveness goals. Table 5-3 provides the composite results of the evaluation of the Tier 1 alternatives relative to the project goals.

Based on the Tier 1 evaluation results, the Project Team recommended that the following alternatives be carried forward in the second phase for more detailed analysis.

- Enhanced Bus Service
- Business Access and Transit (BAT) Lane with Bus
- Business Access and Transit (BAT) Lane with Streetcar
- Exclusive Lane with Bus
- Exclusive Lane with Streetcar

Table 5-2: Tier 1 Performance Measures and Ratings

Goal	Evaluation Criteria	Performance Measures for Tier 1 Screening	Alternatives: Enhanced Bus Service	Grade-Separated Transit Technology	BAT Lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Local and Regional Mobility and Accessibility Goal	Number of transit trips	Horizon year total trips	O	++	O	+	O	+
Local and Regional Mobility and Accessibility Goal	Inclusion of Intelligent Transportation System (ITS) and bus running way or transit guideway improvements.	Number of intersections with TSP capabilities, queue jump lanes, and type of bus runway or transit guideway with regard to level of exclusivity	O	++	O	+	O	+
Local and Regional Mobility and Accessibility Goal	Travel time savings	End-to-end travel time (change between existing and build alternative)	O	++	O	+	O	+
Local and Regional Mobility and Accessibility Goal	Workers within one-half mile of potential stations	Year 2010 and 2035 # of people within one-half mile of potential stations	O	O	O	O	O	O
Local and Regional Mobility and Accessibility Goal	Jobs within one-half mile of potential stations	Year 2010 and 2035 # of jobs within one-half mile of potential stations	O	O	O	O	O	O
Local and Regional Mobility and Accessibility Goal	Mode split	Mode Split in the study area (existing v/s build alternative)	O	++	O	+	O	+
Local and Regional Mobility and Accessibility Goal	Traffic Impacts	Severity of traffic impact vis-à-vis bus runway or guideway configuration	+	++	+	-	+	-
Local and Regional Mobility and Accessibility Goal	Connectivity and safety of non-motorized transportation systems.	Pedestrian/bicycle access to businesses and residential neighborhoods in the corridor in a safe manner	++	++	++	++	++	++
Land Use and Economic Development Goal	Future land use plan and policy	Tools to implement land use plan and policies	O	O	O	O	O	O
Land Use and Economic Development Goal	Publicly supported housing within a half-mile of the project	Number of affordable housing projects within a half-mile of potential stations	O	O	O	O	O	O
Land Use and Economic Development Goal	Minority population within a half-mile of potential stations	Year 2010 # of minority population within a half-mile of potential stations	O	O	O	O	O	O
Land Use and Economic Development Goal	Transit dependents population within a half-mile of potential stations	Year 2010 # of zero-auto households within a half-mile of potential stations	O	O	O	O	O	O
Land Use and Economic Development Goal	Low-income population within one-half mile of potential stations	Year 2010 # of low income households within a half-mile of potential stations	O	O	O	O	O	O
Land Use and Economic Development Goal	School and college/university enrollment within a half-mile of potential stations	Year 2010 and Year 2035 student enrollment within a half-mile of potential stations	O	O	O	O	O	O
Land Use and Economic Development Goal	Transit supportive policies	Presence of RAC, LAC, TOD or TOC land use, CRA within station areas and station area land use planning initiatives	O	O	O	O	O	O
Land Use and Economic Development Goal	Economic development potential	Private sector perception of investing with regard to transit infrastructure (stations and transit guideway)	O	+	O	+	+	+
Environmental Goal	Wetlands within the transit envelop	Wetland areas (in acres) contiguous to the project	O	O	O	O	O	O
Environmental Goal	Parks within the transit envelop	Number and acreage of parks contiguous to the project	O	O	O	O	O	O
Environmental Goal	Community facilities within a quarter-mile of the project	Number of community facilities within a quarter-mile of the project	O	O	O	O	O	O
Environmental Goal	Noise sensitive receptors within a quarter-mile of the project	Number of sites w/in quarter-mile of the project	O	O	O	O	O	O
Environmental Goal	Listed contaminated sites within a quarter-mile of the project	Number of FDEP regulated sites within a quarter-mile of the project	O	O	O	O	O	O
Environmental Goal	Threatened and endangered species within a quarter-mile of the project	Number of wildlife, habitat, environmental consultation areas within a quarter-mile of the project	O	O	O	O	O	O
Environmental Goal	Historical and archeological sites within a quarter-mile of the project	Number of potential sites within a quarter-mile of the project	O	O	O	O	O	O
Community Values Goal	Community vision	Level of support	O	-	O	O	O	O
Financial and Economic Competitiveness Goal	Short-term operational goals and long-term vision of transportation agencies	Level of support (improvements included in agencies work program and/or long term plans such as the Transit Development (TDP)/Long Range Transportation Plan (LRTP))	+	--	O	+	+	+
Financial and Economic Competitiveness Goal	Capital Cost	Estimated capital cost	+	--	O	-	-	-
Financial and Economic Competitiveness Goal	O&M Cost	Estimated annual O&M cost	+	--	O	-	-	-

Table 5-3: Tier 1 Evaluation Results

Project Goals	Alternatives					
	Enhanced Bus Service	Grade-Separated Transit Technology	BAT Lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Local and Regional Accessibility and Mobility Goal	O	++	O	+	O	+
Land Use and Economic Development Goal	O	+	O	+	+	+
Environmental Goal	O	O	O	O	O	O
Community Values Goal	O	--	O	O	O	O
Finance & Economic Competitiveness Goal	+	--	O	-	-	-
Evaluation Results	✓	✗	✓	✓	✓	✓

The Tier 1 evaluation results were presented and discussed with the Technical Advisory Committee (TAC), who agreed with the recommendation. Similarly, the Broward MPO's Citizen Advisory Committee (CAC), and Technical Coordination Committee (TCC), as well as the Broward MPO Board concurred with the recommendation.

5.4 Tier 2 Alternatives: Detailed Definition of Alternatives

As explained in Chapter 4, a series of technical analyses were conducted in an iterative manner in order to develop ridership and transit travel time benefits, impact of short term transit operational improvements, and ramifications of incorporating mobility hubs in the corridor. These results were used to refine the build alternatives during the second phase and are documented in the *Tier 2 Forecasting Methodology Report, April 2013; Short Term Improvements Technical Memorandum, June 2013; Mobility Hubs Analysis Technical Memorandum, September 2013;* and *Travel Demand Forecasting Methodology Technical Memorandum, October 2013*. In addition to refining the build alternatives, a comprehensive set of short term improvements (traffic signal progression, intersection modification, revised local bus schedule, transit signal priority, queue jump lane, bus islands, bicycle lanes and sidewalk improvements) that could be implemented with the next two (2) to five (5) were also identified and included in all of the build alternatives.

The detailed design criteria used for developing the conceptual engineering plans for the bus and streetcar technology alternatives is included in the *Alignment Summary Report, August 2013*. In addition to the FDOT's basic geometric design criteria roadway along with corresponding federal standards, the conceptual plans were developed using the FDOT's Plans Preparation Manual (PPM) for a design vehicle of FL WB-62 (i.e., trucks which have turning radii, axel load, height and width, acceleration, and deceleration parameters which exceed those of a bus) for the bus based build alternatives. For the streetcar based alternatives, all of the applicable criteria for Design Vehicle WB-62FL and specific design criteria for streetcars from guidelines produced by the Washington DC District Department of Transportation were used to prepare the conceptual engineering plans. A detailed description of the alternatives follows.

5.4.1 NO BUILD ALTERNATIVE

As described in Section 5.2.4 the No Build alternative was maintained to represent existing transit levels and a highway network comprised of the existing roadways, committed projects, and projects identified in the adopted 2035 LRTP (see Figure 5-2)

5.4.2 ENHANCED BUS SERVICE ALTERNATIVE

The Enhanced Bus Service alternative includes physical and operational improvements that can be introduced in a shorter time frame (within next two (2) to five (5) years), as well as over the longer time horizon. These improvements include:

1. Limited stop bus service along Oakland Park Boulevard in mixed traffic with potential station locations at Sawgrass Mills Mall, Nob Hill Road, Pine Island Road, University Drive, Inverrary Boulevard W., 56th Avenue, SR 7, 49th Street, NW 31st Avenue, NW 27th Avenue, NW 21st Avenue, Powerline Road, Andrews Avenue, Dixie Highway, US 1 and SR A1A. The existing local bus service would continue to serve all of the local bus stops in the Route 72 schedule today;
2. Revised Route 72 schedule to improve on-time performance;
3. Transit signal priority at 17 intersections along the corridor;
4. Queue jump lanes at Hiatus Road, NW 31st Avenue, and NW 21st Avenue and/or bus islands;
5. Traffic signal progression in eight segments along the corridor; and
6. Enhanced station amenities including shelters, benches, pedestrian access, etc. Figure 5-9 provides an illustration of Enhanced Bus Service on Oakland Park Boulevard while Figure 5-10 shows improvements in the Enhanced Bus Service alternative in the corridor.

The physical infrastructure improvements included in the Enhanced Bus Service alternative are enhanced stations and bus islands. As shown in Figure 5-11, enhanced bus stations would be built as curb side

Figure 5-9: Enhanced Bus Service, Illustration

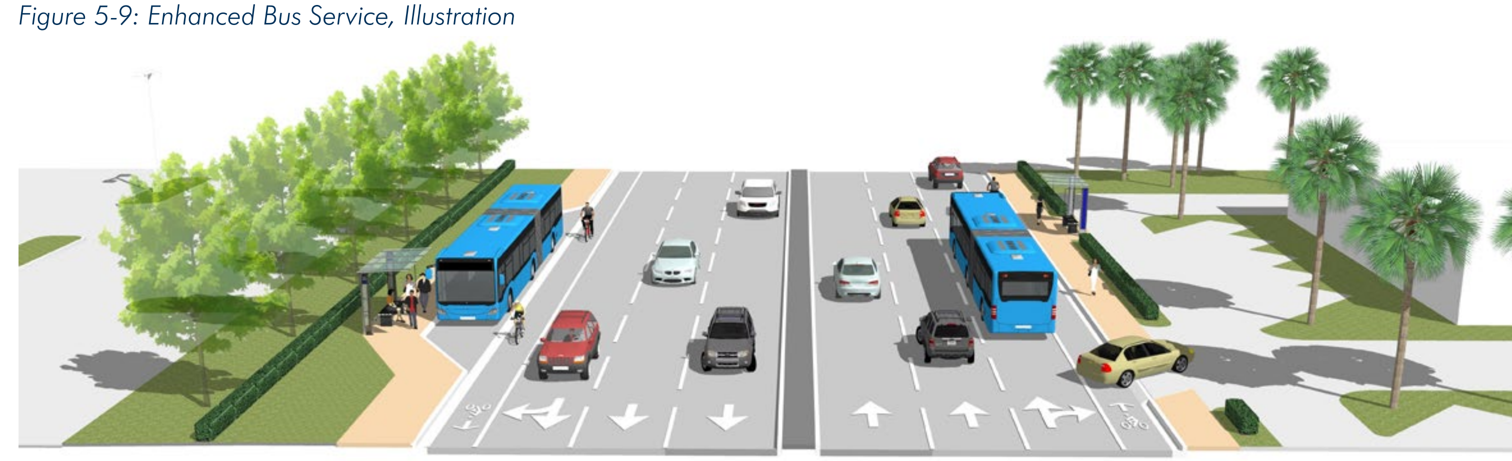
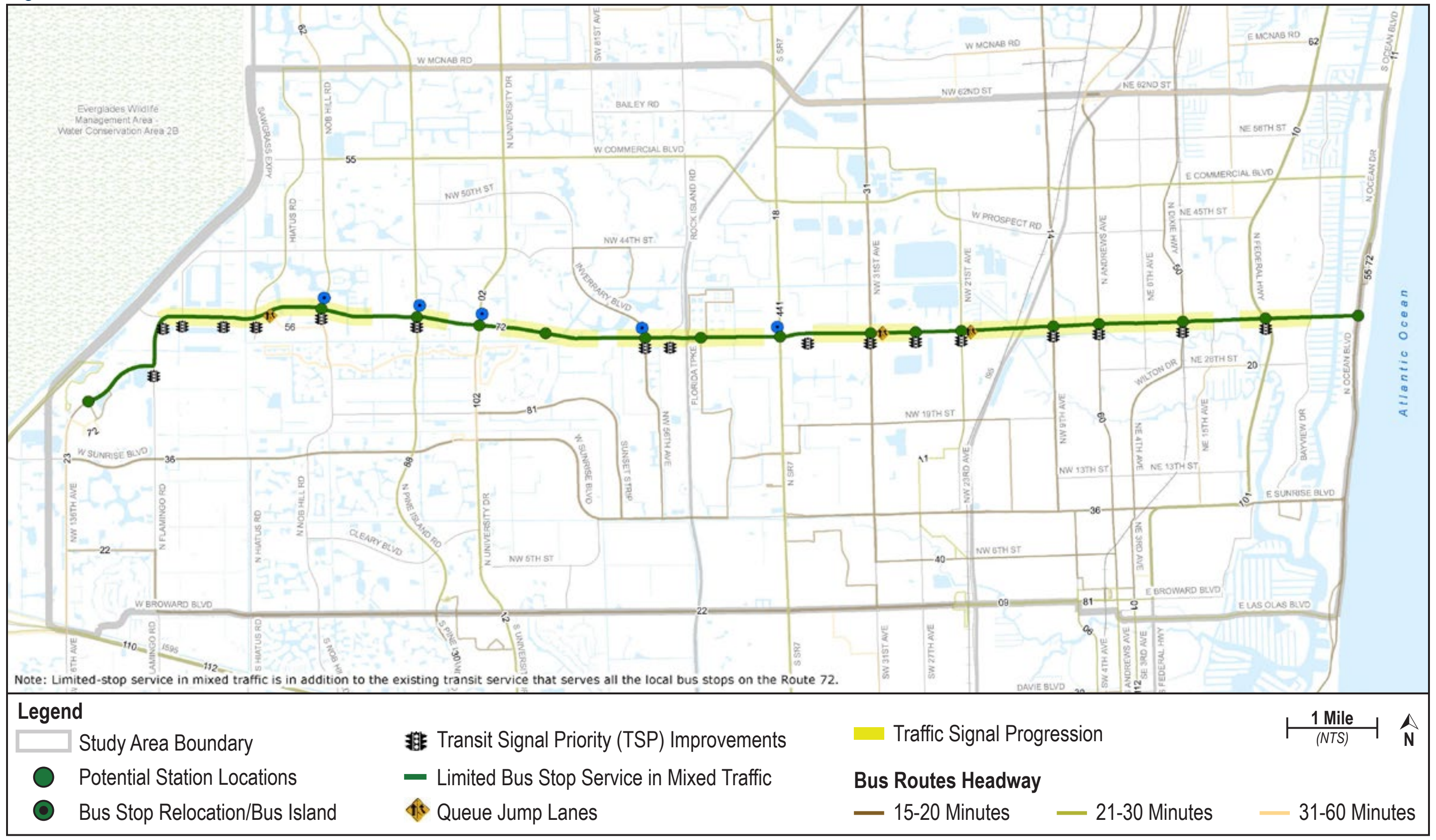


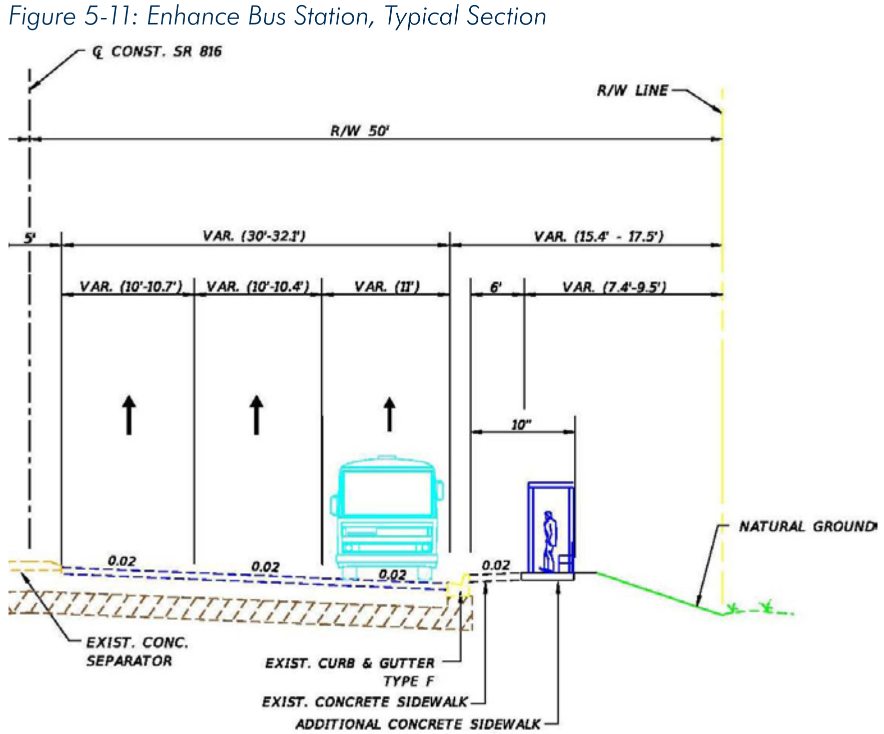
Figure 5-10: Enhanced Bus Service Alternative



stations that have a typical section that is 10 feet wide and a cantilever shelter set back six (6) feet on the sidewalk. The station is about 150 feet in length to accommodate two articulated buses. Station amenities include shelters, benches, real time passenger information, trash receptacle, map display, emergency phone, lighting, and so on.

The bus islands, which would contain the transit stations, would be located between a right turn lane (and in some areas a bicycle lane) and through traffic lanes. Bus islands would be built at the following locations:

Figure 5-11: Enhance Bus Station, Typical Section

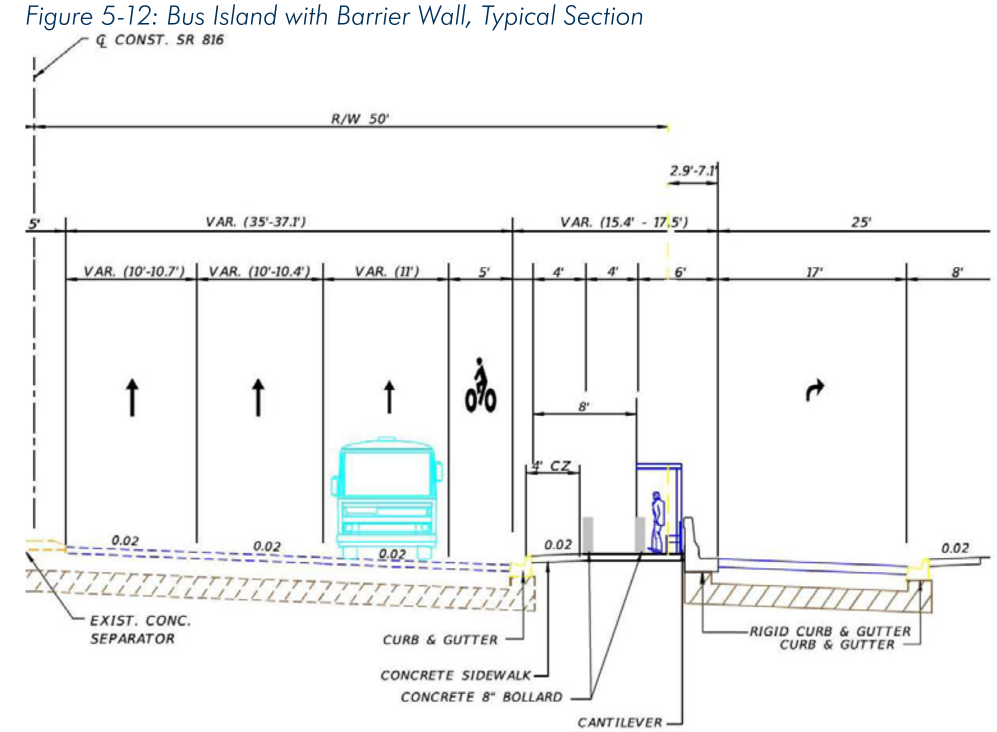


- Westbound Oakland Park Boulevard, east of Nob Hill Road
- Westbound Oakland Park Boulevard, east of Pine Island Boulevard
- Eastbound Oakland Park Boulevard, west of University Drive
- Westbound Oakland Park Boulevard, east of University Drive
- Eastbound Oakland Park Boulevard, west of Inverrary Boulevard
- Westbound Oakland Park Boulevard, east of Inverrary Boulevard
- Eastbound Oakland Park Boulevard, west of SR 7
- Westbound Oakland Park Boulevard, east of SR 7

Bus islands were not included in the eastbound direction of Oakland Park Boulevard at Nob Hill Road and Pine Island Road because their potential impacts would outweigh benefits. At Nob Hill Road, a bus island in the eastbound direction would create an inefficient transit connection for the BCT Route 55 buses, which operate in a counter clockwise direction in this general area, as well as for the BCT Route 56 buses. With bus islands for the Route 72, transit riders would have to walk a longer distance and cross this intersection twice to make transfers between connecting routes. In the case of Pine Island Road, an eastbound bus island on Oakland Park Boulevard would impact access to businesses in the southwest quadrant of the intersection. In addition, the existing far side bus stop on Oakland Park Boulevard is located at the corner of this intersection, which facilitates easy and safe transfers between connecting routes.

The typical section (see Figure 5-12) attributes of the Bus Islands include three 11.0 foot lanes outside of the median with five (5) foot bicycle lanes in each direction. The islands themselves would be 16 feet in width from the back of curb on the bus lane side with cantilever shelters, bollards and pedestrian railings four (4) feet from face of curb. An area of four (4) feet face of curb is necessary to meet the Clear Zone requirements. On the back side of the islands either rigid shoulder gutter would be constructed or handrail to keep pedestrians from walking into traffic depending on the right-of-way widths. The right turning lanes on the back side of the island would have a 17.0 foot minimum pavement width to provide a path for passing a stalled vehicle as per AASHTO. The gutter plus the pavement would provide greater than 20.0 foot clear area. These islands would have a minimum length of 160.0 foot. An alternative typical section for the bus island is included in the *Alignment Summary Report, August 2013.*

Figure 5-12: Bus Island with Barrier Wall, Typical Section



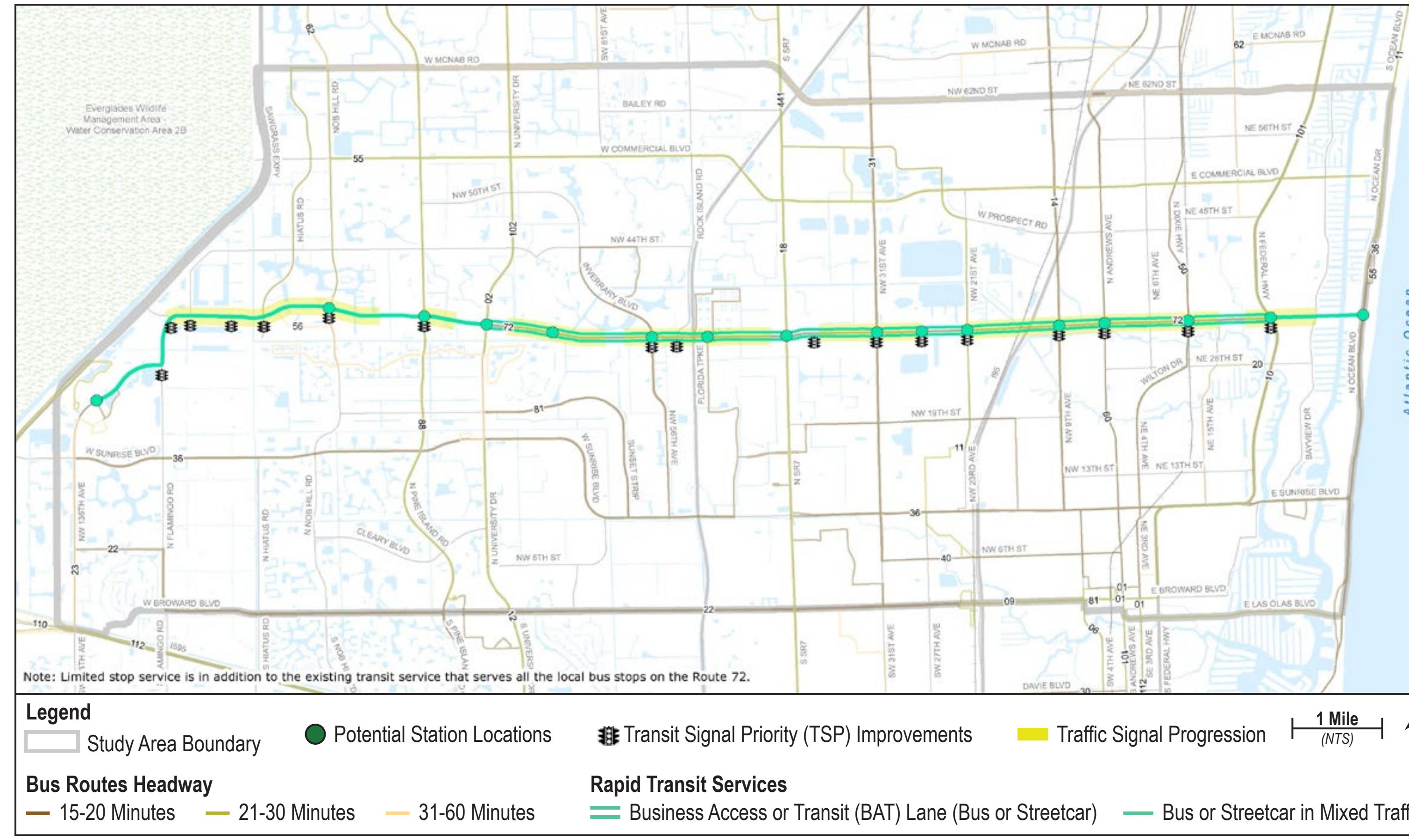
5.4.3 BUSINESS ACCESS AND TRANSIT (BAT) LANE WITH BUS ALTERNATIVE

This alternative contains all of the improvements identified in the Enhanced Bus Service alternative except for the queue jump lanes. Using articulated buses, this alternative would provide premium transit service in the Oakland Park Boulevard corridor. Under this alternative, buses would operate in the curb lane, which would be designated as a BAT lane – which allows for buses and vehicles turning right into neighborhoods and businesses or at cross streets. Both the local bus and limited stop bus would operate in the BAT lane.

The BAT lanes would extend from University Drive to US 1 while the limited stop bus service at 15 minute headway during peak/off peak hours would be provided from the Sawgrass Mills Mall to SR A1A. In addition, the bus would operate in mixed traffic in the vicinity of I-95 and Florida's Turnpike. The bus would operate in mixed traffic west of University Drive and east of US 1. In this alternative, the patrons would board the buses at the curb side stations at the Sawgrass Mills Mall, Nob Hill Road, Pine Island Road, University Drive, Inverrary Boulevard W., 56th Avenue, SR 7, 49th Street, NW 31st Avenue, NW 27th Avenue, NW 21st Avenue, Powerline Road, Andrews Avenue, Dixie Highway, US 1 and SR A1A, and/or at bus islands. Transit patrons would realize travel time and schedule reliability benefits stemming from transit signal priority, traffic signal progression, and bus islands. Amenities to be provided at bus stops and/or stations could include real time passenger information boards, map display panels, covered shelters, benches, trash cans, bicycle racks, etc.

Figure 5-13 provides an illustration of the BAT lane with Bus alternative on Oakland Park Boulevard, while Figure 5-14 shows improvements in the BAT lane with Bus or Streetcar alternative in the corridor. The overall concept plan for this alternative including the short term improvements is include Appendix A.

Figure 5-14: Business Access & Transit (BAT) Lane with Bus Alternative



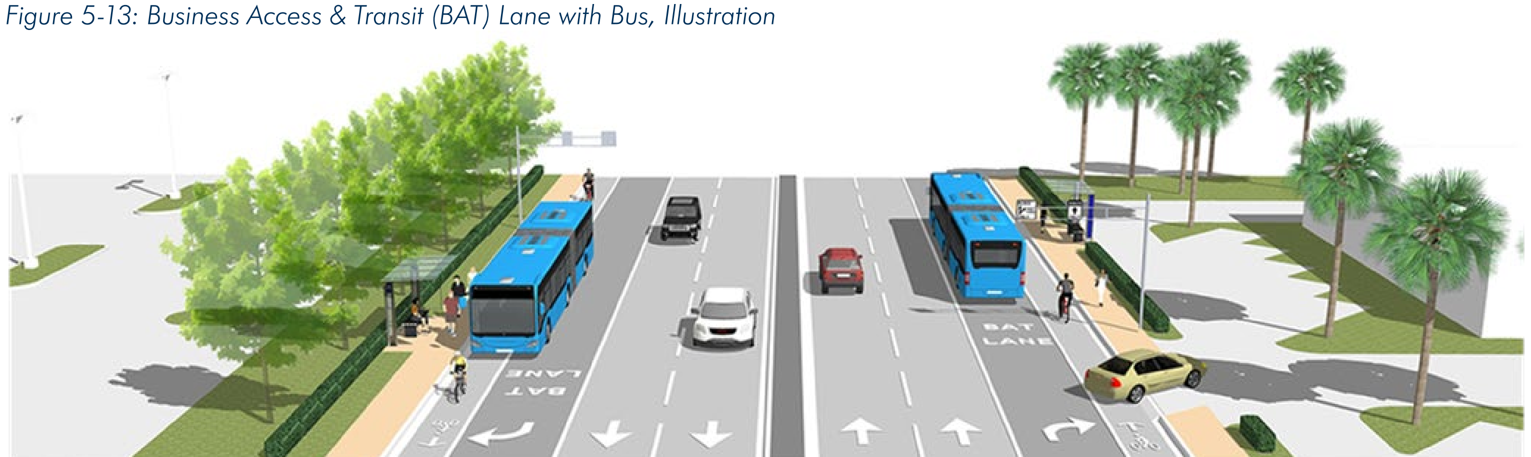
Alignment Description

The western boundary of the alignment for the BAT lane with Bus alternative begins west of University Drive and continues past I-95 for the first segment (see Sheet Number 36 to Sheet Number 58, Appendix A) and from the I-95 to west of US 1 for the second segment (see Sheet Number 58 to Sheet Number 67, Appendix A). The curb lane would be dedicated for buses and emergency vehicles, and for autos turning right to access businesses and neighborhoods or at cross streets. Overhead signs indicating designated BAT lanes and bicycle lanes would be installed every mile along the corridor between University Drive and US 1.

The existing alignment would require minimal modifications to construct this alternative. Bus islands are located at Nob Hill Road (see Sheet Number 29, Appendix A) and Pine Island Road (see Sheet Number 33, Appendix A) in the westbound direction while they're located in both the eastbound and westbound directions at University Drive, Inverrary Boulevard and SR 7 (see Sheet Numbers 36, 43, and 48 respectively, Appendix A). These bus islands would require minor deflections to maintain the existing left turn lanes and the designated bicycle lanes that would be included within the first segment (University Drive and I-95).

The SR 7 intersection (see Sheet Numbers 48 and 19, Appendix A) would be the most challenging area to realign because of the narrow right-of-way on the east side of the intersection and the number of intersecting lanes. The curve to the east of the intersection would also add to the complexity for a safe design and possibly require right-of-way acquisition. Right-of-way would be required to accommodate bus islands.

Figure 5-13: Business Access & Transit (BAT) Lane with Bus, Illustration



Access management issues may require closing or replacing redundant right turn driveway access to businesses with standard FDOT driveways. This would also facilitate a smoother flow for the buses in the outside lanes, as well as to provide for greater safety by reducing the number of conflict points along the corridor.

Several locations along the corridor, such as the crossings of Oakland Park Boulevard with Florida's Turnpike and the I-95 Interchange, would require that buses operate in mixed traffic, though they may be designated as BAT lanes. Auxiliary lanes in the eastbound direction provide additional capacity and facilitate better access to northbound I-95 ramps (see Sheet Numbers 58 and 59 respectively, Appendix A).

Typical Section

Proposed typical section #1 (see Sheet Number 11, Appendix A) starts west of University Drive and continues to I-95 as a six (6) lane urban divided roadway with 5 foot bicycle lanes. The bus lane would be situated in the outside lanes when not in mixed use as described above. The grass median would be 18 feet to 30 feet, and when dual left turns exist, a five (5) feet traffic separator would be necessary. The border zone (area for roadway swales, signage, sidewalks, lighting, and bus stops) varies from zero (0) feet to 45 feet back of curb to the right-of-way line. Sidewalks would run along the right-of-way line behind a swale at the back of curb in the western portion of this segment east of Florida's Turnpike. Right-of-way acquisition would be required for station and bicycle lanes east of Florida's Turnpike.

Proposed typical section #2 (see Sheet Number 12, Appendix A) from I-95 to east of US 1 would have two 10 feet to 10.7 feet lanes with 11 feet bus lanes in each direction with no new bicycle lanes. The sidewalk would be back of curb in this segment with a border width of an additional 9.4 feet to 19.5 feet on the left and 7.4 feet to 9.5 feet on the right.

Enhanced Stations and Bus Islands

The design and location of the enhanced stations and bus islands would be identical to the Enhanced Bus Service alternative. Typical section through curb side stations is shown on Sheet Number 15 in Appendix A.

Constraints and Opportunities

Constraints include a large number of existing driveways into businesses and neighborhoods in conjunction with signalized intersections. There is limited right-of-way for accommodating designated bicycle lanes. Other constraints include the large foot prints created at the intersection with bus islands. Large intersections become difficult for pedestrians and bicycles to traverse.

Opportunities include availability of right-of-way west of the Turnpike for accommodating bus islands and bicycle lanes where needed. Buses also allow for the flexibility to travel in mixed traffic as necessary at Florida's Turnpike and I-95, thus reducing additional construction cost compared to the exclusive lane with bus alternative and streetcar alternatives that require partial or total bridge re-construction.

5.4.4 BUSINESS ACCESS AND TRANSIT (BAT) LANE WITH STREETCAR ALTERNATIVE

This alternative contains all of the improvements identified for the Enhanced Bus Service alternative except for the queue jump lanes. Under this alternative, the streetcar would operate in the curb lane, which would be designated as a BAT lane – which allows for streetcars and emergency vehicles, and vehicles turning right in to neighborhoods and businesses or at cross streets – between University Drive and US1. West of University Drive and east of US 1, the streetcar would operate in mixed traffic. Both the local bus and streetcar would operate in the curb lane.

The BAT lanes would extend from University Drive to US 1 while the limited stop service at 15 minute headway during peak/off peak hours would be provided from the Sawgrass Mills Mall to SR A1A. The streetcar would operate in mixed traffic west of University Drive and east of US 1. In addition, the streetcar would operate in mixed traffic in the vicinity of I-95 and Florida's Turnpike. In this alternative, the patrons would board the buses at the curb side stations at the Sawgrass Mills Mall, Nob Hill Road, Pine Island Road, University Drive, Inverrary Boulevard W., 56th Avenue, SR 7, 49th Street, NW 31st Avenue, NW 27th Avenue, NW 21st Avenue, Powerline Road, Andrews Avenue, Dixie Highway, US 1 and SR A1A, and/or at the bus islands. Transit patrons would realize travel time and schedule reliability benefits stemming from transit signal priority, traffic signal progression, and bus islands. Amenities to be provided at bus stops and/or stations could include real time passenger information boards, map display panels, covered shelters, benches, trash cans, bicycle racks, etc.

Figure 5-15 shows improvements in the BAT lane with Streetcar alternative in the corridor, while Figure 5-16 provides an illustration of the BAT lane with Streetcar on Oakland Park Boulevard. The overall concept plan for this alternative including the short term improvements is included in Appendix B.

Alignment Description

Embedded tracks in the curb lane in both directions from Orange Grove Road to SR A1A would facilitate streetcar service in the BAT lanes. The alignment remains fairly linear as it traverses the corridor following the roadway geometry; however, the tracks would make a sharp 90 degree turn from NW 136th Avenue to Flamingo Road (see Sheet Number 20, Appendix B). The curve radii would require significant reduction in speed by the streetcar to negotiate the intersection. The horizontal curve west of Florida's Turnpike, east of SR 7, and at each terminus for tail tracks, would require reconstruction of the roadway to accommodate much of the roadway and track to meet design criteria.

Figure 5-15: Business Access & Transit (BAT) Lane with Streetcar, Illustration

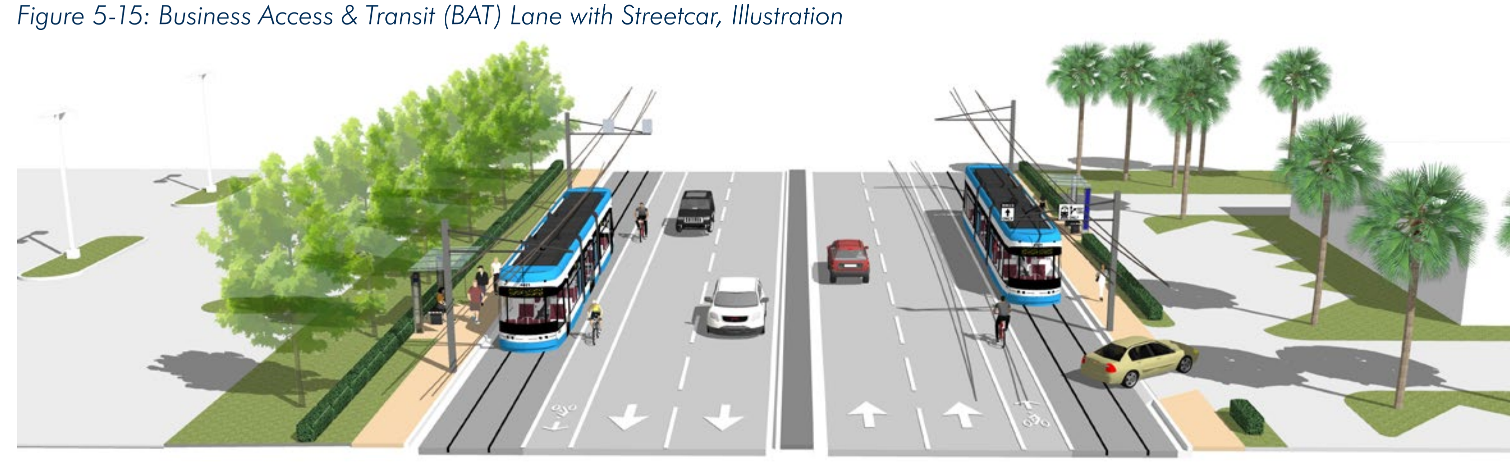
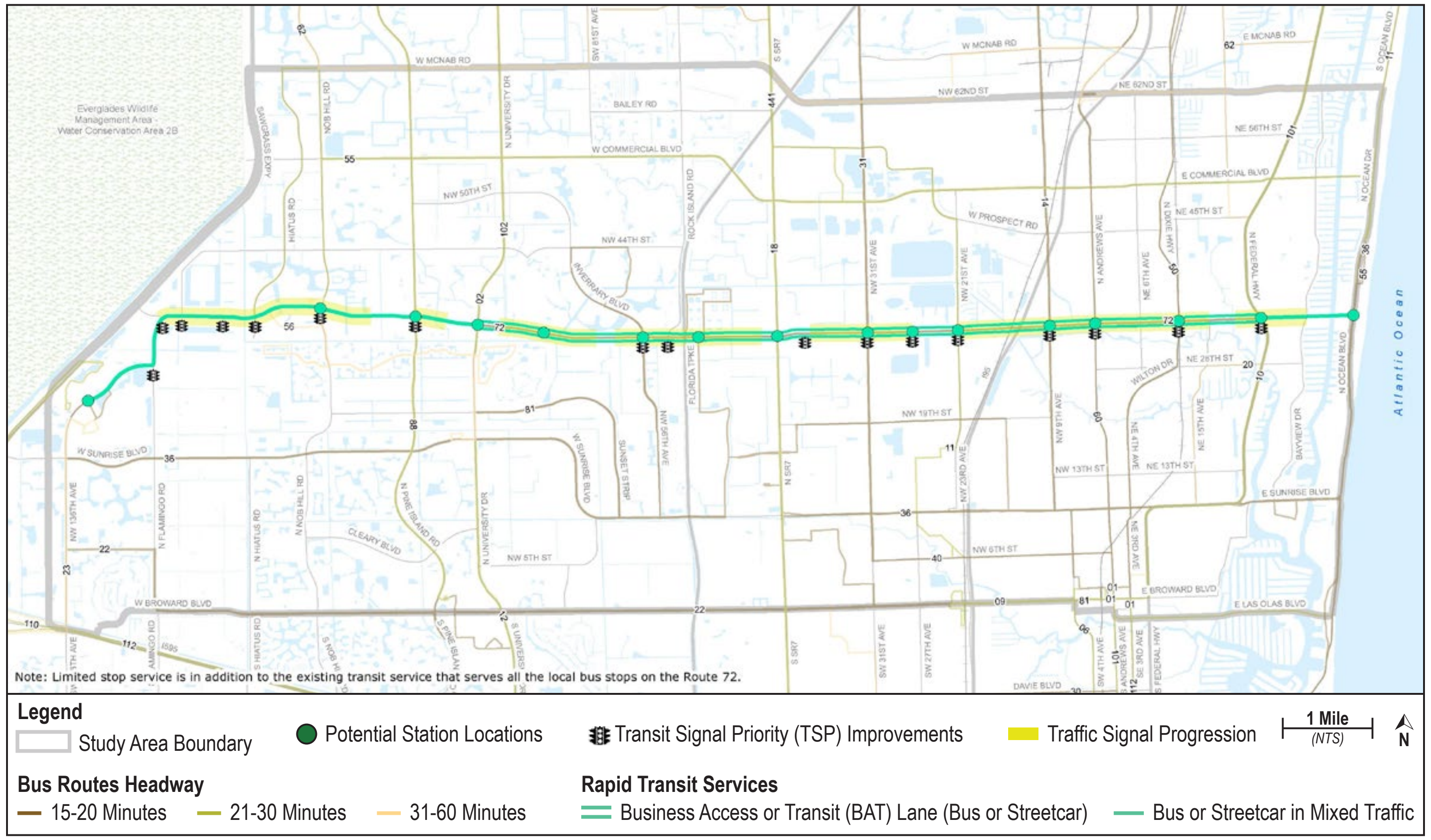


Figure 5-16: Business Access & Transit (BAT) Lane with Streetcar Alternative



Drainage challenges for accommodating rail tracks in the curb lanes include providing cross slopes per FDOT requirements on standard roadway sections with multiple lanes, which is 0.02 for the first two (2) inside lanes away from the profile grade line and 0.03 for the next two (2) outside lanes. With an urban roadway with relatively flat profiles (0.003 gutter grades) like Oakland Park Boulevard it may be difficult to effectively add track to the outside lane and move water to inlets from the interior lanes. This could create ponding and other drainage issues in normal crown sections. Also, the addition of rail tracks along the outside lane of an existing roadway with standard six inches (6") of curbing would require special inlet design for the higher curbing used for the boarding areas along the project.

The vertical alignment is relatively level except for where Oakland Park Boulevard passes over Florida's Turnpike and the bridge over the Intracoastal Waterway (see Sheet Numbers 45 and 70 respectively, Appendix B). These segments of this alternative would require reconstruction of all or portions of the bridges.

Overhead signs indicating designated BAT lanes and bicycle lanes would be installed every mile along the corridor between University Drive and US 1. Further, given the traffic volume and adjacent land uses in the vicinity of Florida's Turnpike and I-95, the streetcar would operate in mixed traffic though the lanes they travel in may be designated as BAT lanes. In addition to the streetcar service, local bus service (Route 72) would also operate in BAT lanes. Auxiliary lanes in the eastbound direction would provide additional capacity and facilitate better access to the northbound I-95 ramps (see Sheet Numbers 58 and 59 respectively, Appendix B).

Typical Section

Proposed typical section #1 (see Sheet Number 11, Appendix B) for this alternative begins at the Sawgrass Mills Mall on the west end and continues through to I-95. This proposed typical section has two 11.0 foot lanes with a five (5) feet bicycle lane and one 11.0 foot BAT lane on the outside with embedded tracks. The five (5) feet bicycle lane should be situated inside of the BAT lane (between the BAT lane and travel lane) because by placing the bicycle lane inside of the rail tracks bicycles would avoid excessive crossing of the tracks when the streetcar approaches stations. Sidewalks would vary from five (5) feet to eight (8) feet depending on the mast locations for the overhead wiring and lighting. Additional border width on the left- and right-side of the road varies from zero (0) feet to 42 feet.

Proposed typical section #2 (see Sheet Number 12, Appendix B) applies to the segment between I-95 to US 1, where streetcars would be in the outside lanes with right turn vehicles only allowed in the BAT lane with embedded tracks. The roadway and transit configuration for the portion from US 1 to SR A1A would be similar to the proposed typical section # 2, except that the streetcar would operate in mixed traffic on the outside lane with embedded tracks. The vertical poles which carry the overhead wires would be placed at the back of the sidewalk approximately 150 feet to 200 feet apart in both directions.

Enhanced Stations and Bus Islands

Enhanced stations along the curb and bus islands (see Sheet Numbers 13, 14, and 15, Appendix B) would be at the same locations as the BAT lane with Bus alternative, except for those stations at the western and eastern terminus of the alternative which would accommodate rail tracks. The curbing at the stations would be several inches higher than standard curbing, providing for level boarding and alighting.

Constraints and Opportunities

The existing roadway from the Sawgrass Mills Mall to SR A1A has some challenges when designing an alignment for streetcars along the outside lanes of the corridor. These include a sharp 90 degree turn from NW 136th Avenue to Flamingo Road. Florida's Turnpike Bridge and the Intracoastal Waterway Bridge would need significant modification to accommodate streetcars if not total replacement. The I-95 interchange would potentially require total reconstruction because of ramp configurations and vertical clearances would not be met. The South Florida Rail Corridor (SFRC) and FEC railroad crossings also create a need for special trackwork that may lead to higher maintenance costs besides requiring regulatory approvals or waivers.

Opportunities exist if variances and exceptions are allowed with special technology that would allow the streetcar to operate in mixed traffic with battery power to cross the interchange and a retractable overhead mast. The opportunity exists on the west side of Florida's Turnpike to accommodate streetcars because of the wide right-of-way.

5.4.5 EXCLUSIVE LANE WITH BUS ALTERNATIVE

In addition to the improvements identified for the Enhanced Bus Service alternative (except for the queue jump lanes), this alternative would dedicate one traffic lane in each direction in the median for exclusive transit use. In other words, transit vehicles would operate in their own dedicated right-of-way and interface with general traffic only at intersections.

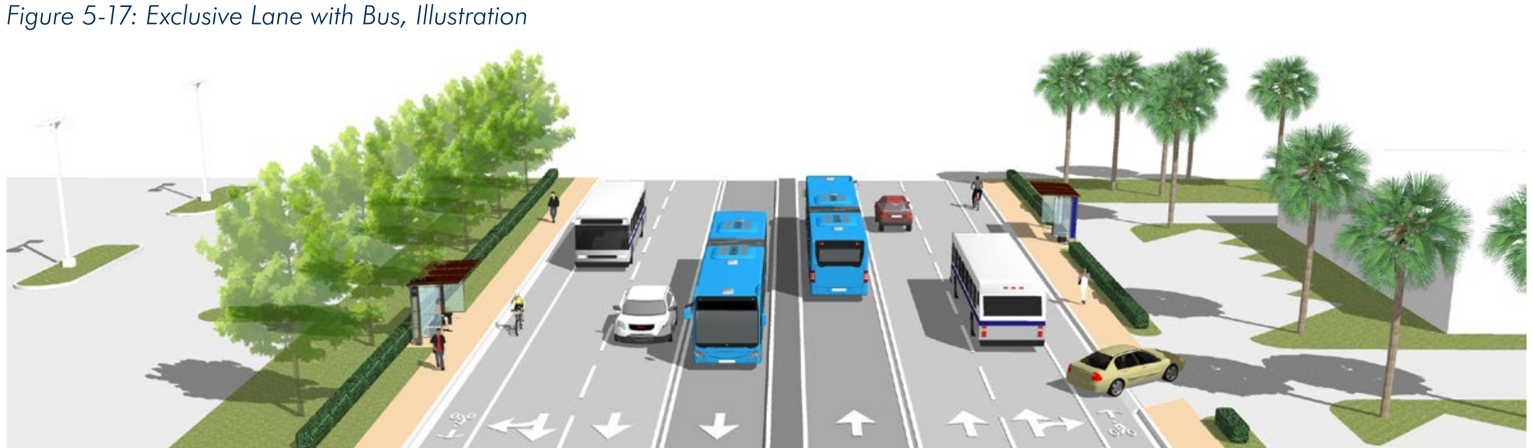
The exclusive median transit lanes would extend from University Drive to US 1. The local and limited stop bus services would operate in mixed traffic in the vicinity of I-95 and Florida's Turnpike. The limited stop transit service at 15 minute headway during peak/off peak hours would be provided from the Sawgrass Mills Mall to SR A1A. Transit patrons would board the bus or streetcar using median stations at the Sawgrass Mills Mall, Nob Hill Road, Pine Island Road, University Drive, Inverrary Boulevard W., 56th Avenue, SR 7, 49th Street, NW 31st Avenue, NW 27th Avenue, NW 21st Avenue, Powerline Road, Andrews Avenue, Dixie Highway, US 1 and SR A1A intersections. Operational improvements such as transit signal priority and traffic signal progression, and physical improvements such as, bus stop and/or station amenities (real time passenger information, map display panel, shelter, benches, trash cans, bicycle racks) would be an integral part of this alternative.

Figure 5-17 provides an illustration of the Exclusive Lane with Bus alternative on Oakland Park Boulevard while Figure 5-18 shows improvements in the Exclusive Lane with Bus alternative in the corridor. The overall concept plan for this alternative including the short term improvements is included in Appendix C.

Alignment Description

The Exclusive Lane with Bus alternative includes a median alignment with one lane in each direction dedicated for transit use only (see Sheet Numbers 34 to 66, Appendix C). The median alignment starts west of University Drive and ends east of US 1 and the bus operates in mixed traffic west of University Drive and east of US 1; and also would operate in mixed traffic in the vicinity of Florida's Turnpike (see Sheet Numbers 41 to 44, Appendix C) and I-95 (see Sheet Numbers 55 and 56, Appendix C). The local bus (Route 72) service would serve the bus islands at Nob Hill Road, Pine Island Road, University Drive, and Inverrary Boulevard (see Sheet Numbers 27, 31, 34, and 41 respectively, Appendix C).

Figure 5-17: Exclusive Lane with Bus, Illustration

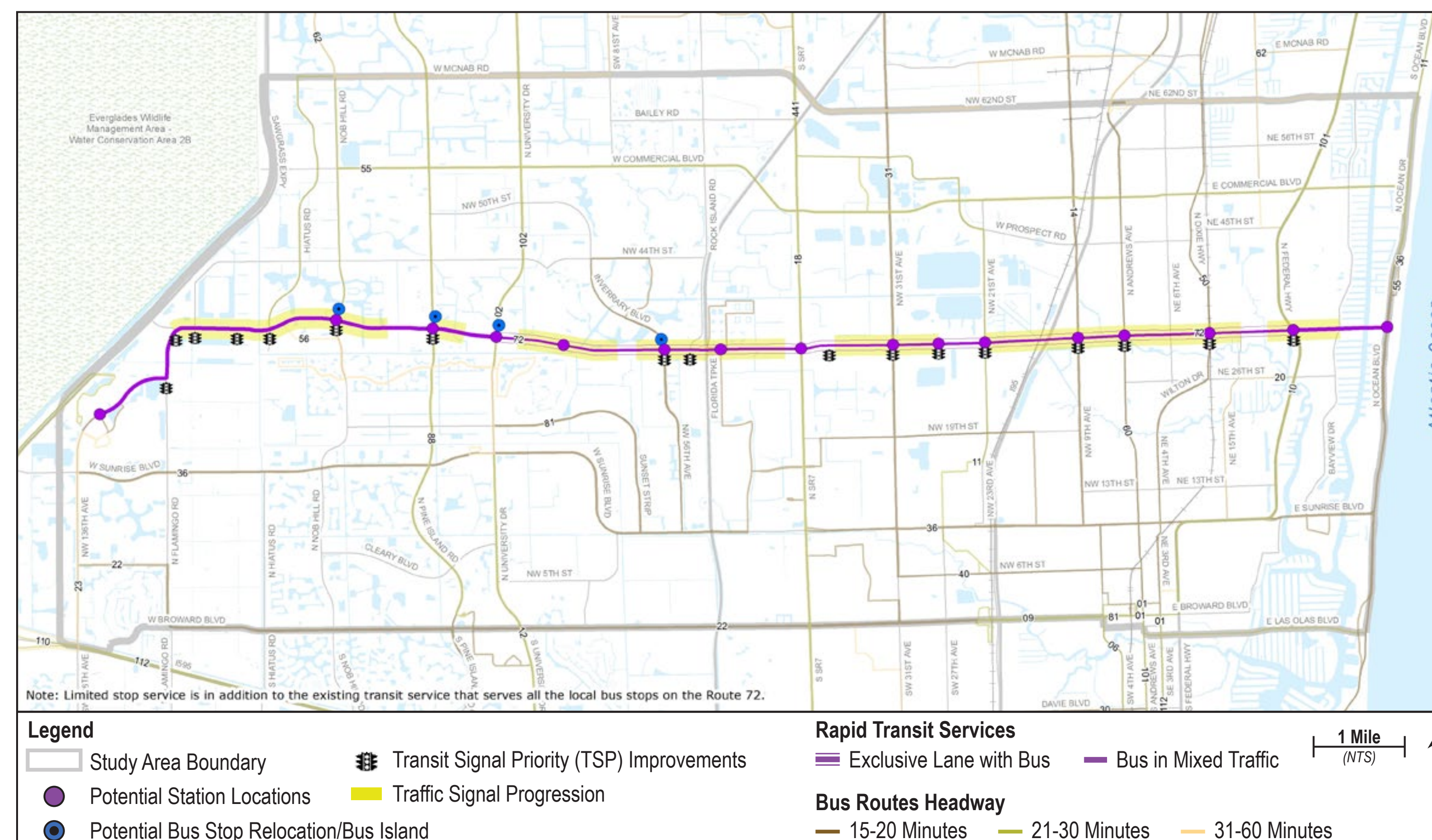


In this alternative, the median and turn lanes would be modified to accommodate bus running way and stations. The left turning movements for vehicles would be limited to the critical intersections and follow FDOT Access Management Criteria. Additional left turning movements may be allowed where right-of-way and geometry allow for turning movements.

Critical intersections where the proposed alignment would shift out from the existing alignment to allow for left turn lanes are at University Drive, West Inverrary Boulevard, Inverrary Boulevard, SR 7, NW 31st Avenue, Oakland Forest Drive, NW 21st Avenue, Powerline Road, Andrews Avenue, Dixie Highway, and the Corral Ridge Mall west of US 1 (see Sheet Numbers 34, 37, 41, 46, 50, 52, 53, 57, 59, 62, and 65 respectively, Appendix C). Other critical horizontal shifts would occur at Rock Island Road to NW 48th Avenue (see Sheet Numbers 42 to 44, Appendix C), and the I-95 interchange to allow for buses to shift from the median and then back to mixed traffic (see Sheet Numbers 55 and 56, Appendix C). Auxiliary lanes in the eastbound direction provide additional capacity and facilitate better access to northbound I-95 ramps (see Sheet Numbers 56 and 57 respectively, Appendix C).

The vertical alignment is not critical for this alternative since the articulated bus currently operates in this corridor, which is similar to the transit vehicle proposed in this alternative.

Figure 5-18: Exclusive Lane with Bus Alternative



Typical Section

Proposed typical section #1 (see Sheet Number 11, Appendix C) from University Drive to I-95 has a minimum 30 feet median with FDOT Type D curbing used to separate the median from the roadway. The median would have two (2) 11.75 feet bus lanes (one in each direction) with five (5) feet separation between the lanes. The five (5) feet separation would accommodate inlets and drainage pipe to receive the additional water runoff from the added impervious area. The six (6) lane urban section outside of the median would be three (3) 11 feet lanes with the two (2) inside lanes serving as left turn deceleration and storage area. Five (5) feet wide bicycle lanes would be made continuous for the length of the section with six (6) feet sidewalk at the right-of-way line or back of outside curb where right-of-way is narrow. The border width would vary from zero (0) feet to 45 feet on the left and right sides of the roadway.

Proposed typical section #2 (see Sheet Number 12, Appendix C) from I-95 to east of US 1 would have a similar median width as in proposed typical section #1 except that the lane configuration would be reduced to two lanes on each side of the median. This would accommodate the exclusive transit lanes within the existing right-of-way. Left turns would be allowed from the inside "through" lane at critical intersections. Bicycle lanes (5 feet) would be added to both sides for this section, a six (6) feet sidewalk would be reconstructed at the back of curb. The border width would vary three (3) feet to 8.4 feet from the back of sidewalk on this typical section. Right-of-way acquisition for this segment would be minimal because stations would be made internal to the roadway with the reduction in through lanes for the median widening.

Enhanced Stations and Bus Islands

Footprint for the median bus stations varies from 37 feet x 120 feet to 37 feet x 160 feet. The median stations would be located at the intersections to ensure that transit riders can safely access the platform. The median requires an additional seven (7) feet widening to accommodate a station that includes bus shelter and handrails. The approximate length of the station would be 120 feet to 160 feet, which allows for a two-car train set. A typical section for enhanced bus station in the median is shown on Sheet Number 13 in Appendix C. Central platform configuration with tracks on either side of the platform would require buses with left-side doors; however, if a split platform configuration is used wherein the tracks are located between the platforms, specialized designed buses with left-side doors would not be required.

Bus islands would be used by local buses on Route 72 except at University Drive bus island which would also serve the limited-stop service. Bus islands at Nob Hill Road, Pine Island Road, University Drive, and Inverrary Boulevard (see Sheet Numbers 27, 31, 34, and 41, Appendix C) are included in this alternative. The bus island at SR 7 cannot be accommodated given right way constraints and intersection geometry. Accommodating a bus island at SR 7 would require an extremely large intersection footprint that would be difficult for pedestrians or bicyclists to safely negotiate in a reasonable amount of time. Further, a bus island at SR 7 in this alternative would require large right-of-way acquisition for realigning the roadway per the design criteria.

Constraints and Opportunities

The constraints for this alternative include modifying and eliminating median openings that provide access to businesses or neighborhoods and the reduction in dedicated "through" lanes for general traffic. One of the opportunities in this alternative is to have continuous bicycle lanes for a majority of the corridor between the Sawgrass Mills Mall and the eastern terminus at the SR A1A.

5.4.6 EXCLUSIVE LANE WITH STREETCAR ALTERNATIVE

In addition to the improvements identified for the Enhanced Bus Service alternative (except for the queue jump lanes), this alternative would dedicate one traffic lane in each direction in the median for exclusive transit use by streetcar. In other words, streetcars would operate in their own dedicated right-of-way and interface with general traffic only at intersections.

The exclusive median transit lanes would extend from Orange Grove Road to US 1 for the streetcar alternative. The wide median west of University Drive allows for constructing exclusive transit lanes in the median at significantly lower cost than providing embedded rail tracks in the curb lanes. Therefore, the median exclusive lanes extend to the Sawgrass Mills Mall area under this alternative; however, the limited stop transit service at 15 minute headway during peak/off peak hours would be provided from the Sawgrass Mills Mall to SR A1A. Transit patrons would board the streetcar using median stations located at the intersections at Sawgrass Mills Mall, Nob Hill Road, Pine Island Road, University Drive, Inverrary Boulevard W., 56th Avenue, SR 7, 49th Street, NW 31st Avenue, NW 27th Avenue, NW 21st Avenue, Powerline Road, Andrews Avenue, Dixie Highway, US 1 and SR A1A.

Figure 5-19 provides an illustration of the Exclusive Lane with Streetcar alternative on Oakland Park Boulevard, while Figure 5-20 shows improvements in the Exclusive Lane with Streetcar alternative in the corridor. The overall concept plan for this alternative including the short term improvements is included in Appendix D.

Figure 5-19: Exclusive Lane with Streetcar, Illustration

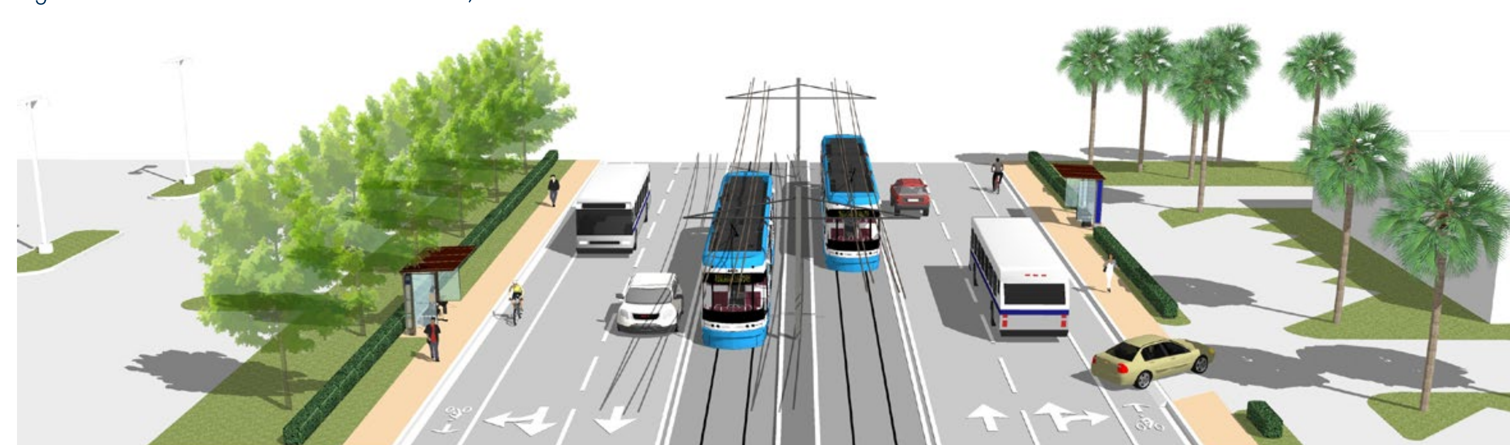
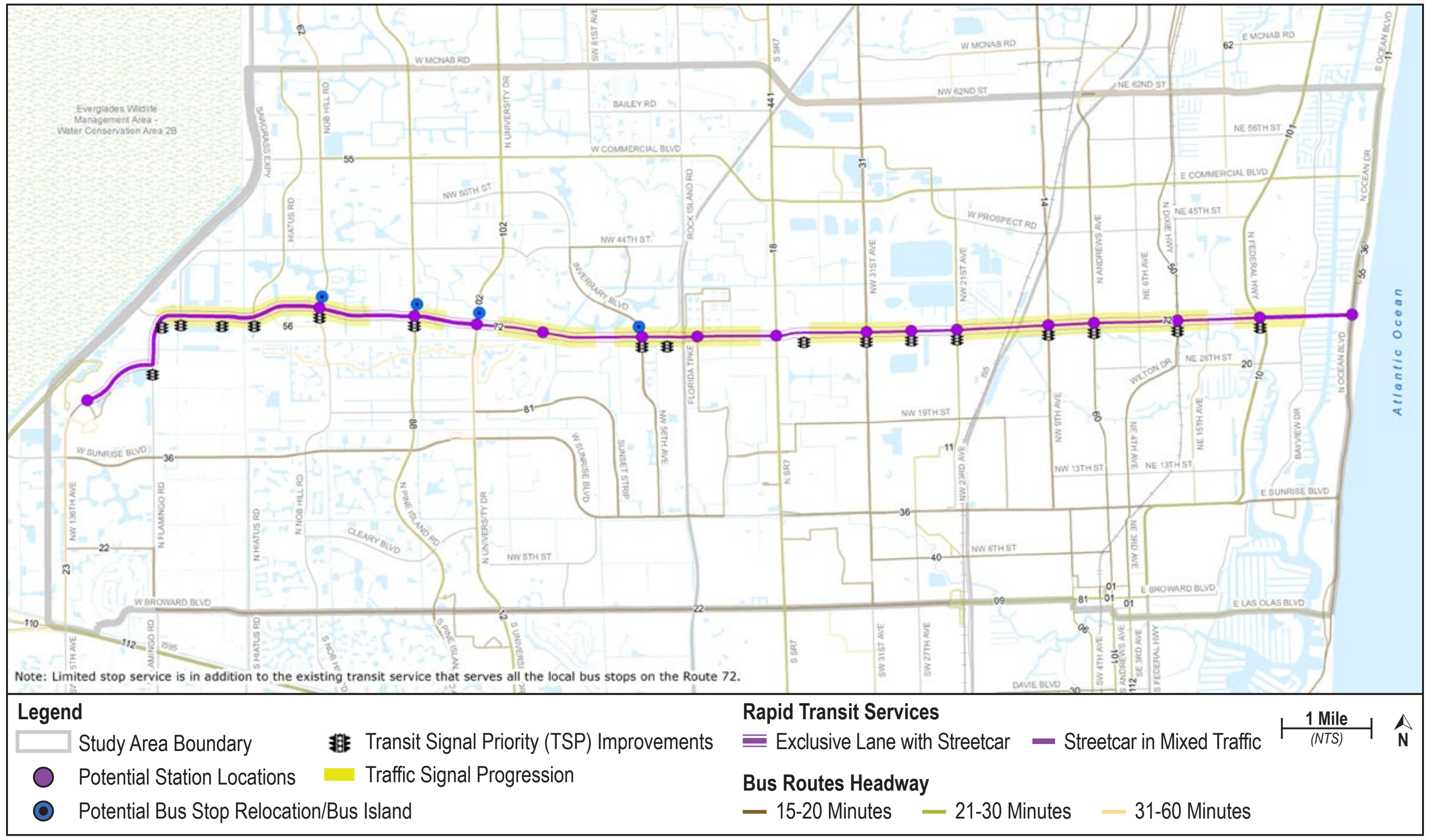


Figure 5-20: Exclusive Lane with Streetcar Alternative



Alignment Description

The alignment for the Exclusive Lane with Streetcar alternative starts at Orange Grove Road near the Sawgrass Mills Mall and ends at SR A1A. The guideway in the median requires a footprint of 30 feet and it flares out to 37 feet at intersections to accommodate median stations. Poles supporting overhead wires would be constructed every 150 feet to 200 feet while traction power substations would be built every mile along the alignment.

Several areas of significant deflections and widening would have to be constructed for this alternative. They include the intersection with the Flamingo Road (see Sheet Number 20, Appendix D) where double left turn lanes would need to be maintained. Also intersections at Nob Hill Road (see Sheet Number 27, Appendix D) and Pine Island Road (see Sheet Number 31, Appendix D) would require significant deflections and additional widening to construct the dual left turn lanes. The right-of-way should be sufficient to accommodate the extra widening at these intersections.

Other critical areas for the median alignment with a streetcar include the Oakland Park Boulevard bridge over Florida's Turnpike, the interchange at I-95, and the Intracoastal Waterway Bridge. In this alternative the alignment would either have to be switched to mixed traffic and/or the structures associated with these areas would need to be completely replaced.

The structures over Florida's Turnpike may not have the structural capacity or geometry capable of carrying a streetcar in an expanded median (see Sheet Number 43, Appendix D). The piers in the middle of the bridges that support the I-95 bridge at Oakland Park Boulevard cannot be removed (see Sheet Number 56, Appendix D). To accommodate the median streetcar alignment, the bridge would have to be raised, which in turn would require that the entire interchange be raised to the minimum height. Consequently, the I-95 bridge with larger roadway spans for Oakland Park Boulevard would be necessary. In other words, the entire I-95 interchange would be reconstructed. The Intracoastal Waterway Bridge is a draw bridge and may not have the mechanical or structural capacity to raise the extra steel supporting the rail system associated with the streetcar (see Sheet Number 68, Appendix D).

Auxiliary lanes in the eastbound direction provide additional capacity and facilitate better access to northbound I-95 ramps (see Sheet Numbers 56 and 57 respectively, Appendix D).

The urban roadway vertical grades on the Oakland Park Boulevard corridor at Florida's Turnpike can be as high as five (5) percent with sidewalks (where no landings are present). This grade should be acceptable for streetcars, which are not meant to exceed 9 percent and should be preferably no greater than seven (7) percent. Grades for moveable bridges at the Intracoastal Waterway are typically between two (2) percent and five (5) percent because the vertical clearance over the waterway is not an issue upon bridge openings. Grades of 2% to 5% are within the allowable range of (zero (0) percent to seven (7) percent desirable, and nine (9) percent maximum) for streetcars and should be acceptable grades.

Typical Section

Proposed typical section #1 (Sawgrass Expressway to I-95) and #2 (I-95 to US 1) (see Sheet Numbers 11 and 12, Appendix D) is similar to the typical sections for Exclusive Lane with Bus alternative as explained in Section 3.5.2, except that the curbing at the platform would be 10 inches high to allow for level boarding and alighting. The paved running way for the bus would also be replaced with tracks set into ballast, and therefore have a reduced drainage runoff compared to the median bus alternative. The vertical poles which carry the overhead wires would be placed in the middle of the section approximately 150 feet to 200 feet apart. When the streetcar approaches the intersection, the ballasted track would change to embedded track. The roadway and transit configuration for the portion from US 1 to SR A1A would be similar to proposed typical section # 2 (I-95 to US 1) except that the streetcar would be in mixed traffic on the outside lane with embedded tracks.

Enhanced Stations and Bus Islands

Enhanced stations in the median and bus islands (see Sheet Numbers 27, 31, 34, and 41, Appendix D) would be at the same locations as in case of the Exclusive Lane with Bus alternative, except for stations at the western and eastern terminus of the alternative which would accommodate rail tracks. The curbing at the stations would be 10 inches to provide level boarding and alighting. Sheet Number 13 in Appendix D shows a typical section at an enhanced station. Bus islands would be served by local buses on Route 72.

Constraints and Opportunities

As with the Exclusive Lane with Bus alternative, the median access would be completely reconfigured to only allow left turning movements at critical locations. The segments where the streetcar would operate in mixed traffic the lane would be shared by general traffic and streetcars, and both operators would have to negotiate their movements to avoid collisions. As stated above, other constraints include major reconstruction efforts at the existing corridor structures.

Opportunities include adding continuous bicycle lanes for most of the corridor length. Other opportunities include closing of unnecessary median access, and thus reducing additional conflict points along the corridor.

5.5 Tier 2 Screening and Evaluation Process

As discussed in Section 5.5, the build alternatives were defined in significant detail including development of 10 percent conceptual engineering design plans and operating plans to support the analysis of their advantages and disadvantages. This information was instrumental for developing capital cost and O&M cost estimates, ridership forecasts, and to analyze the traffic, transit, social, economic, and environmental benefits and impacts of each alternative, which provided the foundation for conducting a thorough and objective quantitative analysis during the Tier 2 evaluation phase.

Tier 2 Evaluation Methodology

The five build alternatives described in Section 5.4 were evaluated against 34 different evaluation criteria corresponding to 45 performance measures relative to the project goals and objectives. Table 5-4 provides a full matrix correlating the goals, objectives, evaluation criteria, and performance measures along with the raw data for each build alternative used in the Tier 2 screening and evaluation process. The performance measures used in the evaluation process are consistent with the FTA's *Final Policy Guidance on New and Small Starts Project Evaluation and Rating Process, August 2013*.

The Tier 2 evaluation was primarily a quantitative assessment using a three-tiered scoring system based on a range of values for the data of a given measure. With the exception of certain criteria such as the land use and economic development analyses, all other criteria were evaluated based on quantitative analysis. A three-tiered scoring system was developed using quartiles, wherein scores ranged from "1" to "3", with "3" being the best or the highest score, and "1" the worst or lowest score. The lower quartile (less than 25 percentile) results received a score of "1" and upper quartile (more than 75 percentile) received a score of "3", while those in between the lower and upper quartile received a score of "2". Note that the highest and lowest values are relative to each measure. For instance, in the case of capital cost and O&M cost, the scoring was inversely proportional to the values for the data. Therefore, the scoring was adjusted to maintain consistency (i.e., higher score reflected better performance). Compilation of performance measure results, including data valuations and scoring, can be found in Table 5-5. Calculation of scores for each performance measure is documented in the *Alternatives Benefit Cost Technical Memorandum, December 2013*.

Table 5-4: Tier 2 Performance Measures and Data

Goals	Objectives	Evaluation Criteria	Performance Measures Tier Two	Enhanced Bus Service	BAT lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Local and Regional Accessibility and Mobility: To enhance the mobility and accessibility of public transportation service in the Oakland Park Boulevard corridor	To increase transit ridership in the corridor.	Number of transit trips	Horizon year total trips per year	1,215,000	1,365,000	1,725,000	1,402,500	2,055,000
	To increase mobility for transportation disadvantaged populations.	Number of transit dependent trips	Trips by zero auto households per year	690,000	765,000	975,000	795,000	1,170,000
	To improve schedule reliability.	Inclusion of ITS and bus running way or transit guideway improvements.	Number of intersections with TSP capabilities, queue jumper lanes, and type of bus running way or transit guideway with regard to level of exclusivity	17 TSP, 3 queue jump lane; 0 miles of dedicated ROW	17 TSP and 9 miles of semi exclusive ROW	17 TSP and 8 miles of dedicated ROW	17 TSP and 9 miles of semi exclusive ROW	17 TSP and 14 miles of dedicated ROW
	To improve transit speeds and decrease corridor travel time.	Travel time savings	End-to-end travel time (change between existing and build alternative)	11 minutes faster	18 minutes faster	24 minutes faster	18 minutes faster	30 minutes faster
	To enhance access to current and projected employment centers, residential neighborhoods	Workers within one-half mile of potential stations	Year 2010 # of people within one-half mile of potential stations	82,100	82,100	82,100	82,100	82,100
			Year 2035 # of people within one-half mile of potential stations	115,700	115,700	115,700	115,700	115,700
		Jobs within one-half mile of potential stations	Year 2010 # of jobs within one-half mile of potential stations	40,900	40,900	40,900	40,900	40,900
			Year 2035 # of jobs within one-half mile of potential stations	49,200	49,200	49,200	49,200	49,200
	To better integrate transit service in the corridor with the regional system and improve connectivity with routes that intersect with the corridor's transit service.	Mode split	Increase in mode split within the study area (existing vs. build alternative)	2.0%	3.1%	4.8%	3.4%	7.0%
		Reduction in VMT	Daily Vehicle Miles of Travel (VMT) in the study area (existing vs. build alternative)	-1,000	-4,3000	-49,000	-47,000	-54,000
		Reduction in delay	Daily Vehicle hours of delay in the study area (existing v .build alternative)	-300	3,500	3,500	3,600	3,200
		Traffic Impacts	Number of intersections operating below level of service 'D' on Oakland Park Boulevard (Year 2035)	19	10	10	10	10
			Queuing and delay at major intersections on Oakland Park Boulevard (Year 2035)	3 minutes	2 minutes	5 minutes	2 minutes	5 minutes
			Auto Travel Time on Oakland Park Boulevard (Year 2035)	68 minutes	73 minutes	74 minutes	75 minutes	73 minutes
			Severity of traffic impact vis-à-vis bus running way or guideway configuration (Change in volume/capacity ratio on parallel facilities - 2035 no build v/s build alternative)	Same as 2035 No Build Alternative	Up to 10% increase on some segments	Up to 10% increase on some segments	Up to 10% increase on some segments	Up to 10% increase on some segments
			Severity of traffic impact vis-à-vis bus running way or guideway configuration (Change in auto travel time on parallel facilities - 2035 no build v/s build alternative)	Same as 2035 No Build Alternative	Up to 8% increase on some segments	Up to 8% increase on some segments	Up to 8% increase on some segments	Up to 8% increase on some segments
	To provide more opportunities for seamlessly and safely interfacing with non-motorized forms of transportation.	Connectivity and safety of non-motorized transportation systems	Pedestrian/bicycle access to businesses and residential neighborhoods in the corridor in a safe manner	88 miles of sidewalk improvements & 46 miles of bicycle lane improvements; bus islands at five intersections				

Table 5-4: : Tier 2 Performance Measures and Data (Continued)

Goals	Objectives	Evaluation Criteria	Performance Measures Tier Two	Enhanced Bus Service	BAT lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Land Use and Economic Development: To serve and complement existing and planned land uses, and help the corridor communities achieve the high quality of life they are seeking to achieve.	To be compatible with land use policies and plans along the corridor.	Future land use plan and policy	Tools to implement land use plan and policies	Consistent	Partially Consistent	Partially Consistent	Partially Consistent	Consistent
	To promote equitable, affordable housing and energy efficient housing choices.	Publicly supported housing within one-half mile of the project	Number of affordable housing projects within one-half mile of potential stations	5	5	5	5	5
		Minority population within one-half mile of potential stations	Year 2010 # of minority population within one-half mile of potential stations	50,929	50,929	50,929	50,929	50,929
		Transit dependent population within one-half mile of potential stations	Year 2010 # of zero-auto households within one-half mile of potential stations	2,948	2,948	2,948	2,948	2,948
		Low-income population within one-half mile of potential stations	Year 2010 # of low income households within one-half mile of potential stations	4,979	4,979	4,979	4,979	4,979
		School and college/university enrollment within one-half mile of potential stations	Year 2010 and Year 2035 student population within one-half mile of potential stations	2,253	2,253	2,253	2,253	2,253
	To further the goals of transit-oriented developments in the corridor and for those planned for the corridor.	Transit-supportive corridor policies	Presence of RAC, LAC, TOD or TOC land use, CRA within station areas and station area land use planning initiatives	Exists	Exists	Exists	Exists	Exists
	To increase number of jobs both within the corridor and throughout the region.	Economic development potential	Performance of land use and community development policies	Low	Medium	Medium	High	High
Environmental: To provide a positive contribution to the social and environmental quality of the corridor.	To enhance and preserve the social and physical environment, and keep potential impacts to sensitive resources to a minimum	Wetlands within the transit envelope	Wetland areas contiguous to the project	809 acres	809 acres	809 acres	809 acres	809 acres
		Parks within the transit envelope	Number and acreage of parks contiguous to the project	18	18	18	18	18
		Community facilities within quarter-mile of the project	Number of community facilities within quarter-mile of the project	232	232	232	232	232
		Noise sensitive receptors within 300 feet of the project	Number of parcels within 300 feet of the project	1,100	1,100	1,100	1,100	1,100
		Listed contaminated sites within one-quarter mile of the project	Number of FDEP regulated sites within quarter-mile of the project	156	156	156	156	156
		Threatened and endangered species within one-quarter mile of the project	Number of sites within quarter-mile of the project	11	11	11	11	11
		Historical and archeological sites within quarter-mile of the project	Number of potential sites within quarter-mile of the project	0	0	0	0	0
		Change in energy use	Annual energy consumption (in million Btu)	1,661	84,195	94,511	92,697	104,886
		Change in safety	Annual cost of disabling injuries and fatalities	$55,024	$2,782,285	$3,123,173	$3,007,836	$3,462,374
	To reduce the level of greenhouse gases and other motor vehicle-related emissions in the corridor.	Reduction in GHG emission	Tons of CO2 emissions per year (existing vs. build alternative)	116	5,929	6,656	6,400	7,369
		Air Quality - Change in carbon monoxide (CO), Nitrous Oxide (NOx), Particulate Matter (PM2.5), and Volatile Organic Compounds (VOC)	Estimated healthcare cost per year (existing vs. build alternative)	$4,124	$224,572	$252,126	$241,234	$277,976

Table 5-4: : Tier 2 Performance Measures and Data (Continued)

Goals	Objectives	Evaluation Criteria	Performance Measures Tier Two	Enhanced Bus Service	BAT lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Community Values: To be consistent with the needs and desires of the jurisdictions within and adjacent to the corridor.	To maximize community acceptance and support for transit improvements in the corridor.	Community vision	Level of support based on public comment (HOA/condo meetings, public workshops, website) and Technical Advisory Committee (TAC) input	Medium	Low	Low	Low	Low
Finance and Economic Competitiveness: To be feasible in terms of its capital and operational costs, and must be structured in a manner that results in a competitive FTA grant application.	To efficiently use available financial resources by leveraging funding from different transportation agencies in the region at all levels of government.	Short term operational goals and long term vision of transportation agencies	Level of support (improvements included in agencies work program and/or long term plans such as TDP/LRTP)	Medium	Medium	Medium	Low	Low
	To be cost effective in terms of capital cost and operations and maintenance costs.	Capital Cost	Annualized capital cost and O&M cost per trip	$6.53	$9.03	$9.26	$48.13	$31.82
			Estimated annualized capital cost per trip	$2.5	$5.1	$5.8	$40.6	$24.8
			Estimated annualized capital cost per passenger mile	$0.55	$1.11	$1.46	$6.38	$4.28
		Annual O&M cost	Estimated annual O&M cost	$4,790,000	$5,080,000	$4,820,000	$9,290,000	$8,240,000
			Estimated annual O&M cost per trip	$3.9	$3.7	$2.8	$6.6	$4.0
			Estimated annual O&M cost per passenger mile	$0.88	$0.80	$0.70	$1.04	$0.69

Table 5-5: Tier 2 Evaluation

Goals	Objectives	Evaluation Criteria	Performance Measures Tier Two	Enhanced Bus Service	BAT lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Local and Regional Accessibility and Mobility: To enhance the mobility and accessibility of public transportation service in the Oakland Park Boulevard corridor	To increase transit ridership in the corridor.	Number of transit trips	Horizon year total trips per year	1	2	3	2	3
	To increase mobility for transportation disadvantaged populations.	Number of transit dependent trips	Trips by zero auto households per year	1	2	3	2	3
	To improve schedule reliability.	Inclusion of ITS and bus running way or transit guideway improvements.	Number of intersections with TSP capabilities, queue jumper lanes, and type of bus running way or transit guideway with regard to level of exclusivity	1	2	2	2	3
	To improve transit speeds and decrease corridor travel time.	Travel time savings	End-to-end travel time (change between existing and build alternative)	1	2	3	2	3
	To enhance access to current and projected employment centers, residential neighborhoods	Workers within one-half mile of potential stations	Year 2010 # of people within one-half mile of potential stations	2	2	2	2	2
			Year 2035 # of people within one-half mile of potential stations	2	2	2	2	2
		Jobs within one-half mile of potential stations	Year 2010 # of jobs within one-half mile of potential stations	2	2	2	2	2
			Year 2035 # of jobs within one-half mile of potential stations	2	2	2	2	2
	To better integrate transit service in the corridor with the regional system and improve connectivity with routes that intersect with the corridor's transit service.	Mode split	Increase in mode split within the study area (existing vs. build alternative)	1	2	3	2	3
		Reduction in VMT	Daily VMT in the study area (existing vs. build alternative)	1	2	2	2	3
		Reduction in delay	Daily Vehicle hours of delay in the study area (existing v/s build alternative)	3	2	2	1	2
		Traffic Impacts	Number of intersections operating below level of service 'D' on Oakland Park Boulevard (Year 2035)	1	2	2	2	2
			Queuing and Delays at major intersections on Oakland Park Boulevard (Year 2035)	2	3	1	3	1
			Auto Travel Time on Oakland Park Boulevard (Year 2035)	3	1	1	1	1
			Severity of traffic impact vis-à-vis bus running way or guideway configuration (Change in volume/capacity ratio on parallel facilities - 2035 no build vs. build alternative)	3	2	2	2	2
			Severity of traffic impact vis-à-vis bus running way or guideway configuration (Change in auto travel time on parallel facilities - 2035 no build v/s build alternative)	3	2	2	2	2
	To provide more opportunities for seamlessly and safely interfacing with non-motorized forms of transportation.	Connectivity and safety of non-motorized transportation systems	Pedestrian/bicycle access to businesses and residential neighborhoods in the corridor in a safe manner	2	2	2	2	2

Note: High score indicates better performance vis-à-vis a given criterion. Performance criteria highlighted in green are directly related to the purpose and need for the project, while the criteria in orange are related to traffic impacts.

Table 5-5: Tier 2 Evaluation (Continued)

Goals	Objectives	Evaluation Criteria	Performance Measures Tier Two	Enhanced Bus Service	BAT lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Land Use and Economic Development: To serve and complement existing and planned land uses, and help the corridor communities achieve the high quality of life they are seeking to achieve.	To be compatible with land use policies and plans along the corridor.	Future land use plan and policy	Tools to implement land use plan and policies	3	2	2	2	3
	To promote equitable, affordable housing and energy efficient housing choices.	Publicly supported housing within one-half mile of the project	Number of affordable housing projects within one-half mile of potential stations	2	2	2	2	2
		Minority population within one-half mile of potential stations	Year 2010 # of minority population within one-half mile of potential stations	2	2	2	2	2
		Transit dependent population within one-half mile of potential stations	Year 2010 # of zero-auto households within one-half mile of potential stations	2	2	2	2	2
		Low-income population within one-half mile of potential stations	Year 2010 # of low income households within one-half mile of potential stations	2	2	2	2	2
		School and college/university enrollment within one-half mile of potential stations	Year 2010 and Year 2035 student population within one-half mile of potential stations	2	2	2	2	2
	To further the goals of transit-oriented developments in the corridor and for those planned for the corridor.	Transit-supportive corridor policies	Presence of RAC, LAC, TOD or TOC land use, CRA within station areas and station area land use planning initiatives	2	2	2	2	2
	To increase number of jobs both within the corridor and throughout the region.	Economic development potential	Performance of land use and community development policies	1	2	2	3	3
Environmental: To provide a positive contribution to the social and environmental quality of the corridor.	To enhance and preserve the social and physical environment, and keep potential impacts to sensitive resources to a minimum.	Wetlands within the transit envelope	Wetland areas contiguous to the project	2	2	2	2	2
		Parks within the transit envelope	Number and acreage of parks contiguous to the project	2	2	2	2	2
		Community facilities within quarter-mile of the project	Number of community facilities w/in quarter-mile of the project	2	2	2	2	2
		Noise sensitive receptors within 300 feet of the project	Number of parcels within 300 feet of the project	2	2	2	2	2
		Listed contaminated sites within one-quarter mile of the project	Number of FDEP regulated sites within quarter-mile of the project	2	2	2	2	2
		Threatened and endangered species within one-quarter mile of the project	Number of sites within quarter-mile of the project	2	2	2	2	2
		Historical and archeological sites within quarter-mile of the project	Number of potential sites within quarter-mile of the project	2	2	2	2	2
		Change in energy use	Annual energy consumption (in million Btu)	1	2	2	2	3
		Change in safety	Annual cost of disabling injuries and fatalities	1	2	2	2	3
	To reduce the level of greenhouse gases and other motor vehicle-related emissions in the corridor.	Reduction in GHG emission	Tons of CO2 emissions per year (existing vs. build alternative)	1	2	2	2	3
		Air Quality - Change in carbon monoxide (CO), Nitrous Oxide (NOx), Particulate Matter (PM2.5), and Volatile Organic Compounds (VOC)	Estimated healthcare cost per year (existing vs. build alternative)	1	2	3	2	3

Note: High score indicates better performance vis-à-vis a given criterion. Performance criteria highlighted in green are directly related to the purpose and need for the project, while the criteria in orange are related to traffic impacts.

Table 5-5: Tier 2 Evaluation (Continued)

Goals	Objectives	Evaluation Criteria	Performance Measures Tier Two	Enhanced Bus Service	BAT lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Community Values: To be consistent with the needs and desires of the jurisdictions within and adjacent to the corridor.	To maximize community acceptance and support for transit improvements in the corridor.	Community vision	Level of support based on public comment (HOA/condo meetings, public workshops, website) and Technical Advisory Committee (TAC) input	2	1	1	1	1
Finance and Economic Competitiveness: To be feasible in terms of its capital and operational costs, and must be structured in a manner that results in a competitive FTA grant application.	To efficiently use available financial resources by leveraging funding from different transportation agencies in the region at all levels of government.	Short term operational goals and long term vision of transportation agencies	Level of support (improvements included in agencies work program and/or long term plans such as TDP/LRTP)	2	2	2	1	1
	To be cost effective in terms of capital cost and operations and maintenance costs.	Capital Cost	Annualized capital cost and O&M cost per trip	3	2	2	1	1
			Est. annualized capital cost per trip	3	2	2	1	1
			Est. annualized capital cost per passenger mile	3	2	2	1	1
		Annual O&M cost	Estimated annual O&M cost	3	2	3	1	1
			Est. annual O&M cost per trip	2	2	3	1	2
			Est. annual O&M cost per passenger mile	1	2	2	1	3

Note: High score indicates better performance vis-à-vis a given criterion. Performance criteria highlighted in green are directly related to the purpose and need for the project, while the criteria in orange are related to traffic impacts.

Tier 2 Evaluation and Performance Assessment

A brief discussion of the evaluation and performance assessment relative to project goals and objectives follows.

Goal for Local and Regional Mobility

As indicated in Table 5-6, eleven (11) evaluation criteria and 17 corresponding performance measures relative to six (6) objectives were used to assess the local and regional mobility goal. The performance measures can largely be categorized as transit ridership for choice riders and zero-car auto households, schedule adherence and reliability, access to job market (transit travel time, station area jobs and households), traffic impacts, and bicycle/pedestrian connectivity.

The Exclusive Lane with Bus and Streetcar alternatives outperformed the other alternatives on the basis of transit ridership, schedule adherence and reliability, and transit travel time given that transit would operate in a dedicated right-of-way with minimal interference from general purpose traffic in the corridor. On the other hand, traffic impacts resulting from implementation of the Enhanced Bus Service alternative would be less compared with the BAT Lane and Exclusive Lane alternatives for both buses and streetcars. The *Transportation Impacts Assessment Technical Memorandum, August 2013* provides a detailed assessment of transit and traffic impacts of the build alternatives. Since all of the alternatives accommodate 16 stations in the same general location they provide the same level of access to households and jobs and therefore perform equally on this specific performance measure. Table 5-4 includes the raw data for each performance measure and Table 5-5 provides an assessment relative to each criterion for all of the build alternatives.

Table 5-6: Local and Regional Mobility Goal

Project Goals	Evaluation Criteria & Performance Measures	Alternatives: Enhanced Bus Service	BAT Lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Local & Regional Accessibility Goal: To enhance the mobility and accessibility of public transportation service in the Oakland Park Boulevard Corridor.	Six (6) objectives, 11 evaluation criteria, and 17 performance measures	31	34	36	33	38

Overall, the Exclusive Lane with Streetcar and Bus alternatives exhibit the best performance for the local and regional mobility goal, followed closely with the BAT Lane with Bus and Streetcar alternatives.

Goal for Land Use and Economic Development

The land use and economic development goal includes four (4) objectives, eight (8) evaluation criteria corresponding to eight (8) performance measures (Table 5-7). Four (4) of the eight performance measures are related to land use and zoning while the others address transit dependent populations and/or demographics within ½ mile radius of potential stations.

All of the build alternatives perform equally on criteria related to station area demographics and zoning since this assessment is driven by location of specific populations in the vicinity of the potential stations and presence of transit supportive policies along the corridor. As mentioned in Section 5.4, all of the build alternatives accommodate 16 stations along the same alignment along the Oakland Park Boulevard corridor.

Table 5-7: Land Use and Economic Development Goal

Project Goals	Evaluation Criteria & Performance Measures	Alternatives				
		Enhanced Bus Service	BAT Lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Land Use and Economic Development: To serve and complement existing and planned land uses, and help the corridor communities achieve the high quality of life they are seeking to achieve.	Four (4) objectives, eight (8) evaluation criteria, and eight (8) performance measures	16	16	16	17	18

Note: Cumulative score relative to land use and economic development goal.

In general, the existing land use pattern in the central portion of the corridor (i.e., between University Drive and US 1) are more supportive of high investment transit alternatives such as the Exclusive Lane with Streetcar alternative. Further, the local government comprehensive plans and policies in this corridor focus on increasing and maximizing transit ridership by enhancing existing BCT bus service and bus stops as in case of the Enhanced Bus Service alternative. The local plans and polices do not specifically identify BAT Lane with Bus or Streetcar alternatives or Exclusive Lane with Bus or Streetcar alternatives in this corridor but these alternatives do increase transit ridership.

The local government comprehensive plans and community redevelopment area (CRA) plans along the Oakland Park Boulevard corridor have clearly stated goals of maximizing economic development and improving transit ridership. The BAT Lane and Exclusive Lane with Streetcar alternatives have the highest ratings since they are the most likely to draw significant private sector development around stations due to a more "permanent" form of mass transit that increases the developer's willingness to make significant investments. On the other hand, the Enhanced Bus Service alternative would be the least successful in achieving the goal to maximize economic development while it partially helps increases transit ridership. The BAT Lane and Exclusive Lane with Bus alternatives possess partial attributes of increasing transit ridership and catalyzing economic development.

Table 5-4 includes the raw data for each performance measure and Table 5-5 provides an assessment relative to each criterion for all of the build alternatives. The *Social, Economic, and Environmental Impact Assessment Technical Memorandum, September 2013* provides a detailed assessment of land use and demographics in the corridor as they relate to the build alternatives.

Overall, for the land use and economic development goal, the Exclusive Lane with Streetcar alternative outperforms the other build alternatives but only marginally. It should be noted that the numerical difference indicating relative performance of individual alternatives is merely one (1) or two (2) points.

Goal for Environmental Quality

As depicted in Table 5-8, eleven (11) evaluation criteria and eleven (11) corresponding performance measures relative to two (2) objectives were used to assess the environmental quality goal.

Table 5-8: Environmental Goal

Project Goals	Evaluation Criteria & Performance Measures	Alternatives				
		Enhanced Bus Service	BAT Lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Environmental: To provide a positive contribution to the social and environmental quality of the corridor.	Two (2) objectives, 11 evaluation criteria, and 11 performance measures	18	22	23	22	26

Note: Cumulative score relative to environmental goal.

There are relatively few differences between the various build alternatives with regard to transit service levels and alignment since all alternatives are along the same corridor and more or less within the existing right-of-way. The major discriminators between the streetcar and bus technologies are largely transit vehicles (rail vs. bus) and propulsion system (electricity vs. hybrid). It is recognized that the general differences that may influence the environmental effects among the two technologies include:

- Visual impact of overhead wire (catenary) associated with the streetcar alternatives
- Streetcar infrastructure would have a longer construction period
- More utility relocation associated with streetcars even though it has shallower excavation requirements.
- Maintenance facility and sub-stations needed to support streetcar mode.
- Streetcar has the potential for multicar and higher capacity vehicles which can reduce the number of trips.

The *Social, Economic, and Environmental Impact Assessment Technical Memorandum, September 2013* provides a detailed evaluation of the potential effect of the build alternatives in the corridor. For the purpose of this Tier 2 evaluation, the environmental impacts resulting from relative increased levels of service compared to the existing transit service levels were determined to be slight.

All of the build alternatives performed equally in terms of their potential effect on environmental quality for seven (7) of the eleven (11) evaluation criteria since the assessment was driven by spatial location of various environmental resources with respect to the alignment. The Exclusive Lane with Streetcar alternative outperformed the other alternatives on four (4) evaluation criteria with regard to change in energy use, change in safety, reduction in GHG emissions, and air quality that were assessed based on FTA's *New Starts and Small Starts Evaluation and Rating Process Final Policy Guidance, August 2013*.

Overall, the Exclusive Lane with Streetcar alternative performed best on the environmental quality goal, followed by the Exclusive Lane with Bus and the BAT Lane alternatives, while the Enhanced Bus Service alternative performed poorly. It should be noted that the spread between the total points between the top three alternatives is quite narrow.

Goal for Consistency with Community Vision

Only one performance measure was used to ensure consistency with community vision (Table 5-9). The general public was not requested to vote on their preferred alternative during the public workshops conducted in September 2013; however, comment forms were made available to the attendees for providing written comments. In addition, public comments were also received through the project website (www.oaklandparkboulevardtransitstudy.com).

Table 5-9: Community Values Goal

Project Goals	Evaluation Criteria & Performance Measures	Alternatives				
		Enhanced Bus Service	BAT Lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Community Values: To be consistent with the needs and desires of the jurisdictions within and adjacent to the corridor.	One (1) objective, one (1) evaluation criterion, and one (1) performance measure	2	1	1	1	1

Note: Cumulative score relative to community values goal.

In addition, comments from the January 2013 and April 2013 public workshops were also compiled to understand community concerns and support for different types of improvements being considered in the corridor. Further, comments received at homeowners' association meetings and city commission meeting in April 2013 were considered as inputs for assessing this performance measure. In general, the public was supportive of all of the short term improvements while a majority was concerned with the traffic impacts resulting from re-assigning a general purpose traffic lane for semi-exclusive or exclusive transit use. Based on these comments, the Enhanced Bus Service alternative received the highest rating compared to the other build alternatives.

Goal for Finance and Economic Competitiveness

The finance and economic competitiveness goal includes two (4) objectives, three (3) evaluation criteria corresponding to seven (7) performance measures (Table 5-10). Except for one (1) performance criterion that addresses local transportation agency support, all of the other metrics are related to capital cost and operations and maintenance (O&M) cost were normalized by different variables.

Table 5-10: Finance and Economic Competitiveness Goal

Project Goals	Evaluation Criteria & Performance Measures	Alternatives				
		Enhanced Bus Service	BAT Lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Finance and Economic Competitiveness: To be feasible in terms of its capital and operational costs, and must be structured in a manner that results in a competitive FTA grant application.	Two (2) objectives, three (3) evaluation criteria, and seven (7) performance measures	17	14	16	7	10

Note: Cumulative score relative to financ and economic competitiveness goal.

The increase in ridership between the different build alternatives is not proportional to the increase in their capital cost and operations and maintenance (O&M) costs. The capital cost for the BAT Lane and Exclusive Lane with Bus is three to four times higher than the capital cost for the Enhanced Bus Service alternative, but the increase in ridership is 50 percent higher (or 1½ times). The ridership difference the BAT Lane and Exclusive Lane with Bus alternatives compared to the streetcar alternatives is even more dramatic with the streetcar alternatives requiring six to eight times more investment while increasing ridership by less than 25 percent (or 1¼ times). In addition, the O&M cost for streetcar alternatives is approximately double compared to the bus based alternatives. Various different metrics listed in Table 5-4 support this assessment while Table 5-5 indicates the evaluation results for each of the metrics.

Support from local transportation agencies is based on BCT's most recent effort on their Transit Development Plan update, which identifies Oakland Park Boulevard as one of the candidates for "Enhanced Bus Corridor" improvements. It is anticipated that the Broward MPO's 2040 LRTP update will continue to consider Oakland Park Boulevard as one of the priority corridors for High Capacity Premium Transit improvements. Further, FDOT District Four has programmed design funds to further advance the short term improvement projects identified above in this corridor.

Overall, the Enhanced Bus Service alternative outperforms all of the other build alternatives on the finance and economic competitiveness goal, closely followed by the BAT Lane and Exclusive Lane with Bus alternatives. Both streetcar alternatives are placed a distant fourth and fifth.

5.5.1 TIER 2 EVALUATION RESULTS

After completing the Tier 2 evaluation, the project team found that the screening process did not result in one single alternative that unequivocally met all of the project goals and objectives or the Purpose and Need Statement. The project team considered a variety of different approaches to further quantifying these scores such as applying weights to different goals to normalizing the scores for each goal to simply summing up the scores for each goal; however, the numerical differences indicating ranking of alternatives relative to each other using any of these approaches was still narrow. Therefore, the project team conducted a qualitative analysis comparing the benefits and costs of the different alternatives and evaluated the performance of the build alternatives against FTA's project justification criteria to bolster the Tier 2 evaluation with the intent of identifying the most promising build alternative in the Oakland Park Boulevard. A discussion of the potential impacts as well as benefits and costs of the build alternatives is included in Sections 5.5.2 and 5.5.3 respectively.

5.5.2 PHYSICAL AND NATURAL ENVIRONMENTAL IMPACT ASSESSMENT

Transportation Impacts

Transportation impacts resulting from the implementation of build alternatives based on the detailed traffic impact analysis conducted for the Oakland Park Boulevard corridor study and documented the Transportation Impacts Assessment Technical Memorandum, August 2013 in are summarized below.

In the short term (2018), the increase in traffic volume would result in slightly longer traffic travel time in the corridor due to increased traffic congestion. The traffic signal progression improvement would help offset some of the degradation of travel time. The introduction of the limited-stop bus service and operational improvements such as TSP, queue jump lanes, bus islands, and revised local bus schedule would not have significant adverse impacts on traffic. Further, the short term improvements would help speed up the local bus on Route 72 and are anticipated to improve schedule adherence. However, the advantages of these operational improvements would start to diminish as the traffic volume and congestion grows in near future.

Table 5-11 summarizes and compares the long term traffic impacts on roadway capacity, travel time, and traffic operations resulting from the build alternatives with the 2035 No Build alternative. It also compares the reliability of transit service in terms of schedule adherence and consistent travel time (i.e., higher transit speed and reduced travel time) for these build alternatives. It can be concluded that the Enhanced Bus Service alternative would have the least adverse impact on traffic in the corridor given the oversaturated future traffic conditions on Oakland Park Boulevard; however, it would provide little transit reliability in the corridor given that the buses would operate in mixed traffic. On the other hand, the BAT Lane with Bus or Streetcar alternatives are forecast to have moderate adverse impacts on traffic but provide better transit reliability in the corridor. The Exclusive Lane with Bus or Streetcar alternatives would provide the highest transit reliability and performance while the study area traffic impacts would be comparable to the BAT Lane alternatives; however, the operational impacts resulting

Table 5-11: Transportation Impact Assessment Summary, 2035

Performance Measure	Alternatives						
	Existing Conditions	No Build	Enhanced Bus Service	BAT Lane		Exclusive Lane	
				Bus	Streetcar	Bus	Streetcar
Total annual corridor ridership	2,700,000	3,630,000	4,290,000	4,425,000	4,440,000	4,755,000	4,950,000
Annual ridership, Route 72	2,700,000	3,630,000	2,910,000	2,865,000	2,850,000	2,565,000	2,265,000
Annual ridership, Limited-stop Service	-na-	-na-	1,380,000	1,560,000	1,590,000	2,190,000	2,685,000
End-to-end transit travel time, One way	69 minutes	84 minutes	73 minutes	65 minutes	65 minutes	55 minutes	48 minutes
# of intersections below LOS 'D'	9	18	19	10	10	10	10
Delays at major intersections	~2 minutes	~3.5 minutes	~3 minutes	~2 minutes	~5 minutes	~2 minutes	~5 minutes
End-to-end transit travel time, One way (Peak Hour)	40 – 45 minutes	65 – 70 minutes	65 – 70 minutes	70 – 75 minutes	70 – 75 minutes	70 – 75 minutes	70 – 75 minutes
Change in volume/capacity ratio on parallel facilities compared to 2035 no build alternative	-na-	N/A	Same as 2035 no build alternative	Up to 10% increase on some segments	Up to 10% increase on some segments	Up to 10% increase on some segments	Up to 10% increase on some segments
Change in auto travel time on parallel facilities compared to 2035 no build alternative	-na-	-na-	Same as 2035 no build alternative	Up to 8% increase on some segments	Up to 8% increase on some segments	Up to 8% increase on some segments	Up to 8% increase on some segments
Per capita annual vehicle miles traveled (VMT) in the study area	-na-	5,850	5,850	5,830	5,820	5,820	5,820
Per capita annual vehicle hour of delay (VHD) in the study area	-na-	61	61	64	64	64	64
Transit Reliability	-na-	LOW	LOW	MEDIUM	MEDIUM	HIGH	HIGH
Traffic Impacts	-na-	LOW	LOW	MEDIUM	MEDIUM	HIGH	HIGH

Note: Ridership animalization factor, 300 days/year from reconfiguration of the center lanes and median to accommodate exclusive lanes for transit would result in somewhat higher traffic impacts on traffic operations when compared to BAT Lane alternatives that may not entirely be reflected in the micro simulation analysis given VISSIM model's limitations when it comes to dynamic assignment.

Socioeconomic, Land Use and Environmental Impacts

As evident from the detailed description of the build alternatives in Section 5.4, there are relatively few differences between the various alternatives with regard to transit service levels and alignment since all of the alternatives will be along the same corridor and more or less within the existing right-of way. The findings also suggest that the discriminators between the streetcar and bus technologies are largely transit vehicles (rail vs. bus) and propulsion system (electricity vs. hybrid). The general differences that may influence the environmental effects among the two technologies include:

- Visual impact of overhead wire (catenary) associated with the streetcar
- Streetcar infrastructure would have a longer construction period
- More utility relocation associated with streetcar even though it has shallower excavation requirements.
- Maintenance facility and sub-stations needed to support streetcar mode.
- Streetcar has the potential for multicar and higher capacity vehicles which can reduce the number of trips.

Further, the environmental impacts are generally relative to the increased levels of service compared to the existing transit service levels, and most differences are slight. The *Social, Economic, and Environmental Impact Assessment Technical Memorandum, September 2013* provides a detailed evaluation of the potential effect of the build alternatives in the corridor. A brief summary of the environmental impacts of the build alternatives follows:

Land Use and Redevelopment

- Existing land use and land development patterns in the western portion of the corridor is predominantly suburban in nature, which hinders non-motorized transportation and transit use, while higher densities and intensities in the central and eastern portion of the corridor generally increase and the scale of development and helps create a more pedestrian-friendly environment that supports transit use.
- Future land use designations along Oakland Park Boulevard generally support premium transit investment. The western terminus at the Sawgrass Mills Mall features high intensity development and an existing bus transfer center that are both supportive of the BAT and Exclusive Lane with Bus or Streetcar alternatives, while several key locations in the eastern portion of the corridor are slated for high intensity commercial, mixed use, and residential development.

Land Acquisition

- Potential right-of-way impacts would be anticipated at intersections for accommodating bus islands, and median stations or curb side stations as well as for providing contiguous bicycle lanes along Oakland Park Boulevard. The Enhanced Bus Service alternative has the least right-of-way impacts while the BAT Lane with Bus or Streetcar requires the largest amount of right-of-way (however, the right-of-way impacts are limited to the segment from SR 7 to I-95 under all of the build alternatives since this segment is severely constrained). Under the BAT Lane with Bus or Streetcar alternatives, there would be isolated right-of-way impacts east of I-95 to SR A1A.

Economic Development

- The eastern portion of the corridor has the highest potential for development from a private sector standpoint, while the areas near University Drive, SR 7 and NW 31st Avenue have the highest redevelopment potential in the corridor. Based on the experience of several communities in the country that have made investments in providing premium transit service, it is safe to assume that rail or streetcar alternatives have higher potential to spur economic development compared to bus based alternatives.

Environmental Justice

- Approximately 10 percent of all of the low income households and minority population in Broward County lives in the Oakland Park Boulevard corridor: defined as an area within one-half mile of the road. However, the concentration of low income households (14 percent) and minority population (64 percent) in the corridor is higher compared to that of Broward County, which has 12 percent low income households and 56 percent minority population as well as the study area (13 percent low income households and 59 percent minority population).
- Low income households are concentrated in the central portion of the corridor between University Drive and I-95, while minority population concentrations occur between Nob Hill Road and Dixie Highway. Since transit service levels will increase uniformly throughout the corridor, the environmental justice populations would not be negatively impacted. Further, the increased service levels and improved transit access would result in positive impacts on these populations. It should be noted that the BAT Lane with Bus and Exclusive Lane with Bus alternatives would require construction in the central portion of the study area and there could be temporary effects on populations in this area as their access would be modified. However, maintenance of traffic (MOT) plans should be able to mitigate any temporary adverse impacts.

Neighborhoods, including Community Facilities and Services

- More than 200 activity centers consisting of major shopping areas, community centers (such as libraries and civic centers, government centers) and other areas of community significance exist in the Oakland Park Boulevard corridor. Each of these centers represents areas that are likely to generate transit usage. Several residents in the six different municipalities in the corridor access these activity centers via more than ten (10) community bus routes. Each of the transit alternatives would enhance transit service along the corridor, provide connections with the community bus routes, and improve accessibility to these destinations. The Exclusive Lane alternatives with Bus or Streetcar are projected to have the highest ridership, therefore, increasing the number of individuals with access to these locations via transit.

Visual and Aesthetic

- All of the build alternatives include bus island stations which would enhance the character of the surrounding area with improved bicycle and pedestrian facilities, landscaping and use of iconic designs for bus shelters as well as unique lighting during evening periods.
- The alternatives using bus technology (Enhanced Bus Service, BAT Lane with Bus, and Exclusive Lane with Bus) would consist of the same or similar transit vehicles that are found on Oakland Park Boulevard today, although at greater frequencies.
- The Exclusive Lane with Bus or Streetcar alternatives assume a dedicated lane in the middle of the corridor, with transit stops located in the median. This configuration would result in the most significant visual change from what exists today of all of the alternatives being evaluated.
- The BAT Lane with Streetcar and Exclusive Lane with Streetcar alternatives may have adverse visual impacts from the catenary system consisting of both poles and wires used to provide power to the vehicles. These potential effects may be offset by the use of wireless streetcar technology; however, a more detailed analysis will be needed to determine whether the catenary/power system infrastructure is in fact a visual impact and whether a wireless technology is feasible).
- The study area intersects with three community redevelopment areas (CRAs), each of which have developed ambitious plans for their respective areas. The inclusion of architectural standards, landscaping treatments, public art, etc., will help shape the aesthetics of areas around transit stations that are a part of the various alternatives.

Threatened and Endangered Species

- A total of 46 federal and state listed species were identified in US Fish and Wildlife Service (FWS) and Florida Natural Areas Inventory (FNAI) databases as potentially occurring within the study area. Specific habitat requirements for most of the listed species preclude their presence within the project corridor.
- The corridor intersects USFWS consultation areas for the Everglade snail kite, piping plover, West Indian manatee, and American crocodile. Wood stork core foraging areas (CFAs) of two active nesting colonies also encompass the entire study area.
- The Intracoastal Waterway and the Middle River Canal (C-13) where they transect the project corridor are designated manatee protection zones.
- The Standard Manatee Conditions for In-Water Work and Standard Protection Measures for the eastern indigo snake will be required to ensure protection of these species during construction of the project.

Water Resources/Water Quality

- The study identified 82 acres of wetland and other surface waters within the study area. Water bodies directly adjacent to or transecting the Oakland Park Boulevard right-of-way are limited to other surface waters, man-made swales/drainage ditches, and retention ponds.
- The project study area is over the sole source Biscayne Aquifer and crosses two City of Sunrise well field protection areas.
- The proposed stormwater facility designs will include, at a minimum, the water quantity requirements as required by South Florida Water Management District (SFWMD) and Broward County.
- The proposed alternatives would not change the existing runoff points of discharge, nor significantly increase the existing amount of impervious area, or the pollutant loading of the runoff. Therefore, the proposed alternatives would not have a negative impact on water quality.
- The majority of the project is within mapped 100-year floodplains. Any improvements would occur at existing flood elevations; therefore, although this project would involve work within the horizontal limits of the 100-year floodplain, no work would be performed below the 100-year flood elevation and, as a result, the project would not encroach upon the base floodplain.

Historic, Archaeological, and Cultural Resources

- Three previously recorded linear historic resources and six potential historic structures lie within 500 feet of Oakland Park Boulevard. Further coordination with the Florida State Historic Preservation Office (SHPO) pursuant to Section 106 of the National Historic Preservation Act (NHPA) related to historic, cultural, archaeological and tribal resources will need to be conducted to determine if there is a potential for impact to any of them.

Parklands (Section 4(f) Resources)

- An inventory of the recreational resources within the project area revealed that nine potential 4(f) properties are found within 300 ft of the project corridor. The identified resources will need to be further evaluated to determine if there is a potential for impact from direct property acquisition, access alternation, noise, vibration, or air quality.

Hazardous Materials

- The study area traverses established and heavily developed areas of Broward County. There are approximately 93 regulated hazardous material facilities (e.g., gas stations, dry cleaners, etc.) located within 300 feet of the corridor. The majority of these facilities are located in the central and eastern sections of the corridor, where there are a multitude of commercial facilities.
- Construction requirements and methodology for the proposed system upgrades are anticipated to result in minimal subsurface disturbance, and impacts to existing contaminated areas are not anticipated due to the nature of the construction activities needed to support the alternatives.
- A comprehensive review of the design will need to be completed in order to avoid areas of potential contamination impacts to the maximum extent practical. This will also allow for the identification of areas where soil excavation and dewatering would occur for the installation of drainage structures and utilities.

Air Quality

- Broward County is located in an area currently designated as being in attainment for the National Ambient Air Quality Standards (NAAQS) as established by the Clean Air Act (CAA). For this project, a few criteria pollutants associated with vehicular emissions were selected to assess whether the proposed transit alternatives would impact regional air quality: Carbon Monoxide (CO), Nitrogen Dioxide (NOx), and Particulate Matter ([PM] 2.5 microns in size).
- Calculations show that the proposed alternatives would provide a net regional air quality benefit as compared to the existing condition, with the "Exclusive Lane with Bus" demonstrating the greater benefit. Operation of the alternatives would reduce regional criteria pollutants, mobile source air toxics (MSATs), and greenhouse gas (GHG) emissions due to regional decreases in motor vehicle emissions based upon the reduction of Vehicle Miles Traveled (VMT).

Noise and Vibration

- The potential affected environment for noise consists of properties where quiet is an essential element of their intended purposes such as residential areas, historic landmarks, schools, libraries, churches, outdoor amphitheaters, and hotels. Especially sensitive to vibration levels are medical facilities such as eye laser surgery.
- Due to the characteristics of the corridor, it is assumed that any impacts would be relatively close to the corridor. Noise/vibration sources are considered negligible from the alternatives due to the project being situated in a highly-developed, urban area with existing high ambient sound levels.
- Alternatives along this corridor will be developed in a manner sensitive to adjacent land uses with regard to noise and vibration impacts. Future studies will further assess noise and vibration impacts and consider recommendations for mitigation, if necessary.

Energy

- The No-Build Alternative would retain the existing automobile-based travel patterns and not change the current energy consumption patterns.
- Since transit is inherently more energy efficient than travel by single occupancy vehicle (SOV), the transit alternatives, through a reduction in the automobile-based VMT, create major benefits to energy resources. By putting more commuters on transit, less energy is wasted on automobile fuel in SOVs and, in the case of electric powered transit technologies, the energy production is primarily conducted away from the congested commuting areas.
- The proposed alternatives would provide a net reduction in energy resources as compared to the existing condition, with the "Exclusive Lane with Bus" demonstrating the greater benefit in energy reduction and the "Exclusive Lane with Streetcar" providing the most cost savings.

Indirect and Cumulative Effects

- Transportation improvement projects may have indirect (induced) effects in terms of new residential and new commercial development. Induced development associated with transit improvements, such as stations, is not expected to occur as inadvertent, uncontrolled sprawl, but as carefully planned development consistent with local and regional planning and policies. Therefore, indirect impacts from secondary development are not expected to be significant.
- Some changes in land use patterns, population density and growth rate are projected to occur in the study area regardless of this specific project. In this particular case, the bus stations are in established business districts and areas planned for revitalization and growth.
- Cumulative impacts consider the total impact (or effect) on a resource, ecosystem, or community from past, present, and reasonably foreseeable future actions. It is likely that any of the proposed build alternatives when combined with past transportation projects will contribute to cumulative impacts on natural, social and cultural resources within the project corridor. However, the magnitude of these cumulative impacts could be considered minimal given the urban character of the project corridor and its surrounding environment.
- The proposed creation of increased transit service is also expected to provide an overall benefit to air quality by reducing regional VMT. The increased transit service is expected to provide service to motorists who would otherwise travel between west and east Oakland Park Boulevard by motor vehicle. Consequently, this shift in travel mode is expected to reduce overall vehicle emissions.

5.5.4 CAPITAL COST AND O&M COST

The capital and O&M costs for the different build alternatives were estimated using the bus and streetcar capital cost and O&M cost models. These models are described in detailed in the *Capital Cost Methodology Technical Memorandum, March 2013* and *Operations &Maintenance Cost Methodology Technical Memorandum, March 2013* respectively. Table 5-12 provides the capital and O&M costs for the build alternatives. The annual O&M cost indicated below exclude the existing Route 72 bus service. Further, the annual O&M cost for the No Build alternative is approximately $0.8M more than the existing O&M cost to provide for the same level of transit service as today.

Table 5-12: Capital and O&M Costs, Tier 2 Alternatives

Costs	Alternatives					
	No Build Alternative	Enhanced Bus Service	BAT Lane with Bus	Exclusive Lane with Bus	BAT Lane with Streetcar	Exclusive Lane with Streetcar
Capital Cost (2012 dollars)	$3.0M	$29M	$84M	$126M	$706M	$665M
Annual O&M Cost (2012 dollars)	$5.4M	$5.5M	$5.7M	$5.4M	$9.9M	$8.8M

5.5.5 BENEFIT COST COMPARISON

Table 5-13 presents a comparison of benefits and cost of the five build alternatives and the no build alternative.

It is evident from the findings in Table 5-13 that the Enhanced Bus Service alternative helps improve the quality of transit service and shows ridership gains at low capital costs compared to the other build alternatives. It would, however, have nearly the same O&M cost as the BAT Lane and Exclusive Lane with Bus alternatives. It should be noted that the benefits from transit service improvements in the case of the Enhanced Bus Service alternative would diminish with increased traffic over the next five years and additional investment would be required to maintain headways. In addition, the Enhanced Bus Service alternative does not have significant environmental benefits and is not anticipated to stimulate land use and economic development.

The BAT Lane with Bus alternative increases transit ridership by 22 percent compared to the No Build alternative and provides reliable transit service with better on-time performance since buses would operate in a semi-exclusive right-of-way. This alternative is cost effective and would be a highly competitive project in the FTA's Small Starts program to leverage federal funds for capital improvements. In addition, the BAT Lane with Bus alternative has the potential to attract investment and spur economic development at low upfront capital costs compared to the streetcar alternatives. Further, the BAT Lane with Bus alternative provides the highest return on investment related to environmental benefits based on the size of the needed capital investment with respect to the cost savings resulting from improved air quality, safety and reduction in energy consumption. It is recognized that doubling the transit service in the corridor would result in additional O&M cost and reassigning general purpose traffic lanes would have some traffic impacts. With regard to corridor traffic operations, however, since there are a large number of driveways (approximately one driveway every 300 feet) in existence today along Oakland Park Boulevard, the curb lane (outside lane) does not function like through lane during rush hours.

The Exclusive Lane with Bus alternative has similar advantages as the BAT Lane with Bus alternatives but it outperforms the BAT Lane with Bus alternative with regard to transit speed and reliability as well as in attracting TOD investment; however, it does require higher upfront capital cost. The traffic impacts resulting from the Exclusive Lane with Bus alternative would be relatively high compared to the BAT Lane with Bus alternative since it would require access management and readjusting signal timing/ phasing. In addition, the likelihood of capital cost for this alternative to increase is higher because it requires reconstruction of the median on a major arterial roadway in a built-out urbanized corridor with constrained right-of-way. Further, the rate of return with respect to environmental benefits for the

Table 5-13: Benefits and Costs Comparison

Alternative	Benefits	Costs
No Build	• Marginal traffic impacts in the future given that traffic in the corridor is saturated; • Organic growth in transit ridership due to population and employment growth; and • Requires modest capital investment to acquire additional buses in immediate future to maintain existing headway.	• Increase in auto and transit travel time; • Does not stimulate land use and economic development; • Adversely impacts social and physical environment; and • Inevitable for both capital and O&M cost to increase in the future.
Enhanced Bus Service	• Marginal traffic impacts in the future given that the traffic in the corridor is saturated; • 18% increase in transit ridership primarily due to the introduction of limited stop service; and • Improvement in transit on-time performance in the short term due to ITS improvements.	• Auto and transit travel time to increase in the long term; • Limited potential stimulate land use and economic development; • Adversely impacts social and physical environment; • Inevitable for both capital and O&M cost to increase in the future
BAT Lane with Bus	• 22% increase in transit ridership primarily due to the introduction of BAT lanes; • Increased bus speeds and improvement in transit on-time performance stemming from semi exclusive transit use lanes in conjunction with ITS improvements; • Potential to promote land use and economic development with relatively low investment in transit infrastructure for capital improvements; and • Environmental benefits from reduced energy consumption, GHG emissions, increased safety, and improved air quality.	• Traffic impacts due to reassignment of the outside lanes for transit use in both directions; and • Requires new capital costs and additional O&M cost.
Exclusive Lane with Bus	• 40% increase in transit ridership primarily due to the introduction of exclusive bus lanes; • High transit speed and highly reliable transit service due to dedicated transit right-of-way in the corridor; • Potential to promote land use and economic development with modest capital investment in transit infrastructure; and • Environmental benefits from reduced energy consumption, GHG emissions, increased safety, and improved air quality.	• Traffic impacts due to loss of median and/or center turn lanes, restricted left turning movement; • Investment in transit infrastructure improvements could increase substantially due to the built out nature of the corridor, and • Requires new capital cost and additional O&M cost.
BAT Lane with Streetcar	• 22% increase in transit ridership primarily due to the introduction of BAT lanes; • Increased bus speeds and improvement in transit on-time performance stemming from semi exclusive transit use lanes in conjunction with ITS improvements; • Potential to promote land use and economic development with high upfront capital investment in transit infrastructure; and • Environmental benefits from reduced energy consumption, GHG emissions, and increased safety.	• Traffic impacts due to reassignment of the outside lanes for transit use in both directions; • Does not help improve air quality; • Requires significant capital for transit improvements; and • Substantial capital costs and increase in O&M cost.
Exclusive Lane with Streetcar	• 50% increase in transit ridership primarily due to the introduction of streetcar in exclusive lanes; • High transit speed and highly reliable transit service due to dedicated transit right-of-way for a significant portion of the alignment; • High potential to promote land use and economic development with high upfront capital investment in transit infrastructure; and • Environmental benefits from reduced energy consumption, GHG emissions, and increased safety.	• Traffic impacts due to loss of median and/or center turn lanes, restricted left turning movement; • Does not help improve air quality; • Requires significant investment in transit infrastructure improvements; and, • Substantial capital costs and increase in O&M cost.

Exclusive Lane with Bus alternatives is significantly lower than BAT Lane with Bus alternative based on the size of capital investment in comparison to the cost savings resulting from improved air quality, safety and reduction in energy consumption.

The benefits of the BAT Lane and Exclusive Lane with Streetcars alternatives related to ridership increase and transit reliability are similar to the BAT Lane and Exclusive Lane with Bus alternatives, however, the streetcar alternatives provide reduced travel time (or higher transit speeds) given the better acceleration and deceleration rates. In addition, the Exclusive Lane with Streetcar alternative would have a dedicated right-of-way west of University Drive up to the Sawgrass Mills Mall area. These benefits would require substantial capital cost and O&M cost, which are not proportional to the ridership gains. The economic development potential of the streetcar alternatives is higher than the bus based alternatives because of the "more permanent" nature of transit infrastructure. Given the capital investment required for the streetcar alternatives, the rate of return on investment may be lower. Introducing rail in the corridor would pose several operational challenges compared to the bus based alternatives.

5.5.6 SUMMARY AND CONCLUSION

Oakland Park Boulevard is a heavily traveled corridor and is anticipated to continue to exhibit high travel demand in the future. In addition, the BCT Route 72 in this corridor has very high transit ridership and is projected to serve as an important bus route providing connections to other north-south bus routes and community buses in the foreseeable future. Further, this highly urbanized corridor is built out with constrained right-of-way east of Florida's Turnpike for roadway widening. All of the build alternatives in the corridor improve transit reliability and transit on-time performance with increased ridership in the already mature transit market along Oakland Park Boulevard.

There are differences amongst the Build alternatives in terms of the level of traffic impacts, and capital and O&M costs vis-à-vis ridership gains and environmental benefits. Based on the Tier 2 evaluation in conjunction with the comparative analysis of benefits and costs of the various build alternatives and the context of this corridor, the project team recommended the BAT Lane with Bus alternative as the preferred alternative in the long term, and the gamut of short term improvements (traffic signal progression, intersection modification, revised local bus schedule, transit signal priority, queue jump lane, bus islands, bicycle lanes and sidewalk improvements) that can be implemented within the next two (2) to five (5) years to improve traffic flow and transit operations as well as enhance mobility and accessibility in the corridor.

6. Public Outreach Summary

This chapter provides documentation of the public involvement process that was completed for the Oakland Park Boulevard Transit Alternatives Analysis project between February 2012 and February 2014.

A comprehensive and transparent public involvement process is necessary to determine whether plans and alternatives analyses should be advanced into more detailed study, including environmental assessment and engineering and design, particularly if funding is needed to continue development of the plans. Engaging the public early in the planning process not only serves as a means for gathering input and definition of problems, but also for how to frame solutions to address those problems, confirm the analyses, and ultimately the plan recommendations. The public involvement process does not typically result in unanimous consensus for a project's recommendations, but varying opinions of those recommendations are considered by the governing body, in this case, the Broward MPO Board, which ultimately votes on whether the recommendations are valid and acceptable. On February 13, 2014, the Broward MPO Board voted 18 to 1 to endorse the following Oakland Park Boulevard Transit Alternatives Analysis recommendations:

- Business Activity Lane (BAT) lane with Bus as the recommended build alternative; and
- Move forward with implementing near term solutions.

PUBLIC INVOLVEMENT PLAN (PIP)

The public involvement process conducted for the Oakland Park Boulevard Transit Alternatives Analysis began with the development of a Public Involvement Plan (PIP), which was approved by FDOT. The PIP identified all of the stakeholders, community groups, and agencies that would have interest in the project, and specified a variety of strategies and techniques to engage them in the planning process. The PIP served as a living document and over the course of its implementation, several modifications were made to both the PIP and corresponding activities by the project team to address questions, concerns and need for other public meetings. A description of the different public involvement activities conducted between February 2012 and February 2014 follows.

PUBLIC MEETINGS

In total, 59 meetings were conducted with the general public, elected leaders, agency officials, and community groups to solicit feedback and engage them in the planning process for identifying and selecting a program of short term improvement projects and preferred long term transit solution in the Oakland Park Boulevard corridor (see Table 6-1). Table 6-2 describes the topics that were discussed at each of the public meetings. A summary of the input received through the extensive public involvement effort for this study is available in the *Public Involvement Documentation, March 2014*. In addition to the information provided and input collected at public meetings, the Project Team produced and distributed four newsletters (in English, Spanish and Creole), published public service announcements in newspapers (in English, Spanish and Creole), and a project web site. Prior to the public workshop help in September, flyer announcing the workshops were distributed to businesses located on Oakland Park Boulevard.

Table 6-1: Oakland Park Boulevard Transit Alternatives Analysis - Public Meetings Log

Entity	Meeting Location	Date
Public Workshops	Lauderdale Lakes Branch Library/Educational & Cultural Center 3580 West Oakland Park Boulevard, Lauderdale Lakes, FL 33311	1/ 31/13; 4/11/13; 9/12/13
	Lauderhill City Hall 5581 West Oakland Park Boulevard, Lauderhill, FL 33313	9/10/13
	Beach Community Center 3351 Northeast 33rd Avenue, Fort Lauderdale, FL 33308	9/19/2013
Lauderdale Beach Association	Sea Tower Condominium 2840 Center Avenue, Fort Lauderdale, FL 33308	3/11/13
Commission Meeting, City of Wilton Manors	Wilton Manors City Hall 2020 Wilton Drive, Wilton Manors, FL 33305	4/9/13
Oakland Park Democratic Club	Unitarian Church 3970 Northwest 21st Avenue, Oakland Park, FL 33309	4/15/13
Corals of Oakland Park Homeowner Association	Oakland Park Library Auditorium 1298 Northeast 37th Street, Oakland Park, FL 33334	4/30/2013
Central Sunrise Civic Association	Nob Hill Soccer Club 10200 Sunset Strip, Sunrise, FL 33322	5/1/2013
Commissioner Bruce Roberts, City of Fort Lauderdale	Ft. Lauderdale City Hall 100 North Andrews Avenue, Fort Lauderdale, FL 33301	1/14/13; 2/3/14
Mayor Richard Kaplan, City of Lauderhill	Lauderhill City Hall 5581 West Oakland Park Boulevard Lauderhill, FL 33313	1/14/13; 2/5/14
Commissioner Lawrence Sofield, City of Sunrise	City of Sunrise City Hall 10770 West Oakland Park Boulevard, Sunrise, FL 33323	1/28/13; 2/10/14
Vice Mayor Richard Blattner, City of Hollywood	Hollywood City Hall 2600 Hollywood Boulevard, Hollywood, FL 33020	1/28/13; 2/11/14
Commissioner Shari McCartney, City of Oakland Park	110 Tower 110 Southeast 6th Street, 15th Floor, Fort Lauderdale, FL 33301	1/30/13
Commissioner Dale Holness, Broward County	Broward County Government Center 115 South Andrews Avenue, Room 411, Fort Lauderdale, FL 33301	1/31/13
Commissioner Green, City of Wilton Manors	Wilton Manors City Hall 2020 Wilton Drive, Wilton Manors, FL	2/11/14
Partners Meetings (BCT, BMPO, SFRTA, FDOT)	FDOT District Four Headquarters 3400 West Commercial Boulevard, Fort Lauderdale, FL 33309	2/21/12
Technical Advisory Committee (TAC)	Broward MPO, Trade Center South 100 West Cypress Creek Road, Suite 850 Fort Lauderdale, FL 33309	5/17/12; 10/8/12; 2/26/13; 3/28/13; 8/21/13; 1/9/14
Broward MPO Technical Coordination Committee (TCC)	Broward MPO, Trade Center South 100 West Cypress Creek Road, Suite 850 Fort Lauderdale, FL 33309	6/25//12, 1/23/13; 4/24/13; 9/25/13; 1/22/2014
Broward MPO Community Involvement Roundtable (CIR)	Broward MPO, Trade Center South 100 West Cypress Creek Road, Suite 850 Fort Lauderdale, FL 33309	6/26/12; 11/27/12; 4/24/13; 9/25/13; 1/22/2014
Broward MPO Board	Broward MPO, Trade Center South 100 West Cypress Creek Road, Suite 850, Fort Lauderdale, FL 33309	10/11/12; 12/13/12; 5/9/13;10/10/13; 2/13/14

Table 6-1: Oakland Park Boulevard Transit Alternatives Analysis - Public Meetings Log (Continued)

Entity	Meeting Location	Date
South Florida Regional Transportation Authority (SFRTA)	SFRTA 800 Northwest 33rd Street, Pompano Beach, FL 33064	8/22/12
Broward County Transit (BCT)	Broward County Government Center West One North University Drive, Plantation, FL 33324	4/11/12; 10/4/12; 3/28/13; 4/16/13; 6/20/13; 7/30/13
Broward MPO	Broward MPO, Trade Center South 100 West Cypress Creek Road, Suite 850 Fort Lauderdale, FL 33309	5/22/13; 10/14/13
Florida Department of Transportation (FDOT)	FDOT District Four Headquarters 3400 West Commercial Boulevard, Fort Lauderdale, FL 33309	9/18/12; 2/18/13; 3/22/13; 6/26/13
City of Fort Lauderdale	Ft. Lauderdale City Hall 290 Northeast 3rd Avenue, Fort Lauderdale, FL 33301	10/21/13
City of Lauderhill	Lauderhill City Hall 5581 West Oakland Park Boulevard, Lauderhill, FL 33313	10/23/13
City of Oakland Park (Vice Mayor Shari McCartney via phone)	City of Oakland Park Municipal Building 5399 North Dixie Highway, Suite 2, Oakland Park, FL	2/10/14

6.1 Public Workshops

Five public workshops were held during the course of the project, beginning with a kickoff/introductory workshop in January 2013, an interim workshop in April 2013, and three workshops in September 2013 to review preliminary recommendations.

- *Public Workshop 1 – January 31, 2013 at the Lauderdale Lakes Branch Library and Cultural Center on 350 West Oakland Park Boulevard between 4:00-7:00pm.* In total, 41 individuals attended the workshop, including three elected officials and 11 agency staff. The principal topics for the meeting included a discussion of the transportation problems on Oakland Park Boulevard, that were facilitated by project team members using display boards, an overview with a Powerpoint presentation, and a question and answer period. Over 80 specific verbal comments were recorded, including nineteen about specific locations, four individuals completed comments cards, and five individuals completed surveys, In general, the most common problems that reported were about traffic congestion, need to improve signal timing, and need for sidewalk and bicycle improvements, location of bus stops, bus crowding, and need for bus shelters.
- *Public Workshop 2 – April 11, 2013 at the Lauderdale Lakes Branch Library and Cultural Center on 350 West Oakland Park Boulevard between 4:00-7:00pm.* Forty-two individuals attended the workshop, including one elected official and fifteen agency staff. The primary discussion topic was a description of corridor transportation problems and potential solutions to address them, which was facilitated by project team members at display boards, in a presentation to the audience, and at large scale aerial photographs of the corridor. Forty-four verbal comments, as well as six written comments were recorded, which were a mix of reactions to the potential solutions, comments about existing transit service and performance of roadways and sidewalks, and some new ideas.

Table 6-2: Topics Reviewed at Oakland Park Boulevard Transit Alternatives Analysis Meetings

Review Topic(s)	Entities	Dates
Project Scoping	Partners	2/21/2012
	Broward County Transit	4/11/2012
	TAC	5/7/2012
	TCC	6/25/2012
	CIR	6/26/2012
Existing and Future No Build Conditions	SFRTA	8/22/2012
	FDOT District 4	9/8/2012
	Broward County Transit	10/4/2012
	TAC	10/8/2012
	Broward MPO Board	10/11/2012
	Commissioner Roberts	1/14/2013
	Mayor Kaplan	1/14/2013
	CIR	11/27/2012
	TCC	1/23/2013
	Commissioner Sofield	1/28/2013
	Vice Mayor Blattner	1/28/2013
	Comm. McCartney	1/30/2013
	Public Workshop 1	1/31/2013
	Commissioner Holness	1/31/2013
	Broward MPO Board	12/13/2012
Purpose and Need and Definition and Evaluation of Tier 1 Alternatives	FDOT District 4	2/18/2013
	TAC	2/26/2013
	Lauderdale Beach Assn	3/11/2013
	Broward County Transit	3/28/2013
	Public Workshop 2	4/11/2013
	Oakland Pk Demo. Club	4/15/2013
	TCC	4/24/2013
	CIR	4/24/2013
	COPHA	4/30/2013
	Central Sunrise Res. Assn	5/1/2013
Definition and Evaluation of Tier 2 Alternatives	FDOT District 4	3/22/2013
	TAC	3/28/2013
	Wilton Manors Commission	4/9/2013
	Broward County Transit	4/16/2013
	Broward MPO Board	5/9/2013
	Broward MPO Staff	5/22/2013
Recommended Build Alternative	Broward County Transit	6/20/2013
	FDOT District 4	6/26/2013
	Broward County Transit	7/30/2013
	TAC	8/21/2013
	Public Workshop 3	9/10/2013
	Public Workshop 4	9/12/2103
	Public Workshop 5	9/19/2013
	TCC	9/25/2013
	CIR	9/25/2013
	Broward MPO Board	10/10/2013
	Broward MPO Staff	10/14/2013
	Ft. Lauderdale staff	10/21/2013
	Lauderhill staff	10/23/2013
	TAC	1/9/2014
	TCC	1/22/2014
	CIR	1/22/2014
	Commissioner Roberts	2/3/2014
	Mayor Kaplan	2/5/2014
	Commissioner Sofield	2/10/2014
	Commissioner McCartney	2/10/2014
	Vice Mayor Blattner	2/11/2014
	Commissioner Green	2/11/2014
	Broward MPO Board	2/13/2014

- *Public Workshop 3 – September 10, 2013 at Lauderhill City Hall on 5581 West Oakland Park Boulevard between 4:00-7:00pm.* The primary discussion topic was a description of the preliminary recommended short- and long-term alternatives, which was facilitated by project team members at display boards, in a presentation of the VISSIM simulation to the audience, and at large scale aerial photographs of the corridor. Fourteen individuals, including five agency staff, attended the workshop. Fourteen individuals, including three agency staff, attended the workshop. In total, 53 comments were recorded in both oral and written form, and covered subjects such as the ability to enforce the BAT lanes, need to revise the bus schedule, concerns about safety of motorists traveling next to the BAT lanes, and need for bicycle and pedestrian improvements.

- *Public Workshop 4 – September 12, 2013 at Lauderdale Lakes Branch Library and Cultural Center on 350 West Oakland Park Boulevard between 4:00-7:00pm.* The primary discussion topic was a description of the preliminary short- and long-term recommended alternatives, which was facilitated by project team members at display boards, in a presentation of the VISSIM simulation to the audience, and at large scale aerial photographs of the corridor. Fourteen individuals, including five agency staff, attended the workshop. Fourteen individuals, including three agency staff, attended the workshop.
- *Public Workshop 5 – September 19, 2013 at Beach Community Center on 3351 NE 33rd Avenue (on SR A1A north of Oakland Park Boulevard) between 4:00-7:00pm.* The primary discussion topic was a description of the preliminary short- and long-term recommended alternatives, which was facilitated by project team members at display boards, in a presentation of the VISSIM simulation to the audience, and at large scale aerial photographs of the corridor. Twenty-five individuals, including three agency staff, attended the meeting.

6.2 Community Meetings

After the first two public workshops, representatives of community groups requested presentations to their membership of the Oakland Park Boulevard Transit Alternatives Analysis project. In total, four presentations were made to the Lauderdale Beach Association on March 11, 2013, the Oakland Park Democratic Club on April 15, 2013, the Corals of Oakland Park Homeowner Association on April 30, 2013, and the Central Sunrise Residents Association on May 1, 2013. Primary concerns raised at these meetings included - traffic impacts resulting from partially or fully dedicating a general purpose lane to transit; need for better signal synchronization; transit on-time performance issues; and pedestrian safety. The project team incorporated several short term improvements to address these issues in the build alternatives. At the Oakland Park Democratic Club, City of Oakland Park Commissioner Lonergan recommended that an alternative involving a loop around Prospect Road be considered. The analysis was completed and the results were provided to Commissioner Lonergan.

6.3 Technical Advisory Committee (TAC) Meetings

In addition to the Broward MPO Technical Coordinating Committee, the technical methodologies, analyses and findings for the Oakland Park Boulevard Transit Alternatives Analysis was reviewed by a Technical Advisory Committee comprised of individuals representing FDOT, Broward MPO, Broward County Transit, and the six cities (Ft. Lauderdale, Wilton Manors, Oakland Park, Lauderdale Lakes, Lauderhill and Sunrise) who met on six occasions lining the corridor. Each meeting was conducted at the Broward MPO and lasted between 90 and 120 minutes. TAC members were provided with material sent in advance of each meeting with a description of the questions and decision points that were critical to each meeting agenda.

TAC meetings were held prior to meetings with the MPO Board, TCC and CIR committees, community groups and the public workshops in order to examine and vet each step of the technical analyses prior to sharing them with the other committees and groups. The content and conclusions of each meeting are described below:

- *TAC Meeting 1 – May 17, 2012 at the Broward MPO Board Room between 9:30-11:30am.* In addition to describing the FTA Analytical process and scope of work and schedule, travel market data, information on Route 72 operations and potential short term improvements, and redevelopment and market analyses findings were presented. Multiple questions were asked, such as: 1) reasons for the study area boundaries and, 2) additional information about the population and employment forecasts. The project team followed up with the requested information.
- *TAC Meeting 2 – October 8, 2012 at the Broward MPO Board Room between 9:00-11:00am.* The agenda for this meeting included presentation of preliminary findings current and projected travel conditions and potential solutions and opportunities, as well as a review of the draft Purpose and Need Statement, and the agenda for the first public workshop. The team also asked each city representative to describe major projects and transportation issues, including need for expanded Community Bus services, unsafe pedestrian crossings, need for redevelopment, severe congestion, and site specific geometry issues.
- *TAC Meeting 3 – February 26, 2013 at the Broward MPO Board Room between 1:30-3:00pm.* This agenda included discussions about the Tier 1 alternatives and the analyses that would lead to the selection of Tier 2 alternatives, mobility hubs, and planned outreach. Attendees suggested methodologies and considerations for the evaluation of recreational acreage, safety, and environmental justice. With regard to the Tier 1 alternatives, there was consensus about the validity of the preliminary analyses, however, some attendees requested additional alternatives be examined: e.g., personal rapid transit and signal consolidation). Multiple questions were forwarded about the right-of-way needs and ability to accommodate bicycles in the Tier 2 alternatives. The project team later provided the right-of-way associated with each Tier 2 alternative, recreational area acreages, and completed an assessment of personal rapid transit which was later included in the Tier 1 evaluation.
- *TAC Meeting 4 – March 28, 2013 at the Broward MPO Board Room between 1:30-3:00pm.* This meeting's discussion was focused on the preliminary results of the Tier 2 evaluation, potential short-term operational improvements, and the public outreach schedule. Presentations were given about transit operational improvements (i.e., bus stop consolidation, queue jump lanes, transit signal priority, and bus islands), and suggestions were made about where these improvements might result in the greatest benefits – e.g., locate a "pilot" bus island at University Drive. Preliminary forecasts of ridership was provided and several suggestions were also advanced for bus operations and right-of-way needs for each of the Tier 2 alternatives. The attendees also asked that the study consider "branding" of the Oakland Park Boulevard service, demonstrating the benefits of the Tier 2 alternatives to the general public, and completing traffic impact studies of the alternatives.
- *TAC Meeting 5 – August 21, 2013 at the Broward MPO Board Room between 3:00-5:00pm.* The focus of this meeting's discussion was the preliminary findings of the Tier 2 analyses, recommended short-term improvements, and the bus island concept. Many of the questions from attendees were items, such as: time period for BAT operations, single lane vs. two-lane BAT lane operations, as well as the number of TSP locations, ridership, and associated traffic impacts for the short- and

long-term alternatives. The group also reviewed the recommendation that two to five bus islands would be feasible, and each attendees was asked to provide their lists of recommended bicycle and pedestrian projects along and in the vicinity of Oakland Park Boulevard; particularly those that might not have already been forwarded to the Broward MPO for inclusion into the LRTP.

- *TAC Meeting 6 – January 9, 2014 at the Broward MPO Board Room between 3:00-4:30pm.* This meeting's agenda was focused on the project team's preliminary short- and long- term recommendations. The TAC agreed that the recommendations should be forwarded to the TCC and CIR committees and the MPO Board for their consideration with one exception: the City of Ft. Lauderdale asked that the recommendation include not only BAT Lane with Bus but BAT Lane with Streetcar as well.

6.4 Agency Coordination

Agency coordination, which includes meetings with the Broward MPO (Board, TCC/CIR committees, and staff), Broward County (Broward County Transit and Broward County Traffic Engineering Department), South Florida Regional Transportation Authority, and the Florida Department of Transportation District 4 (Planning and Environmental Management, Traffic, and Design divisions), occurred throughout the project at important project milestones and decision points. These meetings were very helpful in not only coordinating information and considerations among the different agencies and staff, but also to assist in forming the direction for the project's development and ultimately its recommendations. The project's first meeting was a meeting of the "partners" (i.e., Broward MPO, Broward County, SFRTA, and FDOT) in February 2012 to discuss each partner's roles, and their expectations for the project. In total, 25 meetings were held with these agencies (does not include meetings held with elected leaders and the TAC, which typically included staff of these agencies).

6.5 Stakeholder Briefings

On two occasions – in January 2013 and February 2014 – Project Team members met individually with elected leaders and their staff serving jurisdictions along Oakland Park Boulevard as well as City of Hollywood Vice Mayor and Broward MPO Chair Richard Blattner. The discussions at the first set of meetings (six meetings in total) in January 2013 focused on the goals, potential solutions, agency coordination, public process, and breadth of analyses that were associated with the project. Several leaders suggested that making better use of the community bus shuttles as feeders to the Route 72 and consideration of express or limited stop services be incorporated into the analysis. Several also requested additional information about ridership and demographic data most closely associated with transportation disadvantaged populations in the study area.

6.6 Summary

The public involvement process which guided the Oakland Park Boulevard Transit Alternative Analysis project was successful in that it provided multiple techniques and opportunities to gather input, included two one-on-one sessions with MPO Board members to review that input, and the MPO Board voted to endorse the recommendations with only one dissenting vote. Moreover, much of the input received was considered for refinements to the alternatives and the alternatives analysis. An extremely vital component of the process involved the incremental vetting of findings with the Project Team, FDOT, partner agencies, the Technical Advisory Committee and then the MPO advisory bodies, which led to a stronger set of analyses and findings which resulted in a higher level of confidence from agency staff and MPO Board members.

7. Recommended Short Term Improvements and Preferred Alternative

Based on the technical evaluation described in Chapter 5 of this report and public input gathered during the alternatives analysis process, the Project Team prepared preliminary recommendations for review with FDOT staff, the Technical Advisory Committee, and partner agencies. Based on the input received from these groups, the preliminary recommendations were refined. The Project Team's recommendations were described below were approved by the Technical Advisory Committee on January 9, 2014; Broward MPO Technical Coordinating Committee and Broward MPO Community Involvement Roundtable on January 22, 2014. On February 13, 2014, the Broward MPO Board formally endorsed the short-term improvements and the long-term recommendations which are described below.

7.1 Short-term Improvements

Over the course of the project the following improvements were found to have positive utility for all of the long term alternatives, and that they could be implemented at low-cost and in the short term (within-two (2) to five (5) years). Figure 7-1 illustrates the recommended short term improvements and a detailed description of these improvements is available in the *Short Term Improvements Technical Memorandum, June 2013*.

- Corridor Improvements
  - Traffic signal progression along the entire Oakland Park Boulevard corridor
  - Intersection improvements (19 locations)
- Transit Service Improvements
  - Revised schedule
  - Bus Islands (8 at five different locations)
  - Bus Transit Signal Priority (17 locations)
  - Bus Queue Jump Lanes (3 locations)
  - Bus Stop Upgrades (26 locations)
- Bicycle/Pedestrian Improvements
  - Bicycle lane continuity (44 miles of lanes connecting the bicycle lane network on Oakland Park Boulevard and within one-quarter mile north and south of Oakland Park Boulevard)
  - Complete missing sidewalk links (88 miles of sidewalk connecting the sidewalks on Oakland Park Boulevard and within one-quarter mile north and south of Oakland Park Boulevard)

Figure 7-1: Recommended Short Term Improvements

7.2 Recommended Long-term Improvement - BAT Lane Alternative with Bus

Of the five Build alternatives advanced through the Tier 2 screening, the BAT Lane with Bus alternative was found to provide the most cost-effective and efficient set of services for factors such as ridership gains, schedule reliability, economic development opportunities, and limited traffic impact. The recommended alternative includes the following elements (see Figure 7-2):

- Business Access and Transit (BAT) Lane Bus between US 1 and University Drive
  - Using curb lane and limited to buses, emergency vehicles and vehicles making right turns from Oakland Park Boulevard
- All of the short-term improvements
- Continued Local Bus service – existing route 72 in curb lanes serving every existing bus stop
- Addition of a limited-stop service in the curb lanes – stopping at 16 stations each way between Sawgrass Mills Mall and SR A1A

Appendix A includes detailed map showing short term improvements and proposed typical section and conceptual engineering plans for the BAT Lane with Bus alternative.

Figure 7-2: BAT Lane with Bus Alternative on Oakland Park Boulevard

8. Next Steps

As of the Spring of 2014, the FDOT has initiated a corridor-level engineering analysis to refine the concept plan for the short term improvements completed under this effort. At a future date, based on Broward MPO's priority and action, FDOT and its partner agencies would initiate *Project Development* for advancing the long term solution - BAT Lane with Bus alternative. The following is a summary of activities under progress to implement the short term and potential action items to advance the long-term improvements identified in the Oakland Park Boulevard Transit Alternatives Analysis.

8.1 Short Term Improvements

FDOT and its partner agencies have initiated development of several of the short term improvements. Already underway is development of prototype designs for bus islands for two bus stops at the intersection of Oakland Park Boulevard and University Drive, and further analysis and preliminary engineering for the following:

- Corridor Improvements
  - Traffic signal progression
  - Intersection improvements
- Transit Service Improvements
  - Revised schedule
  - Bus Transit Signal Priority
  - Bus Queue Jump Lanes
  - Bus Stop Upgrades
- Bike/Pedestrian Improvements
  - Bike lane continuity
  - Complete missing sidewalk links

Construction and operating funds needed to implement the short term improvements have yet to be secured, but are anticipated to be programmed into future Broward MPO Transportation Improvement Plans (TIP) and FDOT Work Program. Broward County Transit has already committed an additional $500,000 in operating funds for continued operation of the Route 72 services on Oakland Park Boulevard.

8.2 BAT Lane Alternative with Bus Alternative

This Oakland Park Boulevard Transit Alternatives Analysis was conducted using the general framework developed for projects seeking capital funding under the Federal Transit Administration's New Starts/Small Starts program. Based on Broward MPO's priority and action, FDOT and its partner agencies would initiate *Project Development* to advance the BAT Lane with Bus alternative on Oakland Park Boulevard. The first step would be to submit an application to the FTA requesting permission and funding to enter into the *"Project Development or PD"* phase. During the *PD* phase, the FDOT would initiate preliminary engineering and environmental documentation per National Environmental Policy Act (NEPA) requirements. As part of the *PD* phase, the FDOT along with its project partners, should re-evaluate the assumptions and conduct detailed analyses to update the FTA project justification ratings appropriately. Under the new federal surface transportation reauthorization, Moving Ahead for Progress in the 21st Century (MAP-21), the *PD* phase cannot exceed two years.