CENTRAL BROWARD
EAST-WEST TRANSIT ANALYSIS

ALTERNATIVES ANALYSIS SUMMARY REPORT

CENTRAL BROWARD EAST-WEST TRANSIT ANALYSIS BROWARD COUNTY, FLORIDA

FINANCIAL PROJECT ID NUMBER 411189-2-22-01

FLORIDA DEPARTMENT OF TRANSPORTATION DISTRICT 4

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BCt	Broward County Transit
BRT	Bus Rapid Transit
CBD	Central Business District
CIR	Community Involvement Roundtable
CRA	Community Redevelopment Agency
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HOV	High Occupancy Vehicle
HPT	High Performance Transit
LOS	Level of Service
LPA	Locally Preferred Alternative
LRT	Light Rail Transit
LRTP	Long Range Transportation Plan
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
PD&E	Project Development and Environment Study
RAC	Regional Activity Center
SFEC	South Florida Education Center
SFRTA	South Florida Regional Transportation Authority
SOV	Single Occupancy Vehicle
SR	State Road
TAZ	Traffic Analysis Zone
TCC	Technical Coordinating Committee
TIP	Transportation Improvement Program
TOD	Transit Oriented Development
TSM	Transportation System Management
TSUB	Transportation System User Benefits
V/C	Volume to Capacity

1.0 PURPOSE OF THE ALTERNATIVES ANALYSIS

The primary purpose of the Central Broward East-West Transit Analysis (CBEWTA) was to provide a decision-making process for determining transportation investments appropriate to meet the current and future needs of the study area. The CBEWTA contains information sufficient to measure and evaluate a range of investment options. The CBEWTA was used to facilitate careful consideration of alternatives against a baseline and was guided by an open and inclusive process founded upon community input for determining the preferred investment strategy.

The overall purpose and need for the Central Broward East-West Transit Analysis is to address recent rapid growth in the western section of Broward County and resultant traffic congestion on east-west facilities in Central Broward County. The transit project resulting from the Central Broward East-West Transit Analysis would serve as a regional facility connecting the communities and activity centers in western Broward County to those in eastern Broward County. The proposed termini for the project are the Sawgrass Mills Mall/Office Depot Center in western Broward County and the Fort Lauderdale/Hollywood International Airport in eastern Broward, with the alignment passing through the Fort Lauderdale Central Business District (CBD). Based on the existing and future travel needs, the goals and objectives developed and evaluated in the Central Broward East-West Transit Analysis were to provide a "premium transit" improvement that:

- Enhances east-west mobility in central Broward County.
- Efficiently uses available financial resources, and supports economic growth and development.
- Is consistent with the needs and desires of the residents of Broward County, in order to maximize community acceptance and support.
- Ensures compatibility between land use policies and transit service so that the need for trip-making and the amount of travel is reduced and the opportunities for transit-oriented development are maximized.
- Enhances and preserves the social and physical environment, and that keeps potential impacts to sensitive resources to a minimum.

The *Conceptual Definition of Alternatives Report*, dated January 2004, provides a more extensive discussion of the purpose and need for the Central Broward East West Transit Analysis.

1.1 STUDY BACKGROUND

1.1.1 Study Area Description

The Central Broward East-West Transit Analysis study area, illustrated in Figure 1, is in central Broward County, Florida. Oakland Park Boulevard, the Weston/Sawgrass area, Griffin Road, and the Intracoastal Waterway are the general boundaries of the study area. High levels of travel and congestion on major east-west roadways characterize conditions of this area. Historically, the traditional travel patterns have been directional--eastbound in the morning and westbound in the afternoon--fueled by the residential communities in the west and employment centers in the east. As growth in business,

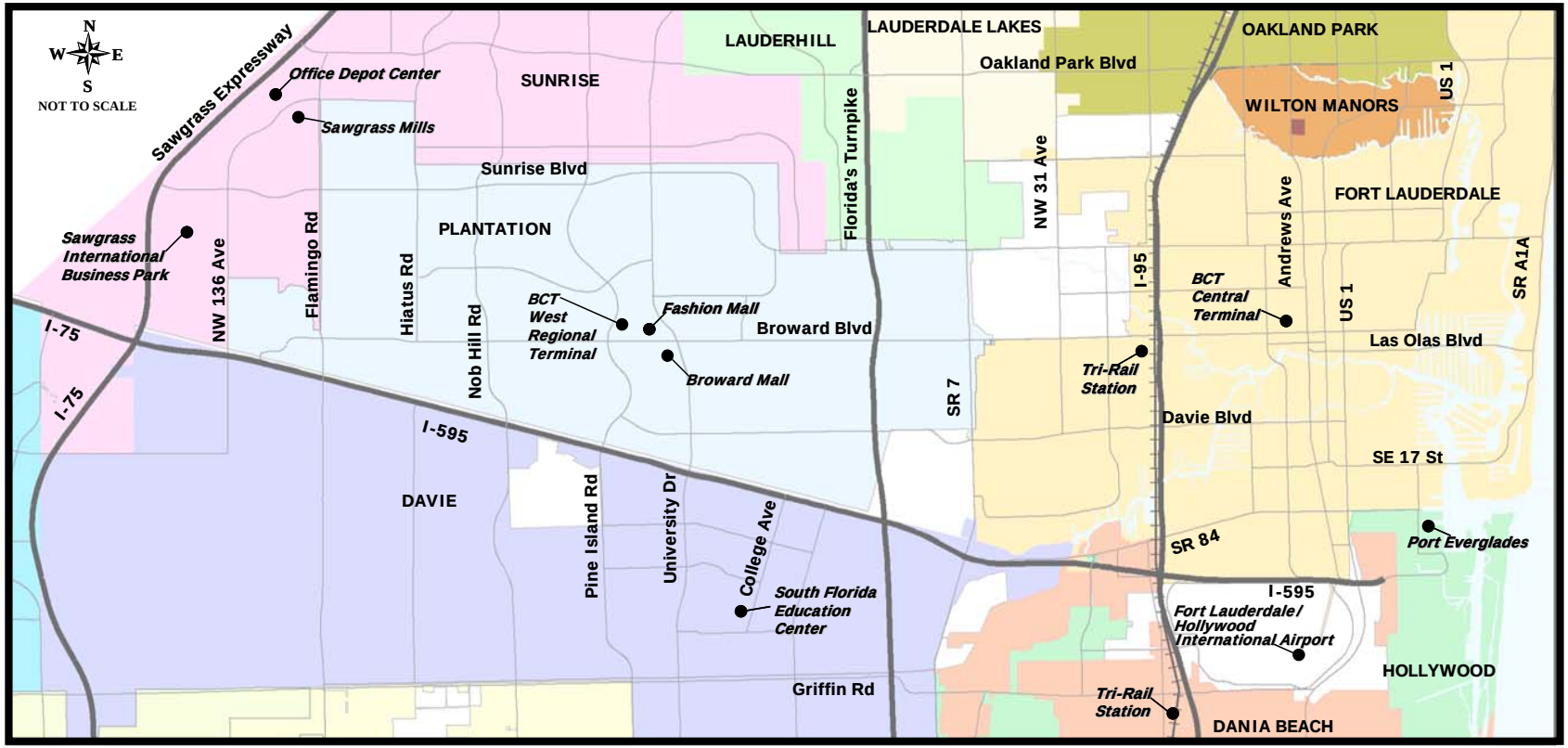


Figure 1: Central Broward East-West Transit Analysis Study Area

retail and other commercial activity centers occurs in the central and western portions of the study area and intense residential redevelopment occurs in the east, this travel pattern is changing. This is producing growing westbound travel in the morning and eastbound travel in the afternoon. In short, the mobility needs in the study area reflect the amount of travel between west and east Broward County; the congestion on main east-west arteries; lack of connectivity among important transportation facilities including Fort Lauderdale/Hollywood International Airport, Port Everglades, and Tri-Rail commuter rail service; and the amount of travel to significant destinations throughout the central Broward area.

1.1.2 Regional Context

Recently, the three major counties that comprise southeast Florida (Broward, Miami-Dade and Palm Beach) were merged to create the Southeast Florida Metropolitan Statistical Area (MSA), the fifth largest in the United States. The MSA has more than 5.1 million people and its population grew by over 950,000 between 1990 and 2000. Furthermore, the Southeast Florida MSA is projected to grow to 7.4 million by 2030, an increase of 48% between 2000 and 2030. This reflects an annual average growth rate of 1.6%. Mobility within the region is already a concern, and it will continue to be as the region's population continues to grow.

Annually, the Texas Transportation Institute ranks the major metropolitan areas with respect to traffic congestion occurring on their highways. In 2001, 57 percent of the highway and street miles in the Fort Lauderdale metropolitan area were identified as congested, and roadways are congested almost one third of the day (7.8 hours). Similarly, 64 percent of daily travel occurs in congested periods and the annual per-capita delay as a result of congestion has increased from three (3) hours in 1982 to 28 hours in 2001.

The Broward County Metropolitan Planning Organization (MPO), with input from the Florida Department of Transportation (FDOT), and others, periodically updates its long range transportation plan (LRTP). The LRTP identifies transportation projects in major corridors throughout the region. Even with the planned $4.9 billion investment in county transportation systems over the next 20 years, the trend of increasing congestion is expected to continue. The central Broward County sub area and I-595 corridor are not exceptions to the trend.

1.1.3 Corridor Context

Key activity centers within the central Broward corridor include Sawgrass Mills, the Office Depot Center, and Sawgrass International Corporate Park in the western portion of the corridor. The Midtown Plantation and South Florida Education Center (SFEC) are located in the center section of the corridor. The SFEC includes Nova Southeastern University, Florida Atlantic University, University of Florida, Broward Community College, and other educational facilities. The Fort Lauderdale Central Business District (CBD), with the County Governmental Center, City Hall, and State and Federal Court Houses are located at the eastern edge of the corridor. Fort Lauderdale/Hollywood International Airport and Port Everglades Seaport are at the far eastern end of the corridor.

The central Broward corridor has many transportation challenges and opportunities. The following is a sampling of the corridor issues that are considered by this study:

- Recurring congestion on segments of I-595, reaching Level of Service F conditions much sooner than originally anticipated;
- Recurring congestion on segments of I-95 and Florida's Turnpike;
- For many trips within the corridor, there are few viable alternatives to the private automobile;
- High capacity transit service is predominately north-south and does not adequately address east-west travel nor adequately serve suburban employment centers;
- Lack of access and mobility within the corridor constrains economic development and redevelopment;

Anticipated population and employment growth is expected to exacerbate the problems described above.

1.2 SUMMARY OF LOCAL DECISION MAKING AND ANALYSIS

Broward County, one of three counties in the Southeast Florida MSA, covers 1,197 square miles. The western two-thirds of the county (787 square miles) consists of the Everglades, Water Conservation Areas managed by the South Florida Water Management District, the Miccosukee Indian Reservation, and a small portion of the Big Cypress Seminole Indian Reservation. The remaining 410 square miles (east of the East Coast Protective Levee) is the developable area with a population density of 3,958 people per square mile, based on the 2000 Census. This compares to the population density of other metropolitan areas such as San Diego, Denver, Portland, Las Vegas, and Dallas. In 2004, Broward County's Planning Services Division compared the Southeast Florida Metropolitan Statistical Area (MSA), which consists of Miami-Dade, Broward, and Palm Beach Counties, to other MSAs in the country. The Southeast Florida MSA is third in the nation in population density, when the undevelopable areas (Everglades National Park, water conservation areas, and Everglades Agricultural Area) are removed from the calculation. Table 1 provides the population density for the municipalities within the Central Broward East-West Transit Analysis study area and several other major US cities for comparison.

Table 1: Population Density Comparisons

	City	Population Density (persons/sq mi)
Central Broward East-West Transit Analysis Study Area	Fort Lauderdale, FL	4,803
	Plantation, FL	3,815
	Davie, FL	2,265
	Sunrise, FL	4,712
Other US Cities	San Diego, CA	3,772
	Denver, CO	3,617
	Portland, OR	3,939
	Las Vegas, NV	4,222
	Dallas, TX	3,469
	Atlanta, GA	3,161
	Chicago, IL	12,750
	Boston, MA	12,165
	New York, NY	26,402

Source: Census 2000 Summary File

There are 30 municipalities in this developable area, which constitutes the urbanized area covered by the Broward County Metropolitan Planning Organization (MPO). Three County Commissioners and elected officials from 13 municipalities are primary voting members on the MPO Board. The 17 remaining municipalities have representatives that serve as alternates on the Board. Broward County provides staff support to the MPO and its committees.

Representatives from two of the public transportation providers in Broward County participate in transportation planning through their representation on the Technical Coordinating Committee of the MPO. Broward County Transit (BCt), which provides fixed route and on-demand bus service throughout the County, is operated by the Mass Transit Division of Broward County. The South Florida Regional Transportation Authority (SFRTA) operates Tri-Rail, a commuter rail service in Palm Beach, Broward and Miami-Dade counties. SFRTA also operates shuttles that provide collection and distribution service to and from Tri-Rail stations and major activity centers.

The *2025 Long Range Transportation Plan* and *2030 Long Range Transportation Plan* are the products of the comprehensive, cooperative, and continuous transportation planning efforts among the MPO and the Florida Department of Transportation (FDOT). Both LRTPs were guided by the principles set forth in the Transportation Equity Act for the 21st Century (TEA-21) and the Clean Air Act Amendments of 1990. TEA-21 was passed by federal legislators in June 1998 and continues the philosophy set out in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), which strengthened the role of the planning process by making it a central decision-making mechanism for development and funding of the Metropolitan Transportation System.

The *2025 Long Range Transportation Plan* was adopted in December 2001 and included a proposed system of bus rapid transit routes along the major arterials in Broward County and a number of "High Performance Transit" routes, including one along I-595. The *2030 Long Range Transportation Plan* was adopted in December 2004 and replaced the bus rapid transit system with a "rapid bus" system. This Plan also includes the Locally Preferred Alternative from this Alternatives Analysis.

This CBEWTA was consistent with FTA guidance and regulations. It was based on a two-tiered evaluation process that used both qualitative and quantitative evaluation measures. The analysis began with an assessment of potential east-west corridors in the central Broward County area, followed by an analysis of trip origin and destination pairs using the Southeast Regional Planning Model (SERPM) travel demand model developed by FDOT to integrate the travel demand models used by the three MPO's within the region. Identification of appropriate transit modes for the study area was conducted through a technology assessment. More detailed evaluation of alternatives was supported by the MPO and FDOT through the use of SERPM. The final evaluation, to refine the LPA, was based on a quantitative analysis of key factors: projected daily ridership, capital and operating costs, and cost effectiveness.

Results of the various analyses and reports conducted for the CBEWTA were presented to the MPO and its committees throughout the course of the project. Ten presentations were made to the MPO throughout the project. Four public meetings (three information workshops and a public hearing) were conducted at various locations throughout the central Broward area, and over 40 stakeholders meetings were conducted with local elected officials and

MPO Board Members. Four project newsletters were distributed to a mailing list containing approximately 600 names. A project website (www.centralbrowardtransit.com) was created in January 2003 and has been continuously updated throughout the project. The website includes information about the project's status, public meetings, and includes a "Documents" page where all final reports and presentations to the MPO and its committees, and from public meetings are posted.

1.3 ENDORSEMENT OF THE LOCALLY PREFERRED ALTERNATIVE

The purpose of the Alternatives Analysis process is to define and evaluate alternatives in order to select a transit project that meets a region's transportation needs in a cost effective way and that has gained regional support. As noted above, a two-tiered evaluation process was used. The process began with the development of a broad range of alignment and technology alternatives. This range of alternatives was reduced through a primarily qualitative evaluation and the remaining alternatives were evaluated in more detail and using a more quantitative analysis. Evaluation criteria for the CBEWTA were established based on the FTA's New Starts evaluation criteria. These criteria are presented in the sections of this report that discuss the evaluation process. The evaluation process and matrices are presented in more detail in Section 4.

The MPO identified and endorsed a light rail transit system serving the Central Broward area. The system improves east-west mobility and improves accessibility to two of the largest employment centers in Broward County (the Fort Lauderdale Central Business District and the Plantation Midtown District), as well as two other major activity centers, the South Florida Education Center and the Sunrise International Business Park/Sawgrass Mills/Office Depot Arena. The Town of Davie, the City of Plantation, the City of Sunrise, and the Fort Lauderdale Chamber of Commerce have endorsed the LPA. The MPO determined that the proposed project is consistent with the 2030 Long Range Transportation Plan. The LPA is shown in Figure 2.

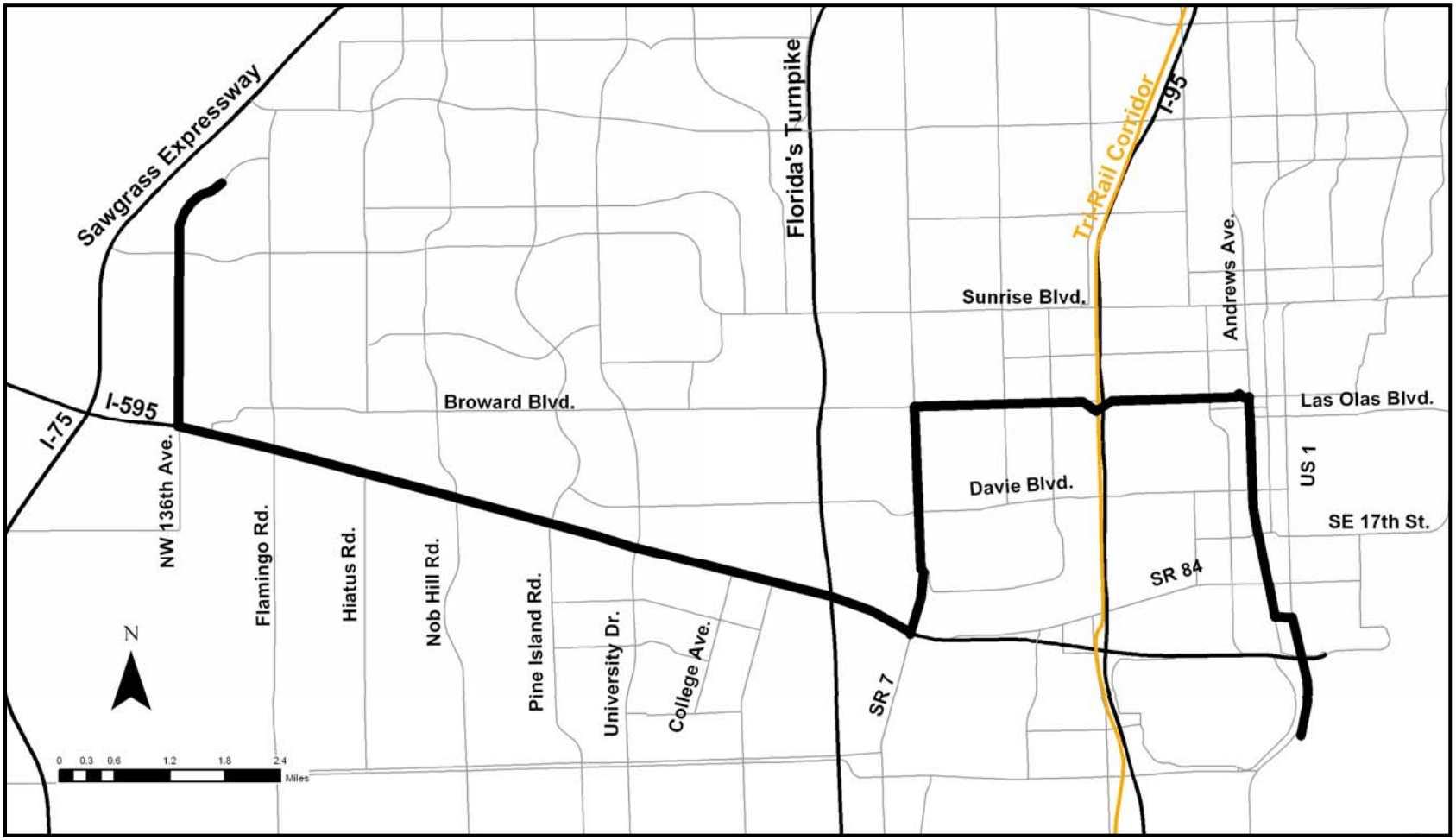


Figure 2: Locally Preferred Alternative

2.0 PROJECT BACKGROUND

The purpose of this chapter is to summarize the status of on-going studies and the results of previous studies. This chapter is a summary of the previous studies and analyses completed in the CBEWTA study area. The primary purpose of the CBEWTA was to provide a decision-making process for determining transportation investments appropriate to meet the current and future needs of the study area. The findings of the CBEWTA resulted in the recommendation of a locally preferred alternative (LPA) for the construction and operation of a light rail transit line from the western portion of central Broward County to Downtown Fort Lauderdale and the Fort Lauderdale/Hollywood International Airport. This recommendation for a preferred transportation investment solution could require major construction, which will be further documented in an Environmental Impact Statement (EIS).

Figure 1 illustrates the study area. There are eleven municipalities in the study area. Several related transportation plans and projects were recently completed, are underway, or are planned to begin in the near future in the study area. These projects are summarized in the following section.

Figure 3 illustrates the location of related projects in the study area. The sponsors of these projects include Broward County, FDOT and the Fort Lauderdale Downtown Development Authority. The CBEWTA will address the mobility issues not met by related projects and will coordinate the development of transportation investment strategies with other transportation planning efforts.

2.1 PREVIOUS WORK

This study has its origins in the I-95/I-595 Master Plan, the Broward County MPO 2025 Long Range Transportation Plan (LRTP), and Tri-Rail's 2020 Plan. Other plans also have influenced, or will influence, mobility in the central Broward area. Brief descriptions of the affiliated plans are below.

I-95/I-595 Master Plan (July 2001)

The I-95/I-595 Master Plan analyzed possible alternatives for meeting the transportation needs of the I-595 and I-95 corridors. This study took a first look at the feasibility of premium or high performance transit (fixed guideway) in the I-595 corridor. In developing the I-95/I-595 Master Plan Locally Preferred Alternative, it was found that high performance transit would be needed to address future travel needs in the corridor. The I-95/I-595 Master Plan recommended an alternatives analysis to follow, if the elected leaders of Broward County wished to pursue its implementation. The MPO subsequently approved funding for an alternatives analysis, which is the Central Broward East-West Transit Analysis.

I-595 Project Development and Environmental (PD&E) Study (Underway)

FDOT is conducting a Project Development and Environment (PD&E) Study to evaluate traffic operations and safety along the I-595 corridor in Broward County. The I-595 PD&E Study is an outgrowth of the I-95/I-595 Master Plan that led to the development of the Locally Preferred Alternative (LPA) that was approved by the Broward County MPO in 2001 and has received favorable comments from FDOT's Central Office and the Federal Highway Administration (FHWA). The study limits for the on-going PD&E extend from just west of I-75 to just east of I-95, a distance of approximately 12 miles. The study is considering interchange modifications, braided and other ramp modifications, and the addition of revers-

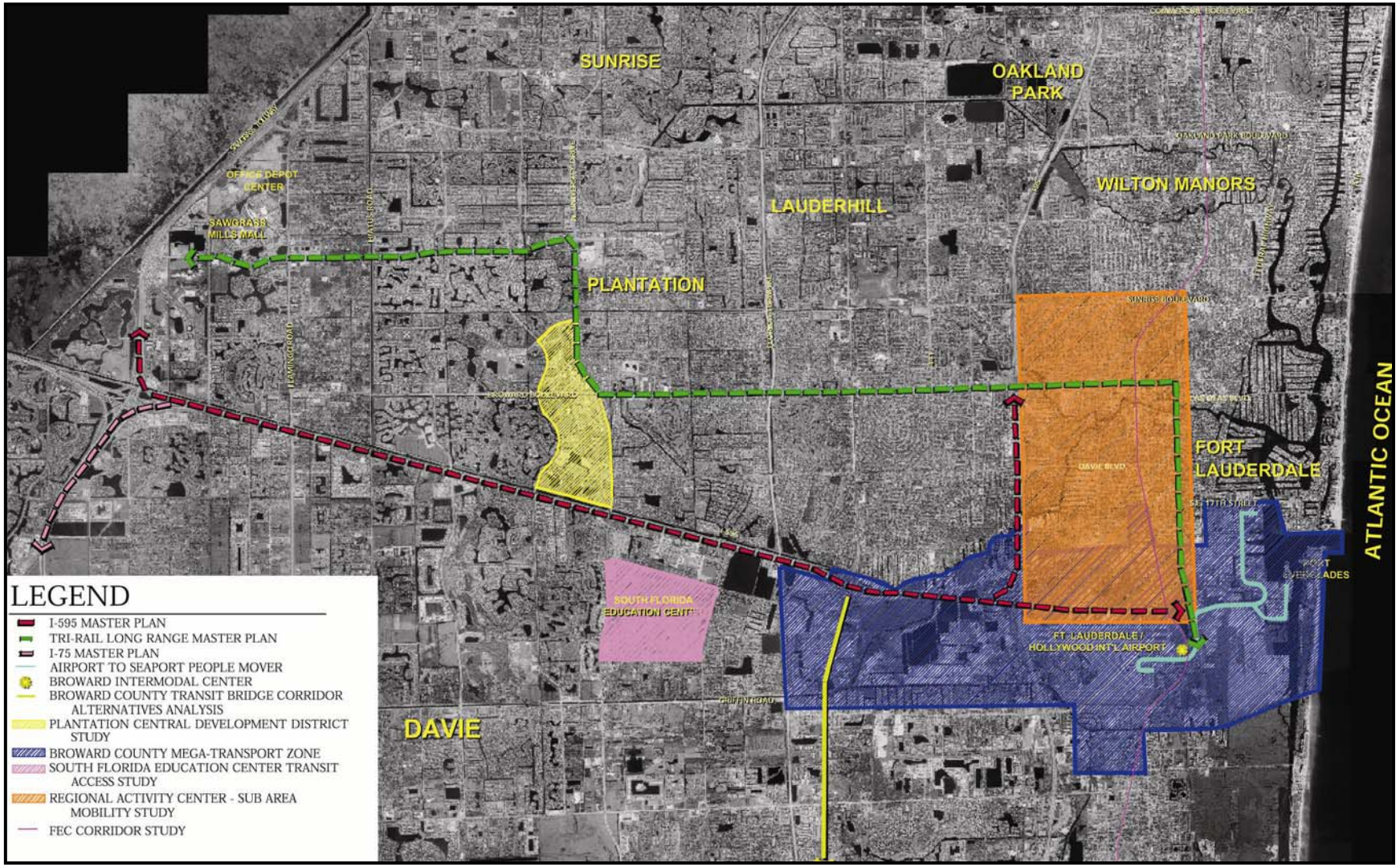


Figure 3: Other Transit Studies in the Central Broward Area

ible lanes. Development of roadway improvements has been closely coordinated with options for transit alignments within the I-595 right-of-way to minimize costs, potential right-of-way impacts and to ensure compatibility of roadway and transit designs.

Broward County MPO 2025 LRTP (December 2001)

The 2025 LRTP is described here because it was the adopted LRTP in place when the Central Broward East-West Transit Analysis was initiated. The projects and programs informed and influenced the development of alternatives. The Broward County MPO defined a countywide network of premium transit, and express and local bus services in its 2025 LRTP. The 2025 Transit Plan, contained within the LRTP, recommends transit improvements within the central Broward study area. Proposed transit services within this study area include premium transit within the I-595 corridor and bus rapid transit along several major arterials.

The 2025 Cost Feasible Plan depicted the proposed transit elements of the 2025 LRTP. Key elements included improving the headways on over 40 routes. The headway improvements generally doubled the frequency of service (e.g. from 30 minutes to 15 minutes), with no listed route having a headway of over 30 minutes. There were several bus rapid transit (BRT) routes identified in the Cost Feasible Plan. The proposed BRT routes created a network of service on major east-west and north-south arterials and highways. East-west BRT routes were planned on Pines Boulevard, Sheridan Street, Sunrise Boulevard, Broward Boulevard, Oakland Park Boulevard, Commercial Boulevard, Atlantic Boulevard and Sample Road. Most of these routes extended from I-75 or the Sawgrass Expressway in the western part of the county to US 1 or SR A1A in the eastern part of Broward County. North-south BRT routes were planned on Powerline Road, University Drive and SR 7. These routes generally extended the length of the county.

"High Performance Transit" (HPT) was planned on I-595 from 136th Street to US 1. A central circulator loop from the Tri-Rail station at Broward Boulevard through downtown Fort Lauderdale to the beaches was also included in the LRTP. The airport was also shown as part of the HPT network. The HPT service shown in the 2025 Cost Feasible Plan also included the Transit Bridge service from I-595 south along SR 7 into Miami-Dade County.

Broward County MPO 2030 LRTP (December 2004)

The Broward County MPO LRTP Year 2030 Update (adopted December 2004) is a plan to guide development of multi-modal transportation systems throughout Broward County for the next twenty-five years. The plan will be used by local governments to prioritize the majority of transportation spending through this period, so it must reflect the choices and desires of Broward County's residents, business people and visitors. In accordance with federal law, the plan is updated every three years to account for the changing needs of the county's population.

The year 2030 update builds upon the previous plan in terms of the mobility choices to be provided through non-automobile modes of transportation. Traditionally, long range plans have focused on road building to improve travel conditions for the automobile-driving public, with less attention paid to transit, bicycle and pedestrian modes of travel, and waterborne and freight transportation. As Broward County becomes more densely developed, elected officials, planners and engineers realize that to meet mobility needs in the county it has become vital to plan for a transportation system that provides a range of mobility options.

Tri-Rail Master Plan (December 2001)
Tri-Rail's 2020 Plan describes the strategies for developing expansion opportunities and infrastructure investments for the commuter rail system managed by the South Florida Regional Transportation Authority/Tri-Rail covering Miami-Dade, Broward, and Palm Beach counties. In relation to the Central Broward East-West Transit Analysis study area, the Tri-Rail plan identifies an expansion opportunity from Sawgrass Mills to downtown Fort Lauderdale, with recommendations for development of light rail transit technology along an east-west arterial route, currently shown as Sunrise Boulevard-University Drive-Broward Boulevard.

2020 Vision for Fort Lauderdale-Hollywood International Airport (November 2002)
The 2020 Vision was developed in anticipation of the next update for the airport Master Plan. The strategies included in this document are intended to account for growth and guide development at the Fort Lauderdale-Hollywood International Airport over the next two decades. The primary airport transit projects currently being promoted as part of the 2020 Vision are the airport to seaport People Mover and the Intermodal Center. A feasibility study for the automated People Mover system, which includes an evaluation of the Intermodal Center, began in 2004.

Port Everglades Master Plan (August 2001)
The Port Everglades Master Plan Update of 2000 assesses the future facility needs for the port, and subsequently outlines comprehensive 5-year and 10-year master plans, with corresponding 5-year and 10-year capital improvement plans. A plan for a fixed guide-way People Mover system connecting Port Everglades to the Intermodal Center is discussed here as a two phase project. Phase I looks to connect the proposed Intermodal Center to the Northport Cruise Complex, while Phase II would spur off of the original line to the Midport Cruise Complex. Both phases of the People Mover project are designated to follow the completion of extensive port expansion projects for both complexes.

Broward County Transit "Bridge" Corridor Alternatives Analysis (Underway)
The Transit "Bridge" study evaluates the alternatives for developing premium transit service improvements between Miami-Dade and Broward Counties. Results from this study determined that a north-south bus rapid transit corridor should be developed between the two counties along US 441 (SR 7). The secondary study area for the Transit "Bridge" alignment identifies an anticipated connection with anticipated high performance transit service in the central Broward corridor.

South Florida Education Center Transit Access Study (November 2001)
The SFEC is a consortium of six educational institutions located in the Town of Davie. The member institutions of the SFEC have formed a Transportation Management Association (TMA). The SFEC TMA transportation plan summarizes the characteristics of current transit services, mainly fixed route bus service provided by Broward County Transit (BCt) connected to Tri-Rail. Some of the needs identified from this plan are improved transit service hours, frequency, coverage, and infrastructure. The plan also identifies specific land use characteristics that have the potential for enhancing overall transit usage, such as pedestrian design and amenities, restricted parking, and transit priority infrastructure.

Downtown Fort Lauderdale Circulation Study (RAC Subarea Mobility Study) (November 2002)
The City of Fort Lauderdale and its Downtown Development Authority began a study to improve community awareness of pedestrian-oriented design and transit access strategies.

The study area and pedestrian-oriented transit linkages are the Beach Community Redevelopment Agency (CRA) area, the downtown, and the Northwest/Progresso/Flagler Heights CRA area. The first phase consisted of presenting the Mobility Opportunities Plan Map, cross sections, plan views, and sketch illustrations in the special attention examples areas, a community awareness plan, and notice to Congress of the Regional Activity Center (RAC) subarea mobility study activities.

Broward County Transit Master Plan (Underway)
The Broward County Board of County Commissioners recently approved the development of a Transit Master Plan. The purpose of the study will be to develop a ten-year plan that serves as a basis for development of enhanced transit services in Broward County. This study will also have a financial element to consider possible funding options for the service. This plan will coordinate and be consistent with the various other on-going transit studies. It will also serve as the basis for BCt's Transit Development Plan, as required by Florida Statute.

Broward County Transit Development Plan (December 2003)
The BCt Transit Development Plan (TDP) is a short-range plan that addresses operational and capital improvements for Broward County's Mass Transit Division. This plan is a Major Update covering years 2005 – 2009. A goal of the TDP is to enhance local and regional connectivity. Objectives include implementing an evolution process within corridors programmed for BRT and implementing smaller scale transit projects during the TDP timeframe that will be needed to support large, capital intensive improvement projects in later years.

Downtown Fort Lauderdale Connection Study (Underway)
The Downtown Connection Study addresses the need for a potential link between the I-95 High Occupancy Vehicle (HOV) System and the Fort Lauderdale CBD. Initial identification of station locations; community involvement to understand alignment, guideway, and technology preferences; and gaining full city involvement in station area planning has been accomplished. The results of this study will be integrated into the Central Broward East-West Transit Analysis as input to the alignment and technology considerations.

I-75 Master Plan / PalTran Extension (Underway)
The goal of the I-75 Master Plan is to identify various transportation alternatives for alleviating congestion on the study corridor linking Miami-Dade and Broward counties. The transit system would potentially consist of a dedicated bus or rail system along I-75 between I-595 and SR 826. In relation to the Central Broward East-West Transit Analysis study area, this I-75 alternative proposes stations at Sawgrass Mills, the Arvida Parkway, and Griffin Road. Additionally, an extension of the current Metrorail system is being considered to the proposed PalTran station at State Road (SR) 826/Palmetto Expressway and NW 79th Avenue, which would potentially link up to the south end of the I-75 corridor.

South Florida Transit Analysis Study (May 2003)
The South Florida Regional Transportation Organization addresses transportation needs for the tri-County area (Palm Beach, Broward, and Miami-Dade counties) of South Florida. Building on current long range plans in each of the three counties, the Transit Analysis Study examines transit alternatives for the region, and formulates a phased plan. In the Short-Range Plan Phase, several corridors are identified for development of bus rapid transit systems, including the alignment displayed in the Tri-Rail Master Plan along Broward Boulevard and Sunrise Boulevard.

2.2 RELATIONSHIP TO OTHER ON-GOING STUDIES

This study is being performed in cooperation with various transportation planners and providers to address the growing concern for mobility in the region. The Broward County MPO recently updated its long range transportation plan for 2030, and this project is included in that plan. There is a Project Development and Environment study underway to evaluate providing reversible lanes within the median of I-595. These two projects are working together to develop a multimodal corridor that maximizes the efficient use of funds for right-of-way and construction.

2.3 TRAVEL DEMAND ANALYSIS

Travel demand forecasts were made using the Southeast Florida Regional Planning Model (SERPM) as the most appropriate tool given the important regional nature of a major east-west transit system. The model was developed based on an extensive data collection effort in 1999. The latest applications, for the year 2025, include the current assumptions for highway and transit services in all three counties, Miami-Dade, Broward, and Palm Beach. The current study focused on the details of transit service assumptions in Broward County and how they might need to be modified to support the evaluation of transit alternatives. The project team worked closely with the staff of the Federal Transit Administration (FTA), which led to a number of refinements to the model structure as described below.

2.3.1 Refinement of the Model and Alternatives

One of the concerns expressed by the modeling team and FTA was the assumption that a high capacity transit system in Broward County would be expected to capture ridership in the same way as the full grade-separated transit system represented by Metrorail in Miami-Dade County. An attempt was made to develop a “Broward premium transit constant” as a blend of other bias constants in the model. A range of bias constants based upon this approach was presented to FTA. FTA staff expressed concern regarding the bias constants in SERPM that were used in blending and, moreover, that these bias constants put the entire modeling system in question for use in New Starts modeling. As a result, the project team embarked on a set of revisions to the model and its calibration.

The changes to the model were to refine the transit targets used to calculate the bias constants, especially for small market segments where a poorly estimated target could lead to very high (or low) bias constants. Positive constants for zero-car households ranged from 4.5 to 15.0 while negative coefficients on 2+ car households ranged up to -20.0. The revised coefficients for zero car households ranged from -4.0 to +3.4, while values for 2+ car households were mostly -1.3 to -3.4. Extensive testing of the model was undertaken and showed that the results were almost always equal in value to those produced previously, except for a few small market segments, while producing bias constants that were much more logical and received a more favorable review by FTA.

Once the revisions to the SERPM model structure described above were completed, work continued on specifying a range of bias constants for these “build” alternatives that would fall between bus and Metrorail in magnitude, as described earlier. For purposes of the analysis, two or three sets of bias constants were computed, based upon the percentage of the bus versus Metrorail share that was used. The following runs were prepared:

Alternative	Bus Share	Metrorail Share
I-595 LRT "Low"	100%	0%
I-595 LRT "Higher"	50%	50%
I-595 LRT "Very High"	20%	80%
I-595 BRT "Low"	100%	0%
I-595 BRT "High"	70%	30%
Sunrise/Broward "Low"	100%	0%
Sunrise/Broward "High"	70%	30%
Sunrise/Broward "Higher"	50%	50%

The argument for the "very high" option for I-595 was based on assumptions in one operating scenario where the alignment would be largely grade separated and thus would perform (and look) much like Metrorail. Conversely, the Sunrise/Broward alignment was never assumed to attain that degree of grade separation.

Several additional discussions were held with FTA staff concerning model performance and assumptions. In the meantime, FTA had been updating their own standards for reviewing models and identifying elements of "good practice". Although significant improvements were made to SERPM, a number of additional refinements were thought to be necessary. The major revision to the model was a restructuring of the bias constants. FTA expressed strong preferences for models which do not have separate bias constants for each transit sub-mode and access mode combination as in SERPM. They prefer to see a simpler model structure whereby far fewer numbers of bias constants would be used in various combinations.

In addition, several other structural changes were added to the model. Some changes were made in the model structure to improve the estimation of bus running times in different operating environments. FTA also indicated that "new modes" should probably be treated separately in the model structure but with a range of bias constants specified as a sensitivity test reflecting the uncertainty in a "new" mode. For SERPM, another path was added for the "new mode", both walk and auto access, and used for both proposed BRT and LRT systems in Miami-Dade and Broward Counties.

Several other special updates were made to the model, including:

- Ensuring consistency between mode choice and transit path building parameters throughout the model structure
- Changing path dis-favoring to a value (1.20) more acceptable to FTA than the previous approach (favoring by 0.10) . This change results in paths being considered which are only marginally worse than the minimum time paths, as opposed to paths that can be unrealistic.
- Extend cut-offs for path "timing out" from 180 weighted minutes to 300 weighted minutes to make the existence of paths more consistent between alternatives
- Replace minimum transit run time "cliffs" with minimum auto distance values which are not sensitive to transit alternatives

Research at FTA indicated that a rail alternative largely on an exclusive right of way, as was proposed for this project, might justify up to 12 minutes of travel time savings as a "premium transit effect" when applied to the calculation of cost effectiveness, which has become the primary measure for FTA assessment of the worthiness of projects. This

value was applied as a test compared to values of zero used as the default. Such a "premium transit effect" is often termed a "silver bullet" in modeling parlance.

Initial analysis indicated that the LPA would not meet the dollar per user benefit hour criterion that FTA established for projects to receive a "recommended" rating. FTA also encourages consideration of a Minimum Operating Segment (MOS) as a way to consider "intermediate cost" alternatives. An MOS was defined from Flamingo Road at I-595 to the BCT Broward Central Terminal in downtown Fort Lauderdale. The MOS will be developed further during the next phase of the project. A revised and simplified Transportation System Management (TSM) alternative was prepared in consultation with FTA, with a slightly different version used for consistency with the MOS alternative. The MOS was assumed to be entirely grade separated and thus to operate virtually identically to Metrorail in Miami-Dade County. Therefore, an additional sensitivity test was prepared using Metrorail bias constants for the East-West project.

Mode choice results are summarized in Table 1 for the MOS with the "standard" constant (treated like bus), with a 12 minute "premium transit" (or "silver bullet") effect added, and with the alternative treated as Metrorail. The Metrorail constant is slightly higher for home based work trips, resulting in a modest increase in ridership, but larger for non-work and non-home base trips, making the increase for total ridership quite substantial. Also shown are results for the full LPA with the "standard" constant and with the "premium transit" effect. The more detailed impact of the various alternatives on boardings is shown in Table 2. The "premium transit" effect increases ridership about 20 percent across the board.

Table 2: Mode Choice Model Results

Market Segment	TSM (MOS version)	MOS Standard	MOS Premium Transit	MOS as Metrorail	TSM (LPA version)	LPA Standard	LPA Premium Transit
Home Based Work							
Walk Access							
Standard Bus	73,019	70,544	70,241	70,065	73,023	69,696	69,364
BRT/LRT	2,366	5,880	7,119	2,347	2,380	7,330	8,921
Metrorail	25,805	25,813	25,755	31,091	25,816	25,818	25,743
Tri-Rail	8,816	8,395	8,026	7,984	8,789	8,294	7,855
Subtotal	110,006	110,632	111,141	111,487	110,008	111,138	111,883
Auto Access							
Standard Bus	7,757	5,974	5,815	5,793	7,893	5,753	5,615
BRT/LRT	1,589	5,773	7,484	1,555	1,609	6,649	8,635
Metrorail	24,669	24,609	24,556	31,294	24,667	24,593	24,509
Tri-Rail	9,396	9,093	8,791	8,729	9,378	8,996	8,638
Subtotal	43,411	45,449	46,646	47,371	43,547	45,991	47,397
Total	153,417	156,081	157,787	158,858	153,555	157,129	159,280
All Trips							
Walk Access							
Standard Bus	247,235	242,935	242,431	241,780	247,249	241,154	240,593
BRT/LRT	3,493	9,160	10,667	3,399	3,638	12,123	14,055
Metrorail	65,078	65,071	65,011	74,520	65,106	65,084	65,005
Tri-Rail	11,792	11,362	10,987	10,922	11,770	11,225	10,780
Subtotal	327,598	328,528	329,096	330,621	327,763	329,586	330,433
Auto Access							
Standard Bus	12,100	9,297	9,095	9,041	12,273	8,969	8,799
BRT/LRT	2,466	9,095	11,479	2,424	2,470	10,759	13,614
Metrorail	38,644	38,567	38,514	50,566	38,641	38,550	38,464
Tri-Rail	13,639	13,293	12,989	12,917	13,629	13,141	12,780
Subtotal	66,849	70,252	72,077	74,948	67,013	71,419	73,657
Total	394,447	398,780	401,173	405,569	394,776	401,005	404,090

Table 3: Transit System Boardings

Service	TSM (MOS version)	MOS Standard	MOS Silver Bullet	MOS as Metrorail	TSM (LPA version)	LPA Standard	LPA Silver Bullet
Home Based Work							
Palm Beach Local	14,592	14,795	14,899	14,775	14,680	14,746	14,734
Broward Local	68,580	70,359	71,959	73,269	67,534	69,684	71,419
Miami-Dade Local	102,514	102,467	102,784	102,693	102,778	102,799	103,052
Metrorail	65,384	65,501	65,568	65,432	65,326	65,467	65,402
Tri-Rail	22,967	23,425	23,741	23,881	23,056	23,515	23,945
Palm Beach Express	180	176	162	184	186	169	185
Broward Express	4,967	1,466	1,487	1,579	5,847	977	1,009
Miami-Dade Express	2,447	2,425	2,446	2,463	2,463	2,465	2,455
Broward Limited	18,881	19,337	19,860	20,045	19,075	19,421	20,019
Miami-Dade Limited	25,633	25,677	25,470	25,644	25,660	25,556	25,537
Broward LRT	0	9,483	11,745	13,059	0	12,252	14,902
Miami-Dade LRT	6,947	6,966	6,984	6,969	6,927	7,002	6,916
Total	333,092	342,077	347,105	349,993	333,532	344,053	349,575
Total Daily							
Palm Beach Local	32,918	33,168	33,225	33,113	32,927	33,060	33,099
Broward Local	180,870	184,160	186,326	190,926	179,416	183,744	185,956
Miami-Dade Local	286,342	286,242	286,499	286,357	286,398	286,383	286,620
Metrorail	133,268	133,497	133,554	133,348	133,335	133,451	133,384
Tri-Rail	31,432	31,854	32,169	32,389	31,531	31,965	32,449
Palm Beach Express	557	547	542	544	546	553	557
Broward Express	8,230	2,700	2,756	3,028	9,564	1,365	1,398
Miami-Dade Express	3,153	3,125	3,172	3,181	3,166	3,187	3,161
Broward Limited	27,470	27,973	28,581	28,846	27,692	28,086	28,649
Miami-Dade Limited	47,130	47,175	47,015	47,201	47,128	47,159	47,122
Broward LRT	0	14,348	17,553	22,704	0	19,830	23,688
Miami-Dade LRT	10,844	10,822	10,782	10,794	10,777	10,844	10,737
Total	762,214	775,611	782,174	792,431	762,480	779,627	786,820

The FTA uses the concept of “user benefits” to evaluate the investment-worthiness of transit projects. User benefits are computed based on all the differences attributed to the various coefficients and bias constants in the mode choice model. These differences are then converted to an equivalent change in minutes of travel time saved, which can be tabulated and compared between alternatives. Bias constants, such as the “premium transit” constant, make up part of the conversion to minutes (or hours) of travel time savings, otherwise known as “user benefits”. The user benefit values are then used as part of overall project evaluation and compared to various cost measures attributed to the comparison of the build project to the TSM baseline to establish a cost-effectiveness ratio for the project.

A summary of user benefits for the options described above is contained in Table 3. In addition to various tabular summaries, user benefits are also typically depicted by geographic area when comparing alternatives. Generally, the maps are shown in shades of green for traffic analysis zones which show a user benefit for the build project and shades of red for zones which show dis-benefits. An example of a user benefit map prepared for the Central Broward East-West Transit Analysis LPA is shown in Figure 4. As shown, benefits are well-distributed throughout the corridor.

Table 4: User Benefit Summary

	MOS Standard	MOS Silver Bullet	MOS as Metrorail	LPA Standard	LPA Silver Bullet
Home Based Work					
Person Trips	4,437,715	4,437,715	4,437,715	4,437,713	4,437,713
Base Transit	152,382	152,382	152,382	152,517	152,517
Delta Transit	2,634	4,327	5,398	3,559	5,695
User Benefits (minutes)					
from service increase	4,636	5,456	6,016	8,449	10,088
from service decrease	(53)	(53)	(56)	(51)	(51)
from capping	(8,392)	(20,357)	(37,915)	(13,507)	(33,075)
net	151,248	244,142	293,572	204,741	319,604
Home Based Other					
Person Trips	10,552,943	10,552,943	10,552,943	10,552,968	10,552,968
Base Transit	161,108	161,108	161,108	161,203	161,203
Delta Transit	1,130	1,712	4,104	1,668	2,445
User Benefits					
from service increase	4,595	5,439	8,805	10,113	11,952
from service decrease	(55)	(55)	(53)	(45)	(45)
from capping	(6,232)	(16,268)	(126,542)	(10,145)	(26,189)
net	74,436	106,376	171,707	108,669	148,883
Non-Home Based					
Person Trips	5,822,282	5,822,282	5,822,282	5,822,282	5,822,282
Base Transit	77,948	77,948	77,948	78,043	78,043
Delta Transit	543	642	1,536	978	1,119
User Benefits					
from service increase	977	1,063	1,536	3,149	3,436
from service decrease	(79)	(79)	(77)	(183)	(185)
from capping	(1,435)	(2,417)	(23,854)	(3,395)	(5,183)
net	29,252	33,872	63,568	51,920	58,104
Total					
Person Trips	20,812,940	20,812,940	20,812,940	20,812,963	20,812,963
Base Transit	391,438	391,438	391,438	391,763	391,763
Delta Transit	4,307	6,681	11,038	6,205	9,259
User Benefits					
from service increase	10,208	11,958	16,357	21,711	25,476
from service decrease	(187)	(187)	(186)	(279)	(281)
from capping	(16,059)	(39,042)	(188,311)	(27,047)	(64,447)
net	254,936	384,390	528,847	365,330	526,591
Total UB (Hours)	4,249	6,407	8,814	6,089	8,777

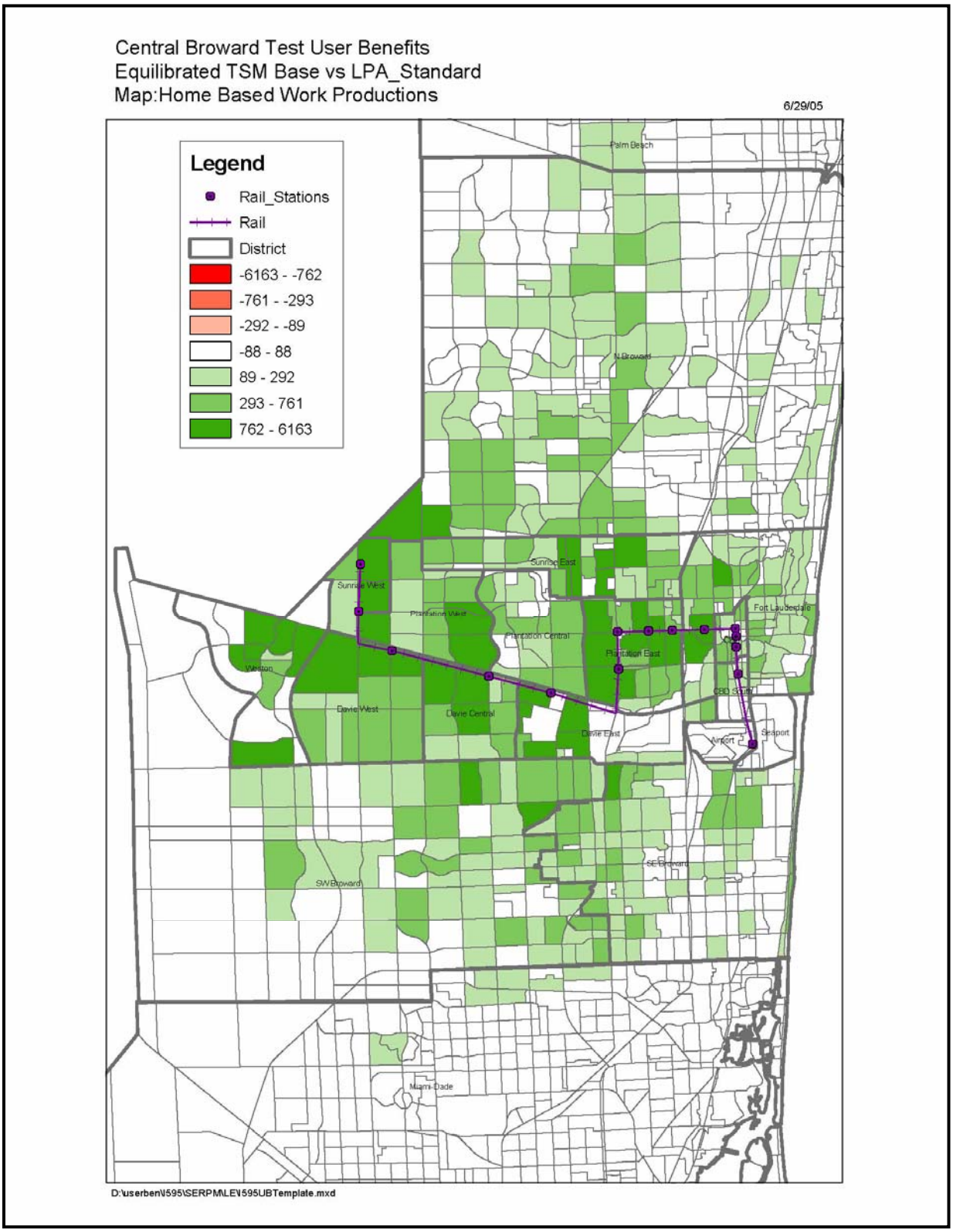


Figure 4: Sample User Benefit Map

3.0 TECHNOLOGY EVALUATION

This chapter describes the potentially feasible technologies considered for the CBEWTA. A range of transit technologies can fulfill general mobility needs. An analysis of transit technologies was conducted to identify the modes that would be appropriate for Broward County.

3.1 DEFINITION OF TRANSIT MODES

For this assessment, the term **technology** reflects **mode**, such as bus or rail, as well as application of the technology, such as ability to operate in mixed traffic or requirement of a dedicated guideway. The focus of this assessment was to determine the most appropriate technologies that could meet travel needs within central Broward County. Evaluation criteria reflect system compatibility, cost-effectiveness, station/access locations and impacts, operating impacts, service frequency, potential ridership, likely environmental impacts and development status. This section identifies the possible available technologies and assesses which technologies could meet the needs for the CBEWTA. Finally, the assessment recommends a limited set of transit technologies for consideration in the CBEWTA.

Roadway improvements, intelligent transportation system and travel demand management elements that are part of the Baseline Alternative and may be incorporated as part of the LPA are also described in the following pages. These improvements to the transportation system are not evaluated because they will be included in both the Baseline alternative and in the locally preferred alternative (LPA).

3.1.1 Express Bus

Bus systems offer flexibility in the location and level of service provided. Buses can operate on virtually all city streets and highways. A wide variety of vehicle types and sizes are available.

Capital cost to expand service is relatively low. A wide variety of service types can be provided with buses such as express, limited stop, fixed route, route deviation and demand responsive services. In express service, buses have very few or no stops between where passengers board and the end of route. Park-and-ride lots are often provided for the users of express bus service. Service frequency can be changed to meet peak period, off-peak period and special event demand. Capacity is limited somewhat by vehicle size. Since buses operate in mixed traffic, it is difficult to provide a travel-time savings versus travel by car.

Typical Express Bus Characteristics

- Capital Cost / Vehicle: $200,000+ (40 ft. urban bus)
- Operating Cost / Passenger Mile: $0.35 - $0.50
- Service distance: Several blocks for circulators, 10+ miles for express service
- Typical maximum speed: Route specific speed limits
- Typical service frequency: 5-20 minutes during peak periods
- Seated capacity: 15-100 per bus (depending on vehicle size & type)

3.1.2 Bus / HOV Lanes

Bus/High-Occupancy Vehicle (Bus/HOV) lanes provide a dedicated travel lane for the exclusive use of buses, vanpools, private shuttles, carpools, and other authorized vehicles. Bus/HOV lanes are designed to provide travel time savings and improve travel time reliability by offering a means to bypass traffic congestion in the adjacent general-purpose lanes.

Increases in ridesharing and transit use in a travel corridor can be achieved when improvements and/or travel time reliability creates significant incentives for individuals to choose higher-occupancy modes over driving alone. Bus/HOV Lanes allow an increase in the person capacity of the roadway. A significant benefit is that more people travel in fewer vehicles reducing congestion and emissions.

Typical Bus/HOV Characteristics

- Capital Cost / Mile: $4-8 million
- Operating Cost / Passenger Mile: $0.45 -$0.65
- Service distance: 5 miles or more
- Typical maximum speed: 65 mph (site specific speed limits)
- Typical service frequency: 5-15 minutes during the peak
- Seated capacity: 35-100 per bus

3.1.3 Bus Rapid Transit (BRT)

BRT provides the speed and guideway advantages typically attributed to a rail line, with the potential added advantage of bus circulation within neighborhoods or other areas. The BRT concept offers high capacity bus operation along an exclusive bus-only roadway (busway or transitway) with on-line stations. In some cases, the vehicles may be specialized and operate only on the transitway as in Curitiba, Brazil or the proposed project in Lane County, Oregon. In other cities, as in Ottawa shown here, standard urban buses operate on both the transitway and city streets. This allows the vehicles to circulate through neighborhoods or downtown and provide high speed, express/limited stop service when operating in the transitway.

Other approaches are being taken to the implementation of BRT. The Los Angeles “Rapid” service operates in a shared lane of major arterial streets with limited stops, distinctive shelters and preferential signal treatment.

The Honolulu BRT calls for buses to operate in exclusive median lanes or curbside contra flow lanes (38 percent of its length), semi-exclusive curb lanes that also allow tour buses and turning cars (29 percent) and in mixed traffic (33 percent). The second phase would use mostly dedicated lanes, including the existing HOV lane on the H-1 Freeway.

Typical BRT Characteristics

- Capital Cost / Mile: $0.2-0.5 million - shared lane
  $8-25 million – dedicated lane or guideway
- Operating Cost / Passenger Mile: $0.55 – $0.90
- Service distance: 5 miles or more
- Typical maximum speed: 55-75 mph
- Typical service frequency: 3-15 minutes during the peak
- Seated capacity: 35-100 per bus

3.1.4 Light Rail Transit

Light Rail Transit (LRT) is a rail technology that can navigate typical roadway intersections, and travel along streets, highways, or exclusive rights-of-way. Since tracks are flush with the street surface, LRT can be operated in areas with pedestrian, cyclist, or automobile activity. Vehicles typically receive power from an overhead wire.

Light rail vehicles can take a variety of forms, including restored or replica historic streetcars. Some U.S. cities are using European-style modern trams (see photograph at left) or streetcars for circulation and distribution service. These vehicles are smaller and have lower maximum speeds than those used in line-haul service in Dallas and Denver, for example.

Typical Light Rail Characteristics

- Capital Cost / Mile: $20 - 55 million
- Operating Cost / Passenger Mile: $0.45 - $0.55
- Service distance: 25 miles or less
- Station spacing: Stations every ¼ to 2 miles
- Typical maximum speed: 45 - 65 mph
- Typical service frequency: 5 -10 minutes during the peak
- Seated capacity: 150 - 300 per train

3.1.5 Commuter Rail

Commuter rail systems operate typically along existing freight railroad rights-of-way, serving longer-distance trips between central cities, suburban activity centers, and outlying areas. Vehicles are configured to provide maximum seated capacity and comfort. Commuter rail vehicles can operate in the same right-of-way with freight trains. In the United States, commuter rail vehicles are pulled or pushed by a diesel powered locomotive (as shown in the photograph of Tri-Rail to the upper right). In other countries, self-propelled trains (shown at right), called Diesel Multiple Units or Electric Multiple Units, operate individually or linked together in trains of up to 8 cars. These vehicles typically operate on exclusive rights-of-way or on existing freight tracks, but may operate along streets or roadways.

Typical Commuter Rail Characteristics

- Capital Cost / Mile: $5-9 million
- Operating Cost / Passenger Mile: $0.45 - $0.55
- Service distance: 25 miles or longer
- Station spacing: Stations every 2-6 miles
- Typical maximum speed: 65-85 mph
- Typical service frequency: 15-30 minutes during the peak
- Seated capacity: Up to 1,500 per train

3.1.6 Heavy Rail

Heavy rail operates along an exclusive guideway and is grade separated, usually elevated or underground, from other vehicular or rail modes. Heavy rail vehicles receive electric current from a third rail. Heavy rail is appropriate for corridors with very high passenger demand. This technology can transport a very high volume of passengers per hour at a high average speed. Complete grade separation of the alignment allows reliable operations. Miami-Dade Metrorail is an example of a heavy rail system.

Typical Heavy Rail Characteristics

- Capital Cost / Mile: $40-250 million
- Operating Cost / Passenger Mile: $0.25 - $0.35
- Service distance: 5 to 30 miles
- Station spacing: Stations every ½ to 2 miles
- Typical maximum speed: 60-80 mph
- Typical service frequency: 5-10 minutes during the peak
- Seated capacity: 60-80 passengers per car, plus standees

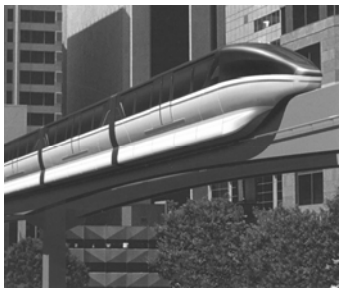
3.1.7 Automated Guideway Transit

Automated Guideway Transit (AGT), also referred to as peoplemovers, includes steel-wheel or rubber-tired vehicles that operate under automated control on an exclusive guideway, grade-separated from other vehicular traffic. AGT may utilize conventional electric propulsion, or alternative types such as linear induction and magnetic levitation. AGT has been implemented as line haul transit in medium to large metropolitan areas. Shuttle or circulator services for downtowns or airports represent the more common use of AGT. Automated operation allows for high service frequency and high passenger capacity, as frequent service offsets smaller vehicle size. The Metromover in downtown Miami is an example of an AGT system.

Typical Automated Guideway Transit Characteristics

- Capital Cost / Mile: $50-70 million
- Operating Cost / Passenger Mile: $2.25 - $2.40
- Service distance: 1-5 miles
- Station spacing: Stations every ¼ to 1 mile
- Typical maximum speed: 25 to 50 mph
- Typical service frequency: 1-10 minutes during the peak
- Seated capacity: 30-100 passengers per car

3.1.8 Monorail



A monorail system is comprised of rubber-tired vehicles that operate along a single rail, or beam. The beam supports the vehicle and provides guidance, and houses the electrical power source. Monorail can be designed for a variety of environments, including activity area circulation, shuttle service, and line haul transit. However, its most common application has been as circulators or shuttles at activity centers such as airports or theme parks. Monorail has met very limited use as a line-haul transit mode; it is not used in North America for this purpose at this time. Recently, voters in Seattle approved a measure to expand the existing 2.2-mile system by 14 miles at a cost of $1.75 billion, approximately $125 million per mile.

Typical Monorail Characteristics

- Capital Cost / Mile: $50-150 million
- Operating Cost / Passenger Mile: $3.80 - $4.25
- Service distance: Under 25 miles
- Station spacing: Stations every ½ to 2 miles
- Typical maximum speed: 50 mph
- Typical service frequency: 5-10 minutes during the peak
- Seated capacity: 30 passengers

3.2 OTHER TECHNOLOGY CONSIDERATIONS

3.2.1 Roadway Improvements for Transit

Certain types of roadway and intersection improvements can confer special treatment for transit vehicles that reduce transit travel time and improve schedule adherence, making transit a more attractive mode choice. In some cases, these roadway and intersection improvements also improve the flow of general-purpose traffic as well.

- **Designated Lanes for Transit Vehicles:** The addition or designation of a curb lane in each direction for priority use by transit vehicles. Non-transit vehicles may be permitted to use the lane for right turns only.

- **"Queue Jumping" Lanes:** The addition of a lane at selected intersections, essentially a right turn bay, that allows the transit vehicle to move to the head of the traffic queue. Transit vehicles can get an additional advantage with a separate signal that allows them to move through the intersection ahead of general traffic and merge back into the general traffic lanes past the intersection.

- **Transit Signal Priority:** This technology gives preference to buses or other transit vehicles (and/or emergency vehicles) at intersections. Buses are equipped with a device that emits a signal to a receiver mounted on the traffic signal. When the transit vehicle approaches the intersection, the signal emitted by the bus directs the traffic signal to hold the green

time longer or shorten the red time for the transit vehicle so that it will not have to stop at the intersection, if it is not a designated stop on the route.

- **Bus Stop Pullouts/Locations:** Pullouts, a curbside space that allows the bus to load and unload passengers out of the flow of traffic, can improve both transit and traffic operations. The location of bus stops, nearside or far side of the intersection can also affect traffic and transit operations. A far-side bus bay allows the bus to use the intersection to move into the bus bay or move from a right turn only lane directly into the bus bay. At signalized intersections, nearside stops allow passenger boarding and alighting during the red signal time. Mid-block bus stops, especially when combined with a pullout, move the bus out of traffic lanes for passenger pick up and drop off. Mid-block stops can make transfer from on route to another more difficult for transit patrons.

- **Skip-stop Service:** One of the reasons that travel time for transit trips is longer than for auto trips is the additional time required for transit vehicles to accelerate and decelerate at stops. In skip-stop service, selected runs load and unload passengers at every other stop. Skip-stop operations can also include express stops. Express stops are located further apart than skip-stops (half mile to one mile). Express runs are limited in frequency and generally to the peak periods.

- **Streamlining Routes:** Deviation of a route from a major thoroughfare or arterial adds route miles, turns and travel time. Such deviations should be limited and used only if they generate substantial ridership.

- **Add/Increase the Capacity of Left and Right Turn Bays:** At some intersections lengthening or creating two left lanes to increase storage capacity insures that there is adequate space for transit vehicles as well as other traffic. It can also insure that transit vehicles waiting to make a left turn do not partially block through traffic lanes, improving general traffic operations.

3.2.2 Travel Demand Management (TDM)

Travel Demand Management (TDM) attempts to reduce the overall pressure placed on the existing transportation network by increasing transit ridership, vehicle occupancy, walking and bicycling, and to reduce the lengths of trips, move them to off-peak hours, or eliminate them altogether.

- **Strategies to Promote Carpooling:**
  - Establish on-line ridematching services.
  - Work with employers and property managers to distribute ridematching forms and facilitate ridematching programs.
  - Offer guaranteed-ride-home programs from employment locations. (Guaranteed-ride-home programs provide employees who carpool a ride home if an emergency requires them to leave work during midday or if they have to stay late.)
  - Offer preferential parking at worksites for carpoolers.
  - Create incentive program offering prizes or cash payments to carpool participants.
  - Charge for parking at work sites.
  - Create regional for-profit carpooling programs.
  - Create real-time carpool matching programs.

- **Strategies to Promote Vanpooling:**
  - Provide matching service for vanpooling.
  - Host zip code meetings at worksites.
  - Offer guaranteed ride home.
  - Use third-party vendor and subsidize operating costs. Purchase vans for employers and provide for maintenance.
  - Offer preferential parking for vanpool vehicles at worksite.
  - Offer monthly subsidy to vanpool users.

- **Strategies to Promote Transit Use:**
  - Encourage employers to subsidize and/or provide bus pass programs.
  - Offer guaranteed ride home.
  - Provide priority access for feeder bus pick-up and drop-off activities. Improve bus stops and bus shelters.
  - Develop feeder bus services from work sites to park-n-ride or bus transfer centers.

- **Strategies to Promote Bicycling and Walking:**
  - Provide bicycle information to employees.
  - Support Bike-to-Work Week.
  - Offer guaranteed ride home.
  - Provide bike storage and employee showers at work sites.
  - Distribute local real estate information to new employees.
  - Create safe and convenient bicycle routes and pedestrian amenities through the area.
  - Require pedestrian and bicycle design amenities for new developments.

3.2.3 Intelligent Transportation Systems (ITS)

Intelligent Transportation Systems (ITS) focus on the optimization of the existing transportation network through the integration of advanced electronics, computers, and communications.

- **Ramp Metering:** This refers to the installation of signals to control traffic entering high-volume roadways, which spreads flow peaks across longer periods of time, utilizing available capacity more efficiently and reducing overall travel times. It also decreases accident potential by reducing turbulence in merge zones by dispersing entering vehicles into a consistent release pattern. HOV bypass lanes are common at ramp metering locations to allow HOV vehicles to bypass the meter delay via a separate lane.

- **Traffic Signal Control Systems:** Optimizes traffic flow by adjusting signal operations through use of real-time traffic data. Coordinated, computerized traffic signals reduce traffic delay and accident potential by facilitating uninterrupted traffic flow.

- **Transit Management Systems:** Uses technology to improve fleet management, schedule performance and safety. Uses Automatic Vehicle Location (AVL) equipment to provide real-time data to optimize bus routes and running times.

AVL equipment can utilize vehicles as 'mobile probes' with ability to obtain real-time traffic conditions. Assures reduced response time to bus incidents by pinpointing bus locations and dispatching aid.

- **Incident Management Systems:** Programs that detect and verify incidents, clear incidents quickly and efficiently, and inform motorists of potential delay from incidents. ITS applications include automatic detectors, closed circuit television, aerial surveillance, courtesy patrol units and inter-jurisdictional coordination, allowing reduced response time to incidents.

- **Traveler Information:** Provide real-time traveler information concerning traffic congestion, weather conditions, alternate route availability and transit schedules and running times. The system could be accessed by automated signs, telephone, Internet, information kiosks, cable television and radio.

- **Electronic Fare Payment Systems:** Allows travelers to consolidate all transit and parking transactions into one card for added convenience to users. Provides centralized information to service providers concerning ridership information for various routes and travel time data.

3.3 TECHNOLOGY EVALUATION

Technology options were compared to a set of guidelines. The evaluation was conducted by consideration of advantages and disadvantages of each technology as related to the defined guidelines. Only technologies that meet defined guidelines with a + or "Good" rating on at least five (5) criteria are considered feasible to carry forward in the Central Broward East-West Transit Analysis.

3.3.1 Evaluation Guidelines

Guidelines were defined to reflect corridor and regional transportation needs and likely fiscal constraints. Qualitative and quantitative issues were considered. Guidelines related to system compatibility, cost-effectiveness, station/access locations and impacts, operating environments, service frequency, potential ridership, likely environmental impacts, and development status are described below.

The technology should be **compatible** with the existing and planned transportation system and with community desires and the travel needs of central Broward County. The chosen technology should coordinate with planned and existing commuter rail and bus routes. The chosen technology should facilitate more direct and convenient transit travel and a decrease in travel time. The technology should not create capacity impacts at intermodal facilities.

The technology should be relatively **cost-effective**. Projected capital and operating and maintenance costs should be comparable to that for at-grade alignments within comparable physical environments and the overall BCT system.

Stations should be easily **accessible** for passengers and allow easy coordination with the transit network. This relates to the number or stations; **station type** (at-grade or grade separated) and the type of platform (high, low, center, or side). **Station spacing** should allow convenient walk access. If bus access is required to reach a station, the total number of transfers for most trips should be low.

The technology should be **adaptable** to a variety of operating environments. This relates to grade separation requirements, ease or feasibility of system extension, transfer convenience, and feasibility of implementation in various rights-of-way.

Increasing **service frequency** generally increases **ridership** and should be coordinated with Tri-Rail service frequencies. The technology should provide sufficient operating **capacity** for expected ridership.

The system should not result in extensive **environmental impacts**. A qualitative assessment of potential traffic, visual, historic, and other environmental impacts should be noted.

The system should be compatible with existing and planned **land uses**. The chosen technology shall be considered appropriate based on a qualitative assessment of existing and planned development densities, mixed uses, socio-economic factors, neighborhood compatibility, and other factors that could affect level of transit demand.

The system should be reliable and based on **proven technology**. The chosen technology shall be considered appropriate based on the number of active operations and corresponding performance records as related to maintenance and reliability. Further consideration should be given to the number of manufacturers and the compatibility of technologies. Vehicle parts, system components, and future expansions of the system should not be limited to a single supplier.

Each technology will be evaluated and ranked according to these criteria as follows:

- **Good (+)** - Good performance on the quantitative or qualitative measure as compared to the other technologies.
- **Fair/Neutral (O)** - Technology has no affect, one way or the other upon the quantitative or qualitative measure as compared to the other technologies.
- **Poor (—)** - Poor performance upon a quantitative or qualitative measure as compared to the other technologies.

3.3.2 Evaluation Results

The ranking of technologies is a qualitative assessment based on typical characteristics of each technology for application as part of the overall transit system in Broward County. A summary of this evaluation of transit technologies is provided in the Table 4 on the following page. The complete technology assessment is included in the *Initial Corridor Screening Report*.

3.4 RECOMMENDED TECHNOLOGIES

Based on this evaluation, the alternatives for this project were BRT and light rail transit (LRT). Express bus also earned five (5) + ratings. Express bus service is incorporated into

the Baseline alternative and was not considered as one of the build alternatives. Both BRT and LRT have the capacity to meet anticipated demand and have proven to be cost-effective in many systems across the country. These vehicles can operate in separate guideways or within existing roadway rights-of-way. This trait will allow direct access to activity centers and downtown Fort Lauderdale. Access to some activity centers and through existing highway interchanges will require a vehicle that can make short radius turns and ascend relatively steep grades. Bus and light rail vehicles should be able to meet the necessary geometric constraints.

3.5 SUMMARY

The transit technology selected for the adopted LPA is light rail transit with enhancements to the existing bus system. Throughout the LPA evaluation both BRT and LRT were presented as technology options. Despite BRT's cost-effectiveness advantage, the MPO Board selected LRT for its ability to attract a larger number of choice riders, the potential for increasing service capacity without significant additional operational costs, and its proven record in fostering economic development. For the selected alignment, the vehicle will need to be able to travel at both high and low speeds, since it will be operating within the right-of-way of an interstate highway on a dedicated guideway, as well as on arterial streets through central Fort Lauderdale. A vehicle with a tight turning radius is necessary for navigating intersections. The specific vehicle design will be determined during the Preliminary Engineering phase of the project.

Table 5: Transit Technology Evaluation Matrix

		CRITERIA								
		System Connectivity	Cost Effectiveness	System Accessibility	System Flexibility	Service Frequency	Ridership/ Capacity	Environmental Impacts	Land Use Compatibility	Proven Technology
TECHNOLOGY	Express Bus	+	+	+	+	O	—	O	O	+
	HOV Lanes	+	O	—	+	O	—	O	O	+
	Bus Rapid Transit	+	+	+	+	+	+	O	O	+
	Light Rail Transit	O	O	+	O	+	+	+	+	+
	Heavy Rail	O	—	—	—	+	+	O	+	+
	Commuter Rail	—	O	—	—	O	O	—	—	+
	AGT	O	—	O	—	+	+	—	—	O
	Monorail	O	—	—	—	+	O	O	—	—

Legend: + = positive; O = neutral; — = negative

4.0 DEVELOPMENT AND EVALUATION OF ALTERNATIVES

The evaluation of alternatives was completed using a two-tiered process that moved from a qualitative review to a more quantitative review. This two-tiered process consisted of four evaluation phases. The first evaluation was completed during the scoping phase, when initial alignment alternatives were identified and evaluated using criteria that were primarily qualitative. The alternatives resulting from the scoping phase were further evaluated during Tier 1, where a qualitative assessment of quantitative data was completed. The same set of alternatives evaluated during Tier 1 was carried into Tier 2 and were re-evaluated using refined criteria and a more quantitative process. At the end of the Tier 2 evaluation, the MPO selected an approved alignment, which was further evaluated during the fourth phase. This fourth round of evaluation was necessary in order to assist the MPO in deciding between the two recommended transit technologies, BRT and LRT, and to assess variations to portions of the recommended alignment, so that a Locally Preferred Alternative was identified. This section provides an overview of each of these evaluation phases.

4.1 SCOPING

Scoping meetings for the study were held on Tuesday, November 19, 2002, at the Town of Davie Police Department Complex. Two (2) separate meetings were held: one that began at 1:30 p.m. that allowed the project team to coordinate with various governmental agencies, including cities located within the study area, Broward County and other interested local, regional, state and federal agencies; and a second meeting, which began at 5:00 p.m., that was open to the public. The scoping phase of the project lasted 10 months and is documented in three reports: *Scoping Meeting Summary Report*, *Scoping Information Document*, and *Initial Corridor Screening Report*.

4.1.1 Scoping Alternatives Development

The alternatives identified during the scoping phase focused on arterial roads and interstate highways, including a baseline alternative. These alternatives are described below and shown on Figure 5.

BASELINE

For the baseline case, all north-south and east-west express bus alignments defined in the Cost Feasible 2025 Transit Plan within Broward County were retained, with the exception of the Sunrise/Broward BRT as it overlaps with some proposed build projects. Premium future bus services retained are Atlantic Boulevard/Sample Road, Cypress Creek Road/McNab Road, Oakland Park Boulevard, Pines Boulevard/Sheridan Street, Flamingo Road, University Dr, US 441 North, and Powerline Road. The proposed Transit Bridge was included as a connection between the US 441 North express bus and Pro Player Stadium/Golden Glades. Furthermore, the Fort Lauderdale Downtown/Beach/Airport Loop People Mover was also included in the baseline. The I-595 High Performance Transit corridor shown in the Cost Feasible Transit Plan was eliminated, as it is very similar to one of the east-west build alignments. NW 27th Avenue Metrorail is assumed to operate as an extension of Metrorail from central Miami-Dade to the terminus of the Transit Bridge at Pro Player Stadium. Local or express bus routes in Miami-Dade interfacing with the extension were modified in the model to stop at the proposed stations, if necessary. All other changes proposed to Tri-Rail and local bus services shown in the MPO Long Range Transportation Plan and by Miami-Dade County were retained.

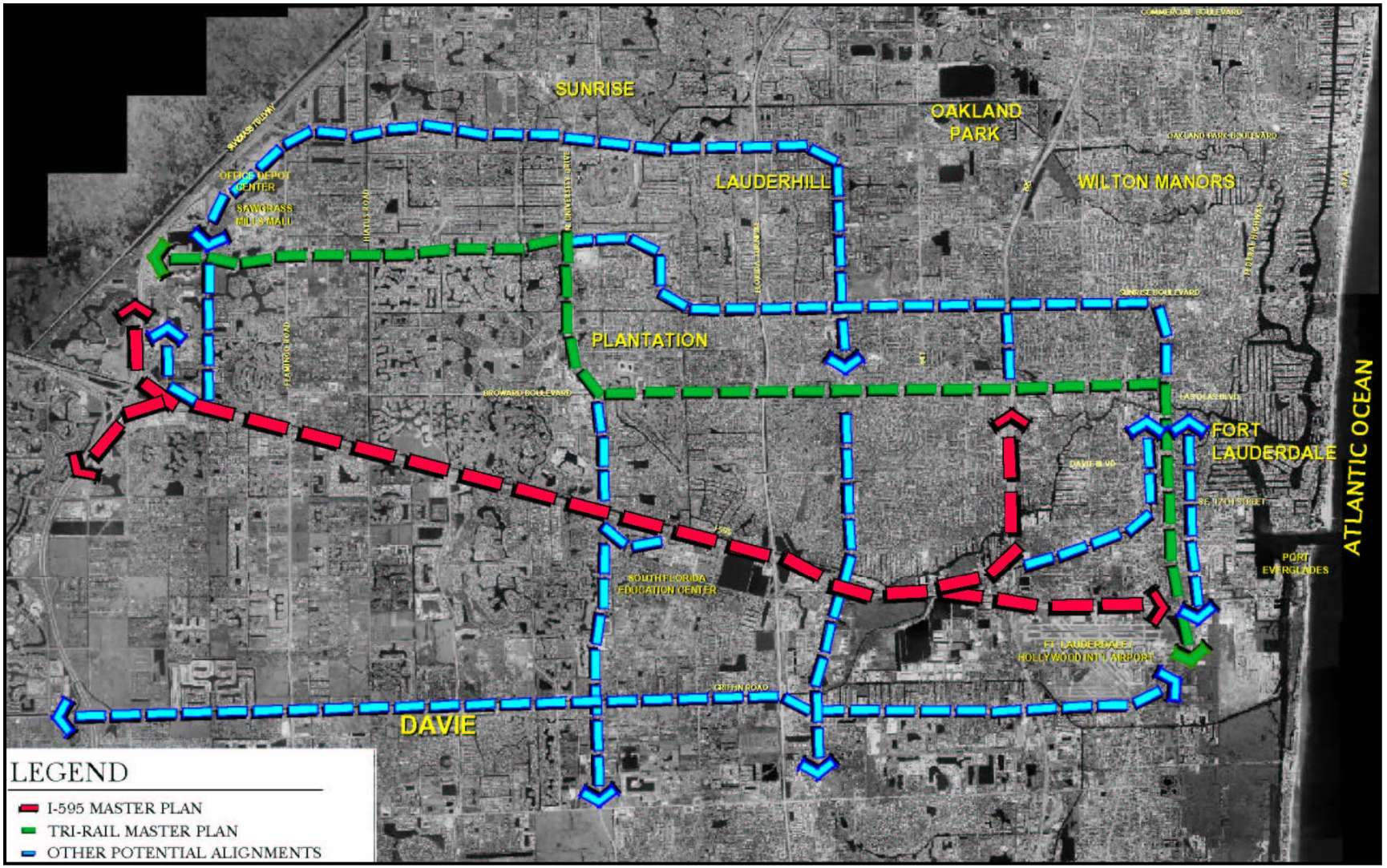


Figure 5: Alignment Alternatives from Scoping

INTERSTATE 595

I-595 Right-of-Way High Performance Vehicle
This I-595 alignment starts from Sawgrass Mills with station stops at 136th Ave/I-595, Flamingo/I-595, and Nob Hill/I-595. This alignment interfaces with the Transit Bridge in the I-595 median, makes a stop at SR 84 and SW 4th Avenue, then turns north on Andrews to make the common CBD stops noted above. Since there is no connection to Tri-Rail in this alignment, a new station was added in the model at SR 84. In order to provide a convenient airport connection, an HPV shuttle was assumed to operate between the station at SR 84 and SW 4th Avenue to the airport terminal.

I-595 With Branch To Davie Road/Griffin Road
This I-595 alignment has two branches. The northern branch follows the alignment described above, without the HPV airport shuttle. The southern branch begins as the alignment above, making stops at 136th Ave/I-595, Flamingo/I-595, and Nob Hill/I-595, but it diverges at Davie Road, stopping at the South Florida Education Center, then turning east on Griffin Road to serve the Transit Bridge, the Airport Tri-Rail stop, and the airport terminal. As this alignment operates two lines, both running at six (6) minute peak headways, this alignment would, in effect, have three (3) minute headways in the section from Sawgrass Mills to Davie Road in the I-595 right-of-way. It would therefore be expected to attract more riders to transit than the other build alignments.

I-595 Express Bus
This alignment consists of several bus routes operating on existing roadways and future HOV lanes where appropriate. All routes operate in both directions at 15-minute headways. The first route begins at Sawgrass Mills Mall station and operates without stops to the airport, then travels north on Andrews Avenue making stops at SE 24th Street, Broward General Medical Center, Davie Boulevard, SE 6th Street, Las Olas Boulevard, and Broward Boulevard. The second route operates in a similar way, but begins service at Broward Mall instead of Sawgrass Mills. A third route begins at Sawgrass Mills, travels south on 136th Ave to I-595, exits at University to serve Broward Mall and returns to I-595, interfaces with the Transit Bridge at SR 7, travels south on I-95 and exits at Griffin to serve the Airport Tri-Rail station, accesses the airport via Griffin, then continues to the CBD making the same stops as above.

ARTERIAL STREETS

Sunrise Boulevard/Broward Boulevard (Tri-Rail Long Range Plan)
This alignment begins at Sawgrass Mills Mall and travels along Sunrise Boulevard making stops at Flamingo Road, Nob Hill Road, and University Drive. The alignment turns south on University and makes a stop at Broward/University. It then heads toward the CBD with stops at SR 7 (Transit Bridge) and the Tri-Rail station, finally following the common CBD stops and terminating at the airport.

Sunrise Boulevard
The Sunrise alignment is the same as the Sunrise/Broward HPV as far east as the stop at Sunrise/University. This alignment then travels along Sunrise and makes stops at Sunrise Boulevard and NW 11th Place (Florida Medical Center South), Lauderhill Mall (Transit Bridge), and just east of I-95 near Dillard High School. Continuing on Sunrise, there is a stop at NW 9th Avenue before turning south on NW 7th Avenue and stopping

at Sistrunk Avenue. At the downtown bus facility the alignment turns east onto Broward Boulevard and follows the rest of the common CBD alignment to the airport.

Griffin Road
This route begins just east of I-75 at the current location of the Regency Square shopping center. Traveling down Griffin Road, it makes stops at Flamingo, Nob Hill, University Drive, SR 7 (Transit Bridge), and the airport Tri-Rail station. After serving the airport terminal, the alignment heads north on US 1 and Andrews serving the common CBD stops.

4.1.2 Scoping Alternatives Evaluation

The scoring was qualitative and each alignment was given an +, O or — relative to the other alignments for each criterion. The evaluation criteria, scoring method and evaluation results are summarized in this section. A more detailed explanation of this process is located in the *Initial Corridor Screening Report*.

- Redevelopment/Economic Development Potential: A qualitative assessment of potential for increased economic development and/or redevelopment based on improved access to industrial and commercial zoned land along the alignment.

  - An alignment received an + if it directly connected to an established Community Redevelopment Agency or if a significant amount of the land along the alignment was designated for non-residential use.

  - An alignment received an O if it had some potential for redevelopment based on the adjacent land uses, but not as significant potential as those alignments that received an +.

  - An alignment received an — if the possibilities for redevelopment were limited due to the proposed technology (e.g. express bus) or the future land use designation of the adjacent land.

- Key Destinations Served: A qualitative assessment of the ability of the alignment to provide access to employment destinations and major activity centers. The key destinations identified were:

  - Sawgrass Mills/Office Depot Arena
  - Sawgrass International Business Park
  - Plantation Central Development District (including the Westside Regional Medical Center, Broward Mall, Fashion Mall, and Fountains Shoppes)
  - South Florida Educational Center
  - Fort Lauderdale/Hollywood International Airport
  - Port Everglades
  - Fort Lauderdale Central Business District

  This evaluation was two-fold. First, each alignment was ranked based on whether or not it served the key destinations identified above. Then a composite score based on the number of destinations served by the alignment was determined. For the initial evaluation:

- An alignment received an + if it directly connected to the destination without the need for a transfer to another system.

- An alignment received an ○ if it passed by the destination and the destination could be reached by transferring to a circulator or shuttle system.

- An alignment received an — if the destination could not be reached with a transfer to a circulator or shuttle system.

The composite score for each alignment was based on the number of +'s received versus the number of ○'s and —'s. The alignments that did not receive any —'s, received an overall rank of +; the alignments that received the same number of +'s and —'s received an overall rank of ○; and the alignments that had more —'s than any other score received an overall rank of —.

- System Connectivity: A qualitative assessment of the ability of the alignment to provide connectivity to existing and planned transit services. The transit services identified as important for connectivity were:

  - Tri-Rail
  - Fort Lauderdale-Hollywood International Airport/ Port Everglades Peoplemover
  - Transit Bridge
  - Broward County Transit
  - Downtown Fort Lauderdale Circulator
  - Plantation Central Development District Circulator

  As with Destinations Served, this assessment had a double approach. First, each alignment was scored based on its connectivity to the transit services identified above. Then a composite score was developed. The initial evaluation by service was:

  - An alignment received an + if it directly connected or could directly connect to the system.
  - An alignment received an — if it did not connect or could not directly connect to the system.

  For the overall composite score, the alignments that had five (5) + scores, received an overall score of +; the alignments with four (4) + scores received an overall score of ○; and the alignments with three (3) or fewer + scores received an overall score of —.

- Commuter Service: A qualitative assessment of the potential of an alignment to provide services for home-based work trips during peak hours.

  - An alignment received an + if the transit service would have the potential to operate at higher average speeds, would be better able to serve longer

distance trips, and provide a less circuitous/more direct route to key destinations than the other alternatives.

- An alignment received an ○ if the transit service would operate in mixed traffic, and therefore have a lower average speed than other alternatives but still provide a less circuitous route to key destinations than the remaining alternatives.

- An alignment received an — if the transit service would operate in mixed traffic and follow a less direct/more circuitous route to key destinations compared to the other alternatives.

- Community Disruption: A qualitative assessment of the potential for impact to neighborhoods within ¼ mile of the alignment and its station areas. The potential for noise and vibration impacts and displacements will be assessed by the proximity of homes, schools, hospitals, parks and/or cultural institutions (museums and theaters) to the alignment and its station areas.

  - An alignment received an + if the adjacent land uses were predominantly non-residential.

  - An alignment received an ○ if the adjacent land uses were a mixture of non-residential and higher density residential.

  - An alignment received an — if the adjacent land uses were predominantly low density residential.

- Local Service: A qualitative assessment of the potential of an alignment to provide services for limited distance non-work trips.

  - An alignment received an + if it would provide transit service for local trips as opposed to commuters.

  - An alignment received an — if it wouldn't provide adequate local service based on speed, adjacent land uses or distance between stations.

- Mode Split: A qualitative assessment of the potential for trips to be made by transit rather than by automobile for a given alignment. This evaluation was based on preliminary "new boarding" numbers generated by the SERPM model.

  - An alignment received an + if the projected new boardings were in the upper third of the range of projected boardings for all alternatives.

  - An alignment received an ○ if the projected new boardings were in the middle third of the range of projected boardings for all alternatives.

  - An alignment received an — if the projected new boardings were in the lower third of the range of projected boardings for all alternatives.

- Local Government/Agency Support: A qualitative assessment of support or opposition for an alignment based on comments and input received from coordinated agency meetings and review with local governments, FDOT, and resource agencies, etc.

    - An alignment received an + if the route was depicted on another agency's long range plan and no opposition to it was raised during the Scoping meetings.

    - An alignment received an O if the route was either depicted on another governmental agency's long range plan and opposition to it was raised during the Scoping meetings or it was not depicted on another government agency's long range plan and no opposition to it was raised during the Scoping meetings.

    - An alignment received an — if it was not depicted on another governmental agency's long range plan and opposition to it was raised during the Scoping meetings.

- Environmental Justice: A qualitative assessment of the potential of an alignment to meet the travel and transportation needs of low-income households, minority households, and persons with disabilities within ½ mile of stations. This measure is an indicator of the how well the alignment serves transit dependent populations.

    - An alignment received an + if it would provide transit service to an area of the County with a higher density of minorities and/or lower income households.

    - An alignment received an — if it would not provide transit service to one of these areas.

The individual scoring for each alignment on the basis of Key Destinations Served and System Connectivity is shown in Table 5.

4.1.3 Results of the Evaluation

Table 6 shows the overall results of the evaluation of the preliminary alignments. A more detailed account of the results can be found in the *Initial Corridor Screening Report*. At the end of the scoping phase, four alignment alternatives and two transit technologies (BRT and LRT) remained: I-595/SR 84, I-595/SR 7/Broward, Sunrise/Broward "A", and Sunrise/Broward "B". Although the Sunrise/Broward alignment was introduced as a single entity, the variety of options for connecting Sunrise Boulevard to Broward Boulevard made it necessary to split this alignment into two sub-alignments. Each of these build alternatives is described below and is shown in Figure 6. Following this is a summary of the criteria used and the evaluation results from the Tier 1 analysis.

Table 6: Evaluation Matrix for Destinations and Connectivity

Alignments	Key Destinations Served							System Connectivity					
	Sawgrass Mills/Office Depot Arena	Sawgrass Business Park	Plantation Central Development District	South Florida Educational Center	Fort Lauderdale/Hollywood International Airport	Port Everglades	Fort Lauderdale CBD	Tri-Rail	Fort Lauderdale-Hollywood International Airport/Port Everglades People Mover	Transit Bridge	Downtown Fort Lauderdale Circulator	Plantation Central Development District Circulator	Broward County Transit
Baseline													
I-595 Right-of-Way Express Bus	+	+	o	o	+	o	+	+	+	+	+	+	o
I-595 Right-of-Way High Performance Vehicle-A	+	+	o	o	+	o	+	-	+	+	+	+	o
I-595 Right-of-Way High Performance Vehicle-B (branch to So. FL Educ. Ctr.)	+	+	o	+	+	o	+	+	+	+	+	+	o
Sunrise/Broward High Performance Vehicle	+	-	+	-	+	o	+	+	+	-	+	+	+
Sunrise Boulevard High Performance Vehicle	+	-	-	-	+	o	+	-	+	-	+	-	+
Griffin Road High Performance Vehicle	-	-	-	-	+	o	+	+	+	+	+	-	o
Oakland Park Boulevard High Performance Vehicle	+	-	-	-	+	o	+	-	+	-	+	-	+

Table 7: Evaluation Matrix of Preliminary Alignments

Alignments	Redevelopment/Economic Development Potential	Key Destinations Served	System Connectivity	Commuter Service	Community Disruption	Local Service	Mode Split	Local/ Agency Support	Environmental Justice	COMPOSITE
Baseline										
I-595 Right-of-Way Express Bus	-	+	+	-	+	-	-	+	-	**o**
I-595 Right-of-Way High Performance Vehicle-A	o	+	o	+	+	-	+	+	-	**+**
I-595 Right-of-Way High Performance Vehicle-B (branch to So. FL Educ. Ctr.)	o	+	+	+	+	-	+	+	-	**+**
Sunrise/Broward High Performance Vehicle	+	o	+	o	o	+	+	o	+	**+**
Sunrise Boulevard High Performance Vehicle	+	o	-	o	o	+	+	o	+	**+**
Griffin Road High Performance Vehicle	-	-	o	-	-	+	o	-	-	**-**
Oakland Park Boulevard High Performance Vehicle	o	o	-	-	+	+	+	o	+	**o**

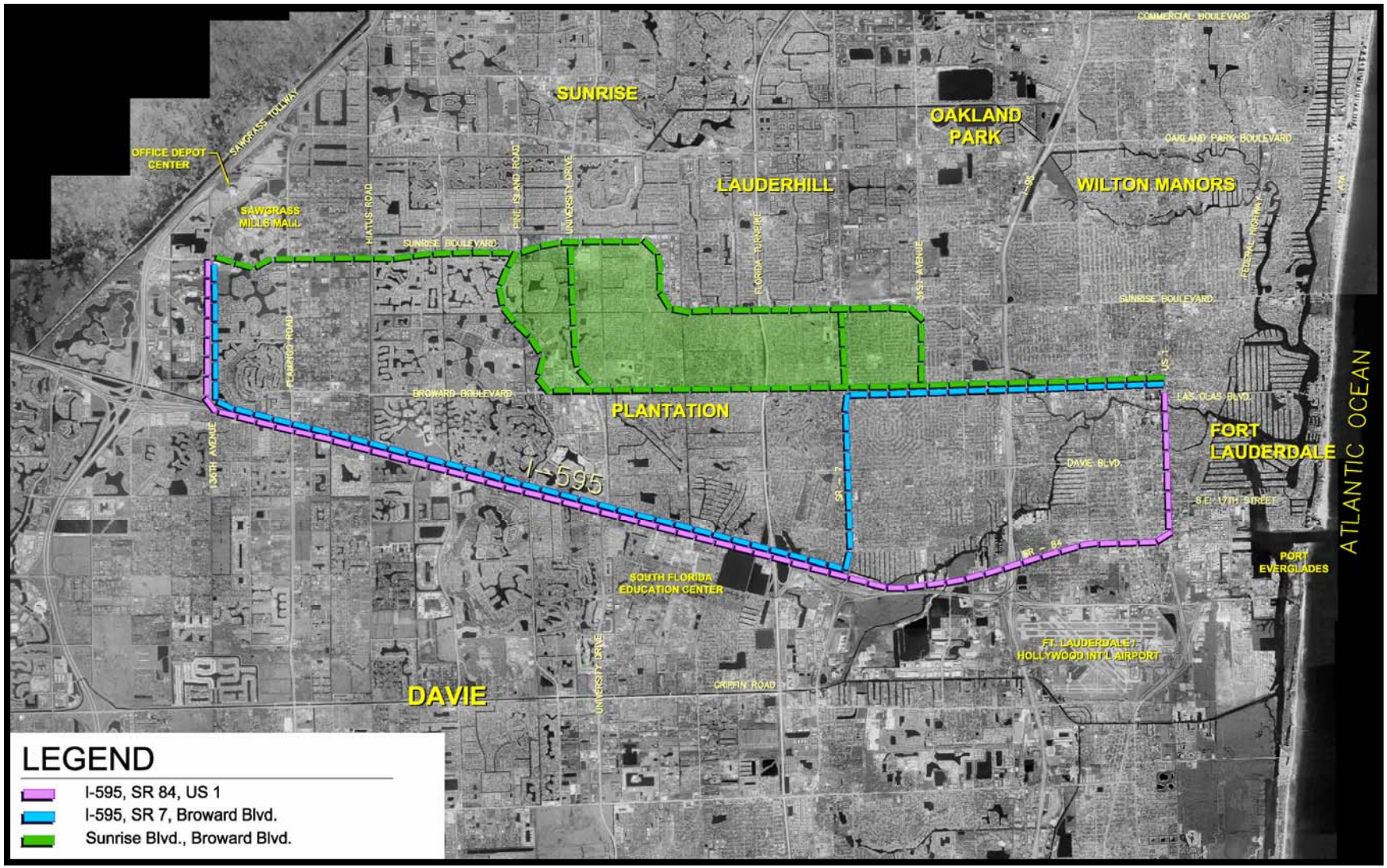


Figure 6: Alignment Alternatives

4.2 TIER 1

The four alignment alternatives from the scoping phase were evaluated during Tier 1 using more quantitative measures. This section describes the alignments evaluated, the criteria used in the evaluation and the scoring results.

4.2.1 Tier 1 Alternatives Development

The following alignment alternatives resulted from the scoping phase.

I-595/SR 84 BRT/LRT

Originating near Sawgrass Mills and the Office Depot Center, this alignment runs south on 136 Avenue to I-595. The alignment follows the southern side of the right-of-way of I-595 until SR 7, where it crosses to the north side of I-595 and continues in a northeasterly direction along SR 84. At South Andrews Avenue, the alignment runs south to the Fort Lauderdale/Hollywood International Airport and then north (along Andrews Avenue) to Broward Boulevard. The terminus of the alignment is the Fort Lauderdale (Broward Boulevard) Tri-Rail station.

I-595/SR 7/Broward BRT/LRT

Originating near Sawgrass Mills and the Office Depot Center, this alignment runs south on 136 Avenue to I-595. The alignment follows the southern side of the right-of-way of I-595 to SR 7. Turning north on SR 7, the alignment goes to Broward Boulevard and then turns east and continues into downtown Fort Lauderdale. At Andrews Avenue, the alignment turns south and runs to the Fort Lauderdale/Hollywood International Airport, where it terminates.

Sunrise/Broward "A" BRT/LRT

Originating near Sawgrass Mills and the Office Depot Center, the alignment runs south on 136 Avenue to Sunrise Boulevard, where it turns east. The alignment continues east on Sunrise Boulevard and connects to Broward Boulevard via a north-south connector. The possible north-south connectors for this alignment include Pine Island Road and University Drive. For purposes of the analysis, a connection along University Drive was considered as the north-south connector. Thus, the alignment turns south on University Drive to Broward Boulevard and then runs east on Broward Boulevard to Andrews Avenue, where it turns south again and terminates at the Fort Lauderdale/Hollywood International Airport.

Sunrise/Broward "B" BRT/LRT

Originating near Sawgrass Mills and the Office Depot Center, the alignment runs south on 136 Avenue to Sunrise Boulevard, where it turns east. The alignment continues east on Sunrise Boulevard and connects to Broward Boulevard via a north-south connector. The possible north-south connectors for this alignment include SR 7 and 31 Avenue. For purposes of the analysis, a connection along SR 7 was considered as the north-south connector. Thus, the alignment follows Sunrise Boulevard as it turns south and then back east, and then heads south on SR 7 to Broward Boulevard. From Broward Boulevard, the alignment runs east to Andrews Avenue, where it turns south again and terminates at the Fort Lauderdale/Hollywood International Airport.

4.2.2 Tier 1 Alternatives Evaluation

The evaluation process for Tier 1 was conducted to be consistent with FTA New Starts guidance. While the analysis in the scoping phase of the study was mainly qualitative (refer to the *Initial Corridor Screening Report* for more information), a significant effort was made to increase the quantitative value of the Tier 1 evaluation. Twelve (12) evaluation criteria, which are defined below, were developed to address the study purpose and need. There is one criterion for each of the following issues, connectivity to major destinations/activity centers, system connectivity, economic/transit-oriented development potential, and impacts to the physical and natural environment; two criteria aimed at potential riders around proposed station areas; and three criteria addressing environmental justice issues.

Once the criteria were established, each alternative was analyzed and evaluated against the ranking values determined for each criterion. A series of symbols were used to reflect the rating for each criterion. These symbols were ● for "good", ⦿ for "neutral", and O for "poor". To develop an overall score that would allow the alternatives to be compared relative to each other, a quantitative score was assigned to the ratings, where "good" equaled two (2) points, "neutral" equaled one (1) point and "poor" equaled zero (0) points. Table 7 on the following page shows the results of the Tier 1 evaluation. More information on these criteria and the results of the evaluation is available in the *Conceptual Definition of Alternatives*.

- Meets Mobility Needs: This criterion provides an overview of the home-based, work trips within the study area. It was a quantitative assessment of the proposed alternative's ability to serve the mobility needs of the study area.

- Connectivity to Major Destinations/Activity Centers: The alternative's ability to provide access to major destinations within the study area was the focus of this criterion. There are eight major destinations in the study area, and each alternative was individually evaluated on its ability to serve these locations. Ratings were assigned based on the nature of the connection provided (direct, transfer required, or no connection).

- System Connectivity: This was an assessment of the alternative's ability to provide or potentially provide direct transfers to existing or future transit services within the study area. The transit services considered included Tri-Rail, BCt bus routes, the Transit "Bridge", the Downtown Fort Lauderdale Circulator, the Fort Lauderdale/Hollywood International Airport/Port Everglades People Mover, and the Midtown Plantation Circulator. As with the major destinations/activity center criterion, each alternative was evaluated individually for its ability to serve each of the listed transit systems. A higher rating was given to alternatives that allowed station-to-station transfers versus a transfer to another transit system that is within ¼ mile, etc.

- Commuter Service: This was a quantitative assessment of the proposed alternative's potential to provide service for home-based, work trips on the proposed alignment.

- Local Service: This was a quantitative assessment of the proposed alternative's potential to serve non-work trips. The length of these trips is shorter than the home-based, work trips used to evaluate commuter service.

- Number of Households within ½ Mile Radius of Proposed Stations: To determine the potential of the alternative to meet the travel and transportation needs of residents, the number of occupied households (utilizing 2000 US Census data) located within ½ mile radius of a designated center point for each proposed station was determined. Alternatives were ranked relative to each other.

- Number of Employees within ½ Mile Radius of Proposed Stations: The travel and transportation needs of employees within ½ mile radius of a designated center point for each proposed station were determined using 1999 Traffic Analysis Zone (TAZ) information files from the Broward County MPO. As with the number of households, alternatives were ranked relative to each other.

- Operating Costs: The operating cost estimates were based on a projection of the number of transit vehicles needed to maintain 15-minute headways during the peak period along the length of the alignment. As ridership projections are developed the fleet size numbers will be modified to reflect the number of transit vehicles required to meet demand.

- Capital Costs: The capital cost estimates were based primarily on construction costs for similar projects. Capital costs were converted to a dollar per linear foot basis. The length of each alignment alternative was based on scaled maps in the project's Geographic Information System (GIS). Items for which capital costs were developed included, site work, track work (LRT alternatives only for this item), signal system, communications, right-of-way/property acquisition, vehicles, and crossings/roadway improvements. In addition to the unit costs estimated for these items, costs for contingencies were also included.

- Opportunities for Economic Development and/or Transit Oriented Development: This was a qualitative assessment of the possibility for transit-supportive and economic development along each alignment. For the purpose of this criterion, transit-supportive development was defined as a complementary mixture of uses within proposed station areas that make transit more attractive by allowing an individual to perform daily activities without the need for an automobile. To determine the feasibility of transit-supportive development near proposed station areas, the amount of developable vacant land and existing land use patterns within ½ mile of a designated center point for each proposed station area were reviewed. If a proposed station area was located within a designated CRA or an area otherwise targeted for economic development (in the local government's comprehensive plan), it was considered to be a transit-supportive development environment, regardless of the amount of vacant land and existing development pattern.

- Potential for Physical/Natural Environmental Impacts: The number of physical and natural features, such as schools, parks, hospitals, and environmentally sensitive lands, within ¼ mile buffer of each alignment were identified and the total number of features along each alignment was calculated.

- Percentage of Households within ½ Mile Radius of Proposed Stations that are Minority: This was a quantitative assessment of the potential to provide transit service to, and conversely impact, minority populations (defined as non-white as reported to the 2000 US Census).

- Percentage of Persons with a Disability within ½ Mile Radius of Proposed Stations: This was a quantitative assessment of the accessibility of the alternative to persons with a disability (as reported to the 2000 US Census).

- Percentage of Households within ½ Mile Radius of Proposed Stations that are Low-Income: This criterion was a quantitative assessment of the ability of the proposed alternative to meet the travel and transportation needs of low-income households (defined as below the poverty line as reported to the 2000 US Census).

The I-595/SR 7/Broward alternative scored the highest during the evaluation and was one of the recommended alternatives to carry into Tier 2. Ultimately, the Technical Coordinating Committee (TCC) of the MPO recommended to the MPO Board that all four of the Tier 1 build alternatives be carried forward into Tier 2, and the MPO Board ratified this decision.

4.3 TIER 2

The build alternatives from Tier 1 (described in Section 4.2.1 and shown in Figure 6) and three variations on these alternatives were re-evaluated during the Tier 2 analysis, at the request of the MPO. The evaluation criteria used for Tier 2 were more quantitative than the criteria employed for Tier 1 and involved more extensive data collection efforts. This section provides a description of each of the alternative variations, the evaluation criteria, the evaluation results, and the recommended alignment. A more detailed account of the Tier 2 evaluation is found in the *Tier 2 Summary Report*.

4.3.1 Tier 2 Alternatives

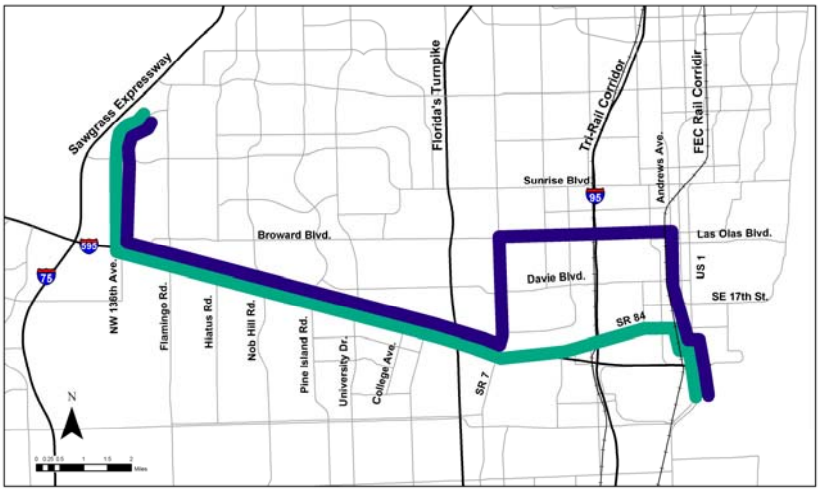
These variations on the build alternatives were identified at public meetings with the MPO and separate evaluations of these alternatives were completed. These variations are shown in Figure 7, described below, and referred to as the Airport Spur, Lauderhill Extension “A”, and Lauderhill Extension “B”.

Airport Spur

This alignment offers two service lines that combine the service provided by the I-595/SR 7/Broward Boulevard and I-595/SR 84/Andrews Avenue alignments, in order to provide a more direct connection to the Airport. Both lines originate near Sawgrass Mills and the Office Depot Center, proceed south on 136 Avenue to I-595, and along the southern side of the right-of-way of I-595 until SR 7, where the lines would separate. One line would turn north on SR 7, go to Broward Boulevard, turn east and continue into downtown Fort Lauderdale to Andrews Avenue, where it turns south and continues to its terminus at the Fort Lauderdale/Hollywood International Airport. The second line crosses to the north side of I-595 west of SR 7, continues in a northeasterly direction along SR 84 to South Andrews Avenue, where it runs south to the Fort Lauderdale/Hollywood International Airport and terminates.

Table 8: Tier 1 Evaluation Matrix

Symbol Key: ● = Good ⦿ = Neutral ○ = Poor ALTERNATIVES	Travel and Mobility Measures							Costs		Community & Environmental Measures		Environmental Justice						
	Meets Mobility Needs	Connectivity to major destinations/activity centers	System Connectivity	Commuter Service	Local Service	Households within 1/2 mile of stations	No. of employees within 1/2 mile of stations	Operating Costs (in Million $)	Total capital cost (in Million $)	Opportunities for economic development and/or TOD	Potential for Physical/Natural Environmental Impacts	% of households w/in 1/2 mile of stations that are minority households	% persons w/in 1/2 mile of stations with a disability	% of households w/in 1/2 mile of stations that are low income households	Total number of good (2 Points)	Total number of neutral (1 Point)	Total number of poor (0 Points)	SCORE
I-595 Right-of-Way Express Bus (Baseline)																		
I-595/SR 84 BRT	●	●	●	●	●	○	⦿	$14.5	$227-252	○	⦿	○	○	●	6	2	4	14
I-595/SR 84 LRT	●	●	●	●	●	○	⦿	$17.2	$565-615	○	⦿	○	○	●	6	2	4	14
I-595/SR 7/Broward BRT	●	●	●	●	●	⦿	⦿	$16.5	$225-250	⦿	⦿	●	⦿	●	7	5	0	19
I-595/SR 7/Broward LRT	●	●	●	●	●	⦿	⦿	$19.3	$605-655	●	⦿	●	⦿	●	8	4	0	20
Sunrise/Broward "A" BRT	⦿	●	●	⦿	●	●	⦿	$14.2	$57-72	⦿	⦿	●	⦿	●	6	6	0	18
Sunrise/Broward "A" LRT	⦿	●	●	⦿	●	●	⦿	$17.8	$470-520	●	⦿	●	⦿	●	7	5	0	19
Sunrise/Broward "B" BRT	⦿	⦿	●	⦿	●	●	⦿	$14.3	$57-72	○	⦿	●	●	●	6	5	1	17
Sunrise/Broward "B" LRT	⦿	⦿	●	⦿	●	●	⦿	$18.0	$470-520	⦿	⦿	●	●	●	6	6	0	18



Airport Spur

Lauderhill Extension "A"

Lauderhill Extension "B"

Figure 7: Alternative Variations Identified by MPO Board

Lauderhill Extension "A"
This alignment originates near Sawgrass Mills and the Office Depot Center, proceeds south on 136 Avenue to I-595. At I-595 it turns east and follows the southern side of the right-of-way of I-595 to SR 7. Turning north on SR 7, the alignment continues to Sunrise Boulevard and then turns east to NW 31 Avenue/Martin Luther King Boulevard, where it turns south and returns to Broward Boulevard. The alignment turns east at Broward Boulevard and continues into downtown Fort Lauderdale. At Andrews Avenue, the alignment turns south and continues to the Fort Lauderdale/Hollywood International Airport, where it terminates. The purpose of this alignment is to provide service to the City of Lauderhill by providing connections to the Lauderhill Transfer Station and the Swap Shop.

Lauderhill Extension "B"
Developed as another alternative to provide service to the Lauderhill Transfer Station, this alignment originates near Sawgrass Mills and the Office Depot Center, proceeds south on 136 Avenue to I-595. At I-595 it turns east and continues along the southern right-of-way of I-595 to SR 7. Turning north on SR 7, the alignment runs to NW 19th Avenue (the Lauderhill Transfer Station), where it turns back south, returning to Broward Boulevard. The alignment turns east at Broward Boulevard and continues into downtown Fort Lauderdale. At Andrews Avenue, the alignment turns south and proceeds to the Fort Lauderdale/Hollywood International Airport, where it terminates.

4.3.2 Tier 2 Alternatives Evaluation
The evaluation criteria in Tier 2 were created to specifically address the stated project goals, which were developed to address the New Starts criteria. Significantly more data collection was conducted in order to maximize the quantitative nature of the Tier 2 evaluation. The alternatives were scored and ranked relative to each other, and several key criteria (travel time, annual operating cost, and capital cost per rider) were used to select between alternatives that scored closely.

Seventeen (17) evaluation criteria were developed to respond to the seven (7) stated project goals. The ranking of alternatives is based on a score developed by totaling the points under each measure. Points range from "1" to "5", with "5" being the best or highest rating and "1", the worst or lowest rating. In most cases, the scoring for a measure is based on quantitative data. For those measures that have qualitative components, or those that combined qualitative and quantitative factors, a relative score or ranking was developed. To visually convey the results, a series of symbols were also used to reflect the 1 through 5 ranking system.

Numeric Ranking	**Symbolic Ranking**
1	○
2	◔
3	◑
4	◕
5	●

- *GOAL: MAXIMIZE POTENTIAL RIDERSHIP*

Criterion: Highest Number of Daily Riders
This criterion is based on the travel demand modeling using SERPM V modified through coordination with FTA staff. Modification of the model was necessary so it would more accurately reflect the operating characteristics of the proposed alternatives. It is a quantitative assessment of the proposed alternatives' ability to serve the mobility needs of the study area. Scores for ridership are based on projections of daily riders in 2025.

Criterion: Number of Households within ½ Mile Radius of Proposed Stations
This criterion provides a quantitative assessment of the potential of the alternative to meet the travel and transportation needs of residents. Alternatives were scored based on the number of occupied households (utilizing 2000 US Census data) located within ½ mile radius of the proposed station locations for each alignment alternative.

Criterion: Number of Employees within ½ Mile Radius of Proposed Stations
This criterion provides a quantitative assessment of the potential of the alternative to meet the travel and transportation needs of employees. Alternatives were scored based on the number of employees (using 1999 TAZ data) located within ½ mile radius of the proposed station locations for each alignment alternative.

- *GOAL: MINIMIZE COSTS*

Criterion: Capital Cost
The cost for construction and implementation (vehicles, maintenance facility, structures, right-of-way, etc.) of each alternative were developed based on unit costs that reflect the configuration of the guideway (at-grade, elevated sections) and other conditions for each alternative. Alternatives were scored based on the range of cost with the highest cost alternative receiving the lowest value (1) and the lowest cost alternative receiving the highest value (5), since the goal is to develop the most cost effective alternative (that is, the alternative that generates the most riders for the least cost).

Criterion: Operating Cost
The cost for operating each of the proposed alternatives on an annual basis was developed. The lowest cost alternative received the highest score.

- *GOAL: POTENTIAL ELIGIBILITY FOR NEW STARTS APPROVAL*

Criterion: Capital Cost per Passenger
This measure is a simple ratio of the estimated capital cost of the alternative to the projected daily boardings.

- *GOAL: SYSTEM CONNECTIVITY*

Criterion: Connections to Other Transit Services
This measure was an assessment of the alternative's ability to provide or potentially provide direct transfers to existing or future transit services within the study area. The transit services considered include Tri-Rail, BCt bus routes, the Transit "Bridge", the Downtown Fort Lauderdale Circulator, the Fort Lauderdale/Hollywood International Airport/Port Everglades People Mover, and the Midtown Plantation Circulator. Each alternative was evaluated individually for its ability to serve the respective transit

services. If the alternative would allow or would have the potential to allow for a transfer to another transit system at a station, a "cross platform" transfer, it received five (5) points. If the alternative would allow or would have the potential to allow for a transfer to another transit system that is within ¼ mile, it received three (3) points. If the alternative would not allow for a "cross platform" transfer or a transfer to another system within ¼ mile, it received one (1) point.

Criterion: Major Destinations/Activity Centers Served
This measure was an assessment of the alternative's ability to provide access to major destinations within the study area. There are eight major destinations in the study area: the Fort Lauderdale CBD, the Fort Lauderdale/Hollywood International Airport, the SFEC, courthouse/city jail complex south of downtown Fort Lauderdale, Broward General Hospital and associated medical facilities, Sawgrass Mills/Office Depot Center, Sawgrass International Corporate Park, and the Plantation Gateway District. Each alternative was individually evaluated on its ability to serve these locations. If the alternative could provide a direct connection to the destination, without the need for transfer to another system, it received five (5) points. If the alternative could serve the destination, but transfer to another system or circulator would be required, it received three (3) points. If the alternative could not serve the destination even with a transfer to another system, it received one (1) point.

- *GOAL: MAXIMIZE SERVICE TO MINORITY AND TRANSIT DEPENDENT POPULATIONS*

Criterion: Percentage of Households within ½ Mile Radius of Proposed Stations that are Minority
A quantitative assessment of the potential to provide transit service to, and conversely impact, minority populations (defined as non-white as reported to the 2000 US Census). The proportion of minority households within the study area is 28%

Criterion: Percentage of Persons with a Disability within ½ Mile Radius of Proposed Stations
A quantitative assessment of the accessibility of the alternative to persons with a disability (as reported to the 2000 US Census). Disabled persons represent 33% of the study area population.

Criterion: Percentage of Households within ½ Mile Radius of Proposed Stations that are Low-Income
A quantitative assessment of the ability of the proposed alternative to meet the travel and transportation needs of low-income households (defined as below the poverty line as reported to the 2000 US Census). The proportion of low-income households in the study area is 12%.

- *GOAL: PROMOTE ECONOMIC DEVELOPMENT*

Criterion: Economic Development Potential
Economic development potential for the proposed alternatives in the Central Broward East-West Transit Analysis was based on a qualitative rating. The process for developing the rating was divided into four basic steps:

  - establish minimum residential density and nonresidential intensities based on accepted TOD principles;

- establish the maximum residential density and nonresidential intensity permitted in each station area based on future land use policies and existing zoning regulations;
- calculate the difference between what is locally permitted and the accepted TOD principles; and
- assign a weight based on local government support for higher densities and intensities and existing land development patterns.

Using a 5-point system, the land use/zoning component of this analysis was worth 3 points and each of the weighting factors worth up to 1 point each. The analysis was based on the area within ½ mile radius of each proposed station area, depending upon the proposed alignment. If the proposed alignment was median running, the entire ½ mile radius was used. For the I-595 alignments, the proposed location of the system is on the south side of the I-595 right-of-way. Any significant station area development is going to occur on this south side of I-595, due to the presence of a South Florida Water Management District primary canal (North New River Canal) on the north side of I-595. Therefore, only the south side of the station area was analyzed for the I-595 stations. Development of a robust, quantitative measure would require market research and analysis beyond the scope of this project.

- *GOAL: MINIMIZE POTENTIAL FOR ENVIRONMENTAL IMPACT*

Criterion: Wetlands within ¼ Mile of An Alignment
Wetlands found within the study area categories fall into two categories: "wetlands" and "developed wetlands". "Developed wetlands" include created wetlands or areas that have been developed as mitigation wetlands or mitigation banks. "Wetlands" include all other designated wetland areas. At this phase of the study, additional information regarding the quality or relative value of these wetlands is not available; therefore it was assumed for the purposes of this evaluation that all wetlands are of comparable value.

The potential for impacts to wetlands was evaluated utilizing three (3) parameters:

- Location within the ½ mile corridor (¼ mile of both sides of the centerline of an alignment);
- Wetland size
- Total number of wetlands within the ½ mile corridor

The location of a wetland within the ½ mile corridor was scored based on whether the wetland is located along the outer perimeter of the corridor; located at some point in the middle of the corridor; or located adjacent to the existing roadway alignment centerline. This parameter was evaluated based on the assumption that a wetland system immediately adjacent to the existing roadway has a greater potential for impact and may be less "avoidable" than a wetland found elsewhere within the study corridor. Each wetland was scored based on location as follows: perimeter = 2, middle = 1 and adjacent = 0. Points were totaled for all wetlands located within each corridor and each corridor was then ranked (1 – 5). The highest ranking (5) was given to the alignment with the highest total points (i.e. fewest number of wetlands in proximity to the existing roadway).

The size of each wetland occurring with the study corridors was assessed based on the assumption that impacts to larger wetlands would be less desirable than impacts to

smaller wetlands. Larger wetland systems may also be more difficult to avoid. Points were assigned to each wetland based on the following:

- 0 – 0.25 acres - 5 points
- 0.25 – 1.0 acres - 4 points
- 1.0 – 5.0 acres - 3 points
- 5.0 – 10.0 acres - 2 points
- Greater than 10.0 acres - 1 point

Points were totaled for all wetlands located within each corridor and each corridor was then ranked (1 – 5). The highest ranking (5) was given to the alignment with the highest total points (i.e. lowest wetland acreage).

The total number of wetlands found on each corridor was evaluated based on the assumption that the greater the quantity of wetlands, the greater the possibility that one or more may be impacted. Each study corridor was ranked based on the total number of wetlands associated with it. The corridor with the most wetlands was given a “1” ranking (i.e. the greatest potential for wetland impact).

A composite score was calculated for each alignment based on the 1-5 ranking assigned for each of the above parameters. Each alignment was then given a final ranking based on the composite score, with the alignment with the highest composite score assigned a “5” ranking, representing the least impact potential.

Criterion: Parks within ¼ Mile of An Alignment
The number of parks within a ¼ mile buffer of each alignment was identified and the total number along each alignment was calculated. The alternative with the least potential to negatively affect parks received the highest score.

Criterion: Community Services
The number of community features, including schools, medical facilities, religious institutions and libraries within a ¼ mile buffer of each alignment were identified and the total number of Community Service facilities along each alignment was calculated. The alternative with the least potential to negatively affect community resources, that is, the lowest number of Community Service facilities, received the highest score.

Criterion: Noise Sensitive Receptors
The number of noise sensitive receptors within a ¼ mile buffer of each alignment was identified and the total number of noise sensitive receptors along each alignment was calculated. Noise sensitive receptors included residential units, schools, parks, medical facilities and religious facilities. The alternative with the least potential to negatively affect noise sensitive receptors, that is, the lowest number of noise sensitive receptors, received the highest score.

Criterion: Listed Hazardous Materials Sites
The potential for contamination to be an issue along the alignments was evaluated based on the total number of listed hazardous materials sites associated within ¼ mile of either side of the centerline of the alignment alternatives. At this stage, there is not enough information available to determine which, if any, of these potential sites could actually affect project development – or be affected by it. The ranking could be based only on the total number of sites within proximity to the alternatives. The alternative with

the greatest number of listed sites was assigned a "1" ranking. Similarly, the study corridor with the fewest number of listed sites within ¼ mile was assigned a "5" ranking.

The results of the Tier 2 evaluation are shown in Table 8 on the following page.

Following this initial evaluation, the Steering Committee and Policy Boards agreed to remove the I-595/SR 84 and Sunrise/Broward alignments from further consideration. However, in addition to the I-595/SR 7/Broward alignment, the MPO suggested variations on this alignment, which resulted in the need for additional analysis. Since these variations were based on an existing alternative it was deemed unnecessary to complete a full evaluation of these alternatives using the Tier 2 criteria described above. Instead, these variations were evaluated based on several key characteristics, including travel time, ridership, capital cost, annual operating cost, and capital cost per passenger. Table 9 shows how these variations compare to the I-595/SR 7/Broward alignment. It should be noted that only light rail technology was considered when evaluating these alternatives. Light rail was used for two reasons: the MPO Board expressed an interest in a rail system and it represents the highest capital costs. Additionally, the capital cost calculation was revised following the initial Tier 2 evaluation to better account for right-of-way costs and to reflect the increase in the amount of elevated structure.

Based on the analysis performed during the Tier 2 evaluation, the I-595/SR 7/Broward Boulevard alignment was selected by the MPO to carry into the LPA evaluation.

Table 9: Comparison of I-595/SR 7/Broward Alignment to Variations

Criteria	I-595/SR 7/Broward	Airport Spur	Lauderhill Extension "A"	Lauderhill Extension "B"
Travel Time (minutes)				
Sawgrass to CBD	39	39	43	43+
Sawgrass to Airport	48	35	52	52+
Daily Ridership (boardings)	26,000	28,700	27,600	26,700
Capital Cost (millions)	$922	$1,077	$1,012	$979
Annual Operating Cost of the Alternative (millions)	$19	$29	$25	$25
Capital Cost per Rider	$35,400	$37,500	$36,700	$36,700

4.4 LPA EVALUATION

At the end of the Tier 2 evaluation, an approved alignment (I-595/SR 7/Broward Boulevard) was selected but a decision on the transit technology (BRT or LRT) was still required. To assist the MPO in deciding between transit technologies, renderings depicting both BRT and LRT at various locations on the alignment were developed, projected ridership numbers re-

Table 10: Tier 2 Evaluation Matrix

Alternatives	Maximize Potential Ridership			Minimize Costs				Potential Eligibility for New Starts Approval	System Connectivity		Maximize Service to Minority and Transit Dependent Populations			Promote Eco-nomic Devel-opment	Minimize Potential for Environmental Impact					Total Score
	Highest Number of Daily Riders	Households within ½ mile of Stations	Employees within ½ mile of Stations	Capital Cost ($ millions)	Capital Cost	Operating Cost ($ millions)	Operating Cost	Capital Cost per Passenger	Other Transit Services	Major Destinations	Households within ½ mile of Stations that are Minority Households	Persons within ½ mile of Stations with a Disability	Households within ½ mile of Stations that are Low Income	Economic Development Potential	Wetlands within ¼ mile of An Alignment	Parks within ¼ mile of An Alignment	Community Services within ¼ mile of An Alignment	Noise Sensitive Receptors within ¼ mile of An Alignment	Listed Hazardous Materials Sites within ¼ mile of An Alignment	
I-595 Express Bus (Baseline)																				
I-595/SR 7 BRT	○	◑	◑	$ 448	◑	$ 8	●	○	●	◔	●	◑	●	◑	◑	◔	◔	○	◔	55
I-595/SR 7 LRT	●	◑	◑	$ 874	○	$ 19	○	○	●	◔	●	◑	●	◔	◑	◔	◔	○	◔	54
I-595/SR 84 BRT	○	○	◑	$ 441	◔	$ 8	●	○	◔	◔	◔	◑	●	◑	○	●	●	●	◔	52
I-595/SR 84 LRT	●	○	◑	$ 845	○	$ 19	○	○	◔	◔	◔	◑	●	◔	○	●	●	●	◔	50
Sunrise/Broward "A" BRT	◔	◑	◑	$ 67	●	$ 16	◔	●	◑	◑	●	◔	●	◔	◔	◔	◔	◔	○	53
Sunrise/Broward "A" LRT	◔	◑	◑	$ 492	◑	$ 16	◔	◔	◑	◑	●	◔	●	◑	◔	◔	◔	◔	○	53
Sunrise/Broward "B" BRT	◔	◔	◑	$ 106	●	$ 16	◔	●	◔	○	●	◔	●	◔	●	○	○	◔	●	54
Sunrise/Broward "B" LRT	◔	◔	◑	$ 504	◔	$ 16	◔	◔	◔	○	●	◔	●	◑	●	○	○	◔	●	53

evaluated, and operating and capital costs refined. With an approved alignment identified, significant coordination with the I-595 Project Development and Environmental (PD&E) was undertaken. An analysis of the financial feasibility and potential funding sources for the Central Broward East-West Transit Analysis, and other transit improvements in Broward County, was completed. This section of the report describes the development of the Locally Preferred Alternative and its evaluation.

4.4.1 LPA Development

After an alignment was approved by the Broward County MPO, the potential guideway configurations were revisited and revised. Based on this reassessment, the guideway options shown in Figure 8 were developed. These configurations were used to refine the capital and operating costs for both transit technologies. Additionally, renderings (see Figures 9 to 15) were developed to show the MPO Board and other interested persons how the system might appear, once constructed. The potential guideway configurations are described below.

Exclusive (elevated guideway): Exclusive guideways include subways and aerial structures, as well as at-grade sections without motor vehicle or pedestrian crossings. This type of guideway offers the highest maximum speed, the greatest passenger capacity, the fastest travel times, and the lowest potential for conflicts between motor vehicles and pedestrians. An aerial structure also costs the most to construct. The potential locations for an exclusive guideway within the approved alignment include the I-595 right-of-way, along the east side of SR 7, in the median of Broward Boulevard, and for a small portion of Andrews Avenue (see Figure 8).

Semi-exclusive (at-grade guideway): Semi-exclusive guideways reduce potential conflicts, but some potential still exists where streets cross the guideway or where left turns are allowed. Speeds are lower than for exclusive guideways due to the need for the transit vehicle to stop at intersections. Preferential signal treatment for transit vehicles can reduce this delay. The two locations for a semi-exclusive guideway within the approved alignment are along 136th Avenue and US-1 (see Figure 8).

Mixed traffic (shared or exclusive lane): Non-exclusive guideways allow for shared use of the transit facility by general-purpose traffic (cars and trucks) and crossing by pedestrians. In this configuration, transit operations have lower speeds and there is greater potential for conflicts. While this type of operation is a component of many light rail systems in the United States, it is usually limited to downtown areas, "… where there is willingness to forgo operating speeds in order to access areas with high population [and employment] density and many potential riders (TCRP Report 17, p. 13)." Typically, fixed route bus service uses this type of configuration for operations. This configuration would be the lowest cost configuration to build, since it would be constructed primarily within existing roadway rights-of-way. The potential locations for mixed traffic operations within the approved alignment include SR 7, Broward Boulevard, Andrews Avenue, and 30th Street (see Figure 8).

The guideway configuration for the portion of the alignment within the I-595 right-of-way is exclusive, but the location of the guideway is still being determined through coordination with the I-595 PD&E Study. The roadway PD&E extends from I-75 to east of I-95 and evaluates alternatives of the LPA from the I-95/I-595 Master Plan. The road-

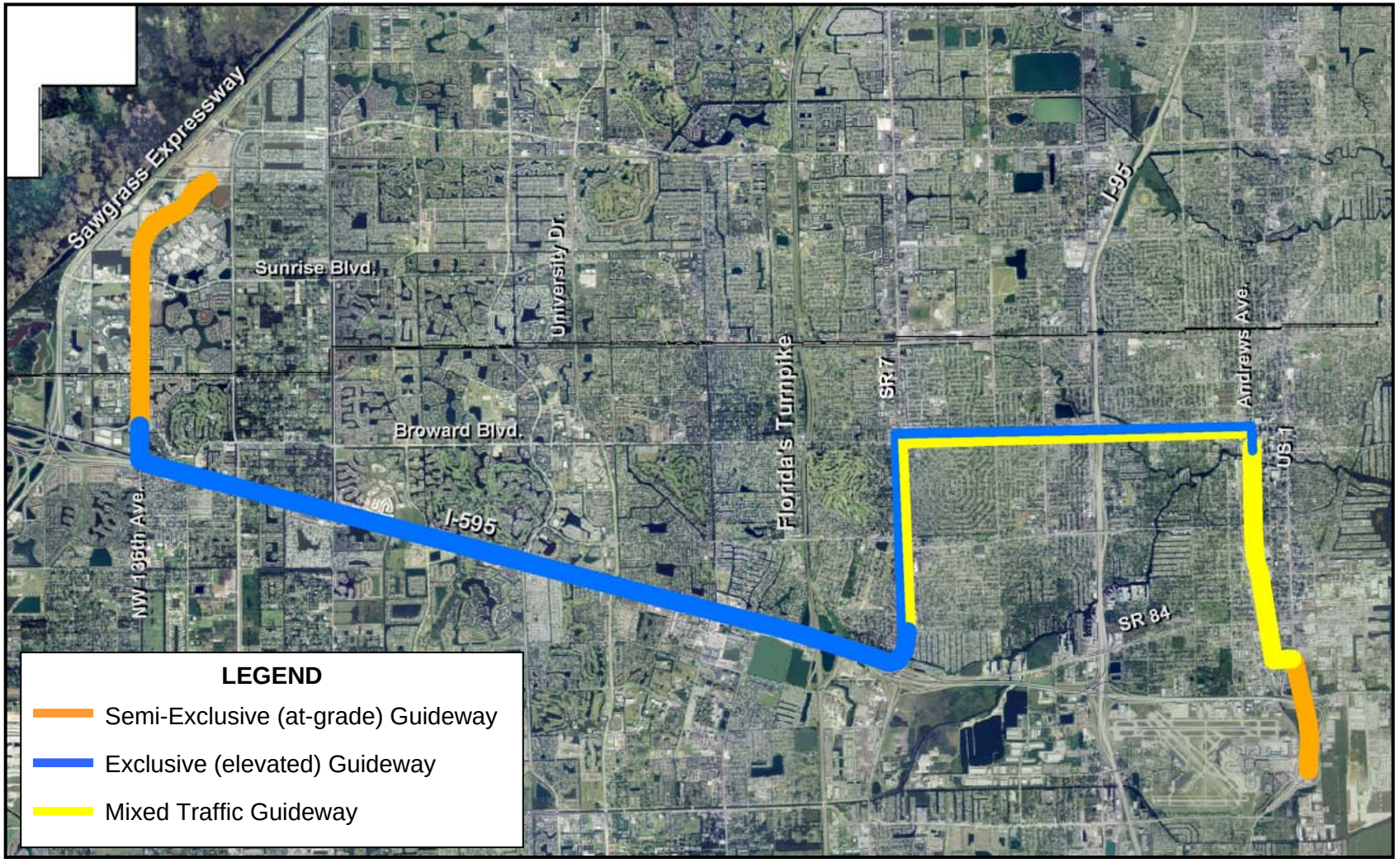


Figure 8: Potential Guideway Configurations for the Approved Alignment

Figure 9: Bus Rapid Transit in a Semi-Exclusive Guideway along 136th Avenue

Figure 10: Light Rail Transit in a Semi-Exclusive Guideway along 136th Avenue

Figure 11: Bus Rapid Transit in Mixed Traffic along State Road 7

Figure 12: Light Rail Transit in Exclusive Guideway along State Road 7

Figure 13: Bus Rapid Transit in Mixed Traffic along Broward Boulevard

Figure 14: Light Rail Transit in an Exclusive Guideway along Broward Boulevard

Figure 15: Light Rail Transit in Mixed Traffic along Broward Boulevard

way component consists of ramp and intersection improvements, modifications to SR 84, and reversible lanes. Each alternative provides a combination of concepts from the study process that best meet the overall transportation needs of this corridor. Recently, due to a re-assessment of projected traffic volumes, reversible, general-purpose traffic lanes were proposed as an additional element in the roadway improvements program. The reversible lanes would be express lanes, i.e., with access only at their western and eastern termini. The western terminus of the reversible lanes would be west of the grade-separated intersection of I-595 and SW 136th Street. The eastern terminus of the reversible lanes would be east of the SR 7-I-595 interchange. There are three potential locations for the transit guideway within the I-595 right-of-way. Figures 16 through 18 depict these alternative locations, and a brief description of each follows.

I-595 Transit Option 1
In this option, the proposed reversible lanes would be at-grade in the existing median between the east and west bound main lanes of I-595. The transit guideway would be on the south side of the I-595/SR 84 right-of-way. This alignment would place stations closer to existing and future development. It would, however, result in placing the transit guideway largely outside of the I-595/SR 84 right-of-way – resulting in extensive right-of-way acquisition costs, the potential for displacements, and relocation impacts.

I-595 Transit Option 2
This option would place the transit guideway under elevated, reversible lanes in the existing median between the east and west bound main lanes of I-595. While this option would result in lower construction costs for the transit guideway since it would be constructed at-grade rather than on an elevated structure; this option would make access to the transit platform more difficult (requiring two vertical circulation movements and a long horizontal movement across SR 84, auxiliary lanes of I-595 and the east bound main lanes of I-595.

I-595 Transit Option 3
In this option, the transit guideway would be on an elevated guideway and located between the auxiliary lanes of eastbound I-595 and the eastbound lanes of SR 84. This option would reduce the right-of-way requirement for the transit option as well as reduce the total need for right-of-way to accommodate both transit and roadway improvements, as compared to Option 1. Access to the transit platform would require one vertical circulation movement and a short horizontal movement across the eastbound lanes of SR 84.

4.4.2 LPA Evaluation
The LPA evaluation was based on quantitative information, but the decision was essentially qualitative, based on the policy direction of the MPO Board. Therefore, an evaluation matrix similar to those completed for the other phases was not developed. Instead, the evaluation was based on the key factors of projected ridership, capital and operating costs, and cost effectiveness. Through the evaluation, the Build Alternative options (BRT or LRT) were compared to the Baseline/TSM (a.k.a. Enhanced Facilities and Services).

Using the guideway configuration options described in the previous section, a range of capital costs and projected ridership estimates were refined. Table 10 (on page 63) shows the revised numbers for both technologies. In each case, the lower number in the

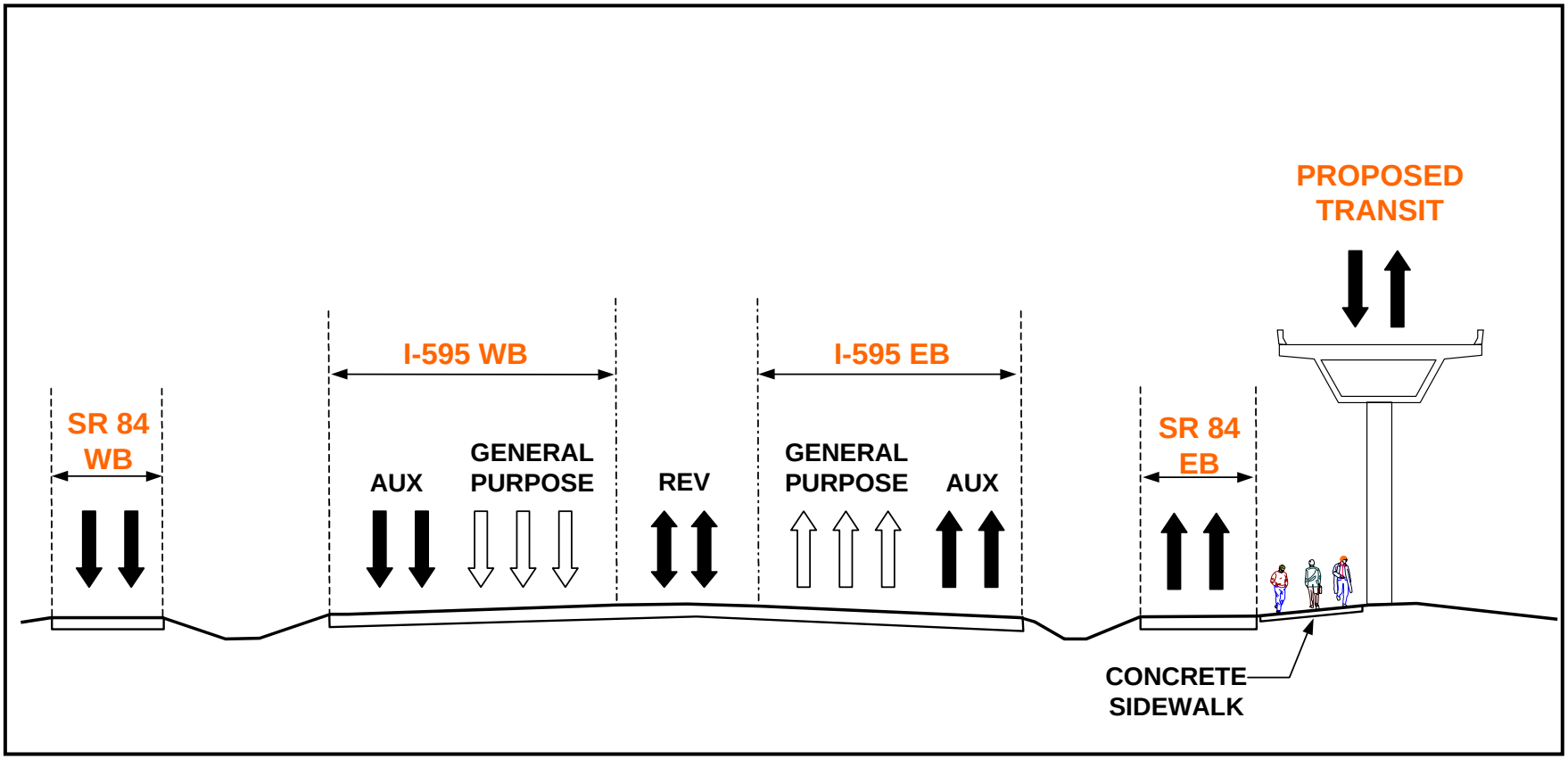


Figure 16: I-595 Transit Option 1

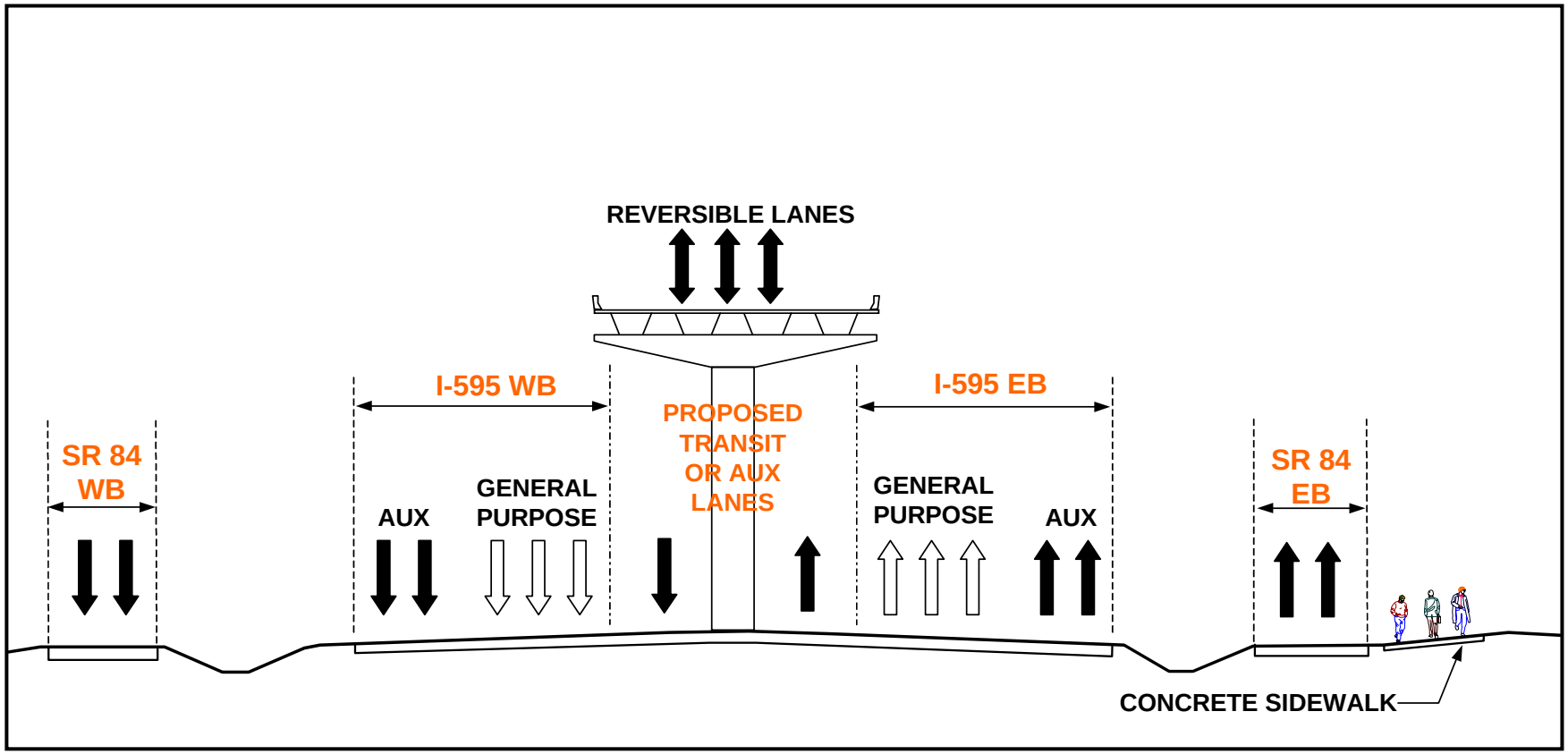


Figure 17: I-595 Transit Option 2

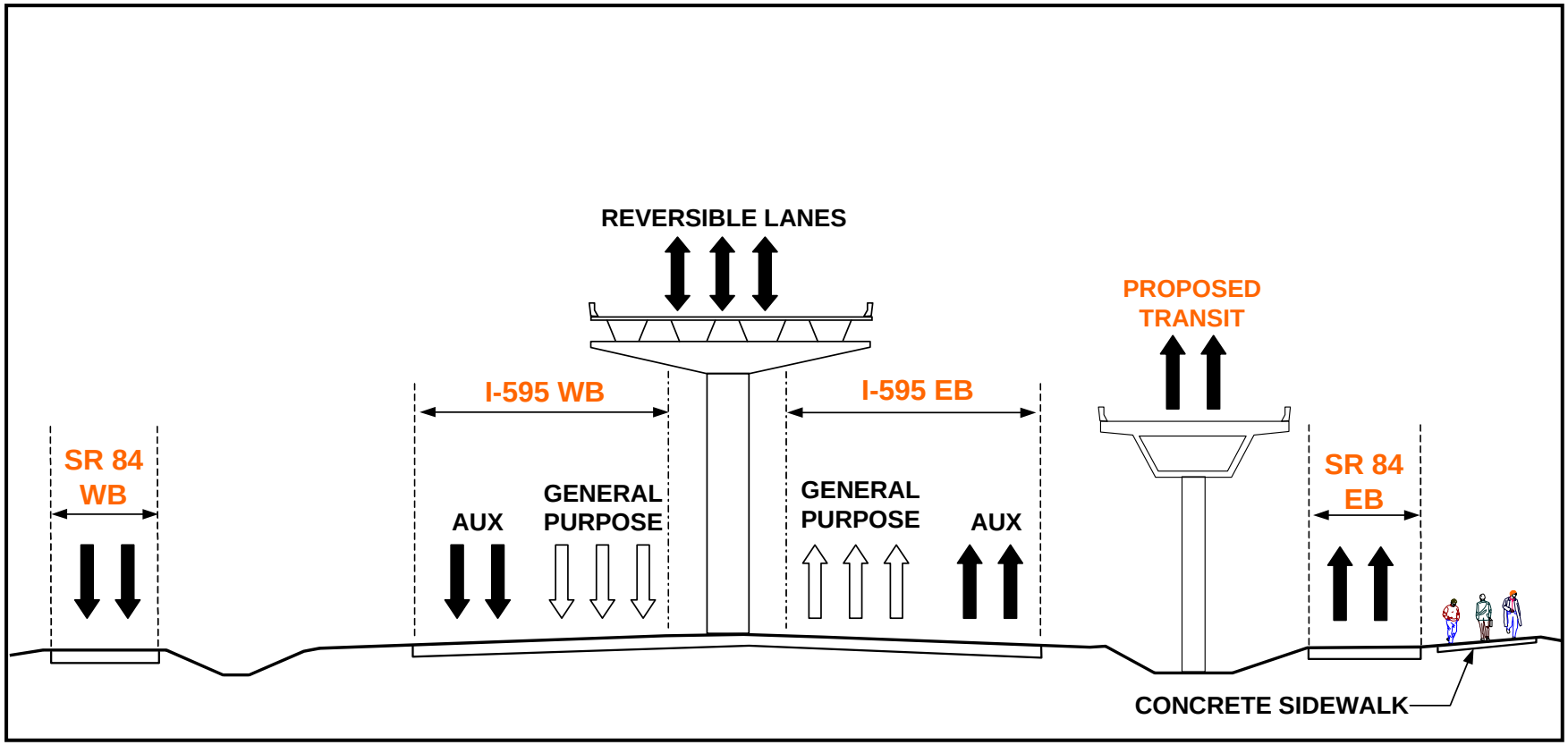


Figure 18: I-595 Transit Option 3

range represents that technology constructed within the SR 7 and Broward Boulevard segments in the mixed traffic configuration. The higher number in the range represents the exclusive guideway configuration for these segments. These numbers reflect the costs associated with I-595 Transit Option 3, since these concept was more fully developed at that time.

Table 11: Revised Ridership and Capital Costs Projections Based on Guideway Configuration

	Projected 2025 Daily Ridership	Capital Costs ($ in millions)	Annual Operating Costs ($ in millions)
Enhanced Facilities & Services (Baseline/TSM)	9,900	$156.3	$16.7
Bus Rapid Transit	14,900 – 16,400	At-grade: $ 657.1 Elevated: $ 882.7	$19.7
Light Rail Transit	17,700 – 23,000	At-grade: $ 869.5 Elevated: $ 1,070.2	$20.8

The cost effectiveness, as defined by FTA, was calculated for each of the Build Alternatives. Figure 19 on the following page shows how these alternatives fared. It should be noted that subsequent to this analysis FTA revised the thresholds for its cost effectiveness ratings.

To further assist in evaluating the transit technology alternatives, and to increase the awareness of different revenue sources, a Financial Workshop was held. The information presented at this workshop included a review of transit revenue sources for transit agencies within Florida and across the country. Using the capital and operating costs that were available at the time of the workshop, information was also provided regarding the amount of additional revenue from potential sources that would need to be generated to support either a BRT or LRT build option.

At the MPO's meeting on April 15, 2005, the Board unanimously adopted the approved alignment with light rail transit as its LPA. The LPA was adopted with the condition that the segments along 136th Avenue, SR 7, and Broward Boulevard be re-evaluated during Preliminary Engineering, and that the guideway configuration be exclusive to the greatest extent practicable, except where such a configuration is not supported by the surrounding communities. The re-evaluation of 136th Avenue arose from concerns expressed by residents in this area about the impacts to their neighborhood from noise, increased traffic congestion, and other secondary impacts that may result from the project. The re-evaluation of SR 7 and Broward Boulevard is based on interest in developing more detail on the effects of an elevated structure on businesses along SR 7.

Cost Effectiveness

(Dollars spent per user hour saved)

Alternative	< $15 Highly Recommended	$15-$20 Recommended	$20-$25 Recommended to Not Recommended	> $25 Not Recommended
LRT Dedicated				
LRT At-grade				
BRT Dedicated				
BRT At-grade				

Figure 19: Cost Effectiveness of the Build Alternative Options (as of February 2005)

5.0 COMPARISON OF BASELINE AND LOCALLY PREFERRED ALTERNATIVE

This chapter compares the performance of the Baseline/TSM (a.k.a. Enhanced Facilities and Services) and the Locally Preferred Alternative (LPA) or Build Alternative.

5.1 BASELINE/TSM ALTERNATIVE

This section describes the Baseline/TSM Alternative for the Central Broward East-West Transit Analysis. There are two subsections: a brief description of the three express bus routes, which would provide service comparable to the "Premium Transit Service" within the I-595 corridor depicted on the 2025 Long Range Transportation Plan, and information on proposed Transportation System Management (TSM) elements. The LPA contains all of the elements of the Baseline, except for the express bus routes.

No Build Alternative

The No Build alternative provides the basis for comparison of the TSM alternative and the Build alternatives. The recently adopted 2030 Cost Feasible LRTP includes the alignment recommended for the Central Broward East-West Transit Analysis and identifies the transit technology as "Rail Transit (Technology & alignment to be determined)." For purposes of comparison of the performance of the No Build, TSM and Build alternatives, the No Build Alternative will consist of the "existing + committed" network plus the transit elements as described in the 2030 LRTP without the Central Broward East-West Transit Analysis.

TSM Alternative

The proposed TSM alternative is comprised of the No Build Alternative plus a set of express bus routes and park-and-ride facilities that are designed to serve the same travel markets as the proposed CBEWTA build alternatives. The proposed TSM alternative was developed in consultation with staff members of Broward County Transit (BCt), the Broward County MPO and District 4 of the Florida Department of Transportation. For the TSM alternative, all north-south and east-west express bus alignments defined in the Cost Feasible 2025 Transit Plan within Broward County were retained, with the exception of the Sunrise/Broward BRT as it overlaps with some proposed build projects. Premium future bus services retained are Atlantic Blvd/Sample Rd, Cypress Creek Rd/McNab Rd, Oakland Park Blvd, Pines Blvd/Sheridan St, Flamingo Rd, University Dr, SR 7 North, and Powerline Rd. The proposed Transit Bridge was included as a connection between the SR 7 North express bus and Pro Player Stadium/Golden Glades. Furthermore, the Fort Lauderdale Downtown/Beach/Airport Loop People Mover remained in the baseline. The I-595 High Performance Transit corridor shown in the Cost Feasible Transit Plan was eliminated as it serves as one of the east-west build alternatives. NW 27th Avenue Metrorail is assumed to operate as a true extension of Metrorail from central Miami-Dade to the terminus of the Transit Bridge at Pro Player Stadium and any local or express buses in Miami-Dade interfacing with the extension were modified to stop at the proposed stations, if necessary. All other proposed changes to Tri-Rail and local buses in Broward and Miami-Dade were retained.

A network of park-and-ride facilities and express bus services, primarily along I-595, would provide improved, line-haul, transit service at relatively low capital cost. The key capital elements, in addition to the vehicles, are the park-and-ride facilities. Additional capital elements would include transit signal priority technology and ITS technology to

maximize schedule adherence and to provide real-time arrival and schedule information for waiting patrons.

Reversible lanes are planned for the median of I-595. The entry/exit points for the reversible lanes would be west of 136th Avenue and east of SR 7. These lanes would function as express lanes: service to and from park-and-ride facilities located between the western and eastern termini of the reversible lanes would not have access to these lanes and would operate in the general purpose traffic lanes of I-595. Because of the limited access to and from the reversible lanes, it was necessary to develop three, express bus routes in order to serve the markets served by the proposed build alternatives.

5.1.1 Express Bus Routes

Figure 20 shows the three express bus routes that make up the Baseline Alternative. These routes would utilize over-the-road coaches and are described below.

I-595/SR 7/Broward Boulevard Route (shown in purple on Figure 20): This route follows the same alignment as the LPA, beginning in Sunrise at the Sawgrass Mills/Office Depot Center area, traveling south on 136th Avenue, east on I-595, north on SR 7, east on Broward Boulevard into Downtown, south on Andrews Avenue, and then to the proposed Intermodal Center at the Fort Lauderdale/Hollywood International Airport via US-1. This route includes three park-n-ride facilities at the Sawgrass Mills/Office Depot Center station, at the Flamingo Road/I-595 station, and at the Pine Island Road/I-595 station. This route would also stop at:

- 136th Avenue and 8th Street
- College Avenue and I-595 to serve the South Florida Education Center
- SR 7 and Davie Boulevard
- SR 7 and Broward Boulevard
- Broward Boulevard and 31st Avenue/Martin Luther King
- the Fort Lauderdale Tri-Rail Station (at Broward Boulevard, just west of I-95)
- Broward Boulevard and 11th Avenue/Palm
- Broward Boulevard and Andrews Avenue
- Andrews Avenue and Las Olas
- Andrews Avenue and 6th Street
- Andrews Avenue and SE 17th Street
- The Fort Lauderdale/Hollywood International Airport Intermodal Center.

Downtown Express Bus (shown in green on Figure 20): This route is designed to provide express service to Downtown Fort Lauderdale. In an effort to maximize travel speed, this route uses the Sawgrass Expressway to access I-595, travels north on I-95 to Broward Boulevard, then follows Andrews Avenue and US-1 to the Fort Lauderdale/Hollywood International Airport Intermodal Center. There are only three stations/stops on this route: the Sawgrass Mills/Office Depot Center park-n-ride facility, Downtown Fort Lauderdale (corner of Broward Boulevard and Andrews Avenue), and the Fort Lauderdale/Hollywood International Airport Intermodal Center.

I-595/SR 7/Griffin Road Route (shown in blue on Figure 20): This route is designed to provide service to the Fort Lauderdale/Hollywood International Airport. It follows the same route as the I-595/SR 7/Broward Boulevard route, except that at SR 7, it turns south and travels to Griffin Road, where it heads east to the Fort Lauderdale/

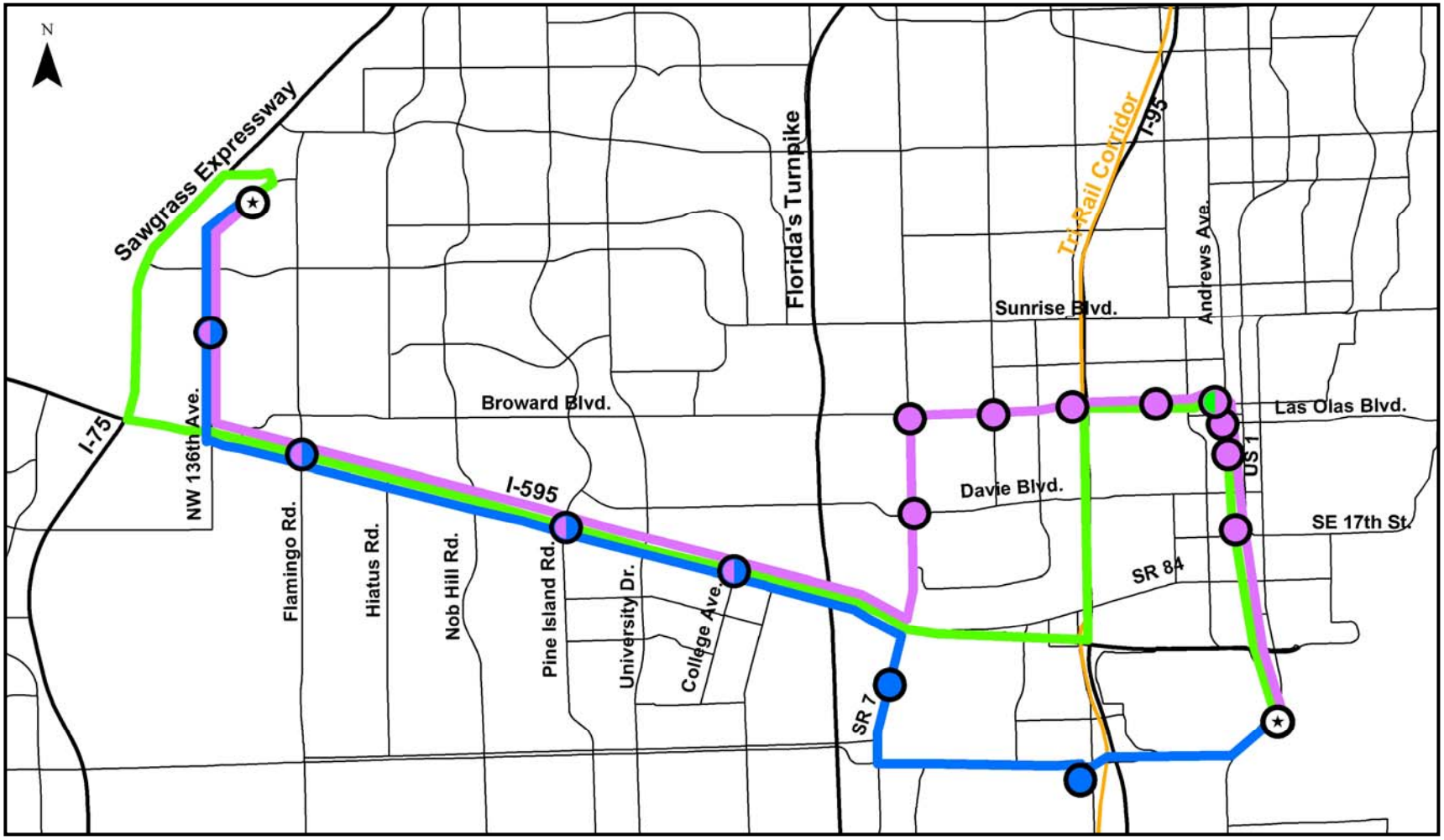


Figure 20: Baseline/TSM Alternative Express Bus Routes

Hollywood International Airport. In addition to the three park-n-ride facilities at the Sawgrass Mills/Office Depot Center station, the Flamingo Road/I-595 station, and the Pine Island Road/I-595 station, this route includes stops at:

- 136th Avenue and 8th Street
- College Avenue and I-595 to serve the South Florida Education Center
- The Transit Bridge terminus (SR 7)
- The Fort Lauderdale/Hollywood International Airport Tri-Rail Station (at Griffin Road and I-95)
- The Fort Lauderdale/Hollywood International Airport Intermodal Center.

5.1.2 Transportation System Management

The key TSM element for both the Baseline/TSM alternative, as well as the build alternatives is transit signal priority (TSP). TSP is an operational technology that facilitates the movement of transit vehicles through traffic-signal controlled intersections. Because TSP reduces delay at signals, it can result in a significant improvement in travel time and service reliability. Implementation of TSP is dependent on existing traffic signal hardware, software and operations. In Broward County, a traffic-signal upgrade program is currently being implemented that will make TSP possible. Transit vehicle detection and priority system request hardware and software would need to be added to the signals and vehicles, although the BCt already has part of this system in place through its automatic vehicle locator program.

5.2 LOCALLY PREFERRED ALTERNATIVE

The Locally Preferred Alternative (LPA) is the construction of a light rail line that provides service from the Sunrise/Sawgrass area to Downtown Fort Lauderdale and the Fort Lauderdale/Hollywood International Airport Intermodal Center. This alternative has been endorsed by the Central Broward East-West Transit Analysis Steering Committee, the Technical Coordinating Committee of the MPO, the MPO Board, and the cities of Sunrise, Plantation, and Davie. The alignment (shown in Figure 21) begins at the Sawgrass Mills/Office Depot Center and travels south to I-595. Currently, 136th Avenue is the preferred alignment for this southerly route; however alternatives to 136th will be examined during Preliminary Engineering. The alignment runs east on I-595, providing service to the South Florida Education Center, and then turns north on SR 7. At Broward Boulevard, the alignment turns east to Downtown Fort Lauderdale. In Downtown, the alignment heads south on Andrews Avenue to 30th Avenue, where it turns east to US-1. The alignment follows US-1 south to the proposed Fort Lauderdale/Hollywood International Airport Intermodal Center.

Trains would operate at six minute headways in the morning and afternoon peak periods; 15 minute headways in the off-peak periods. Hours of operation would be similar to existing BCT operations; generally from 5:30 a.m. to 11:00 p.m. The fare structure and transfer policy would be the same for light rail service as for BCt fixed-route bus service.

5.3 COST EFFECTIVENESS AND FINANCIAL ANALYSIS

Effective in the Spring of 2005, FTA made revisions to the New Starts Evaluation and Rating Process. These changes are incorporated and described in the *Reporting Instructions for the Section 5309 New Starts Criteria* (April 2005), available on the FTA website. Each candi-

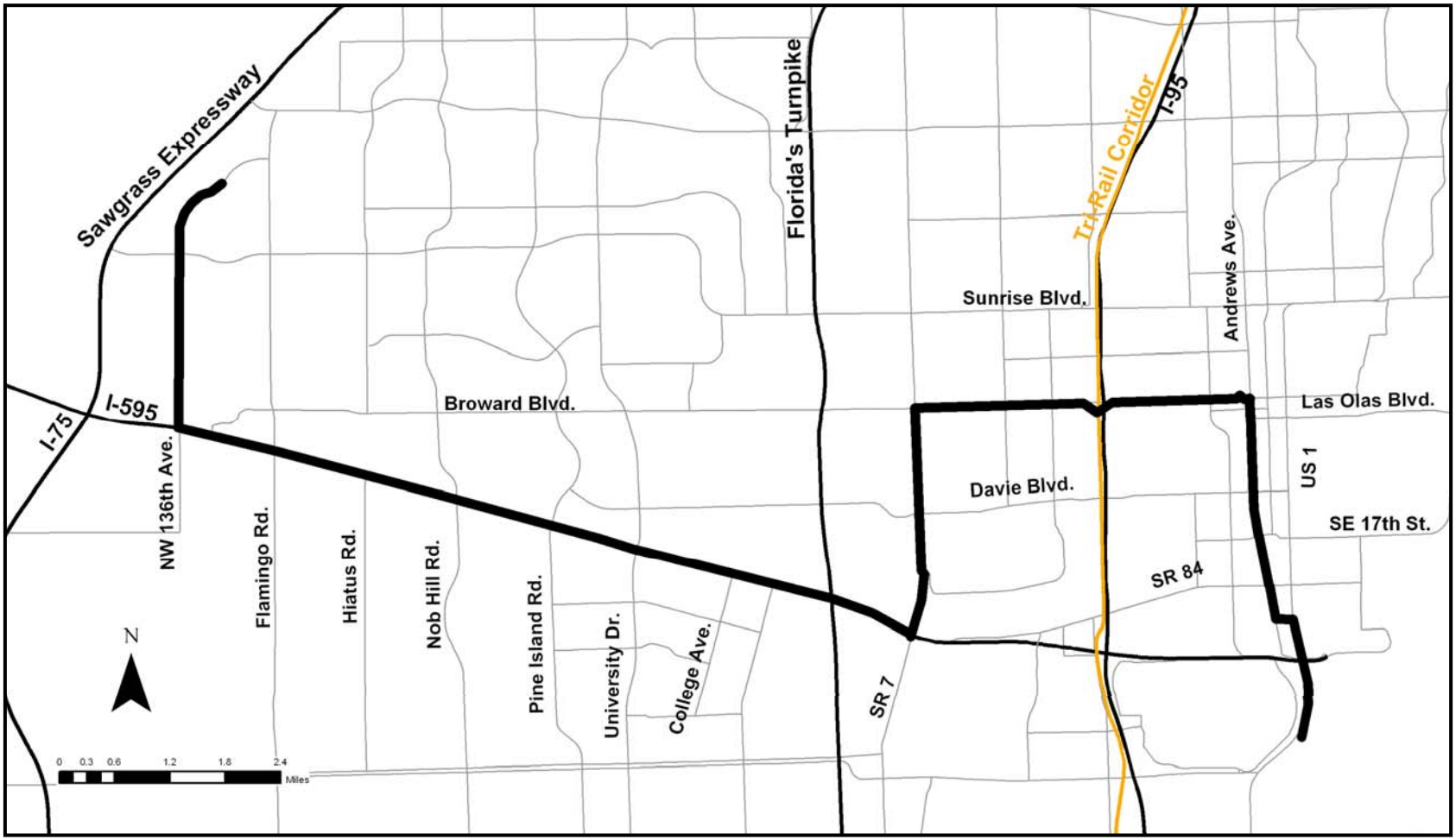


Figure 21: Locally Preferred Alternative

date New Starts project receives three, primary ratings:

- Project Justification Rating;
- Local Financial Commitment Rating; and
- Overall Project Rating

The project justification and local financial commitment ratings are summary ratings. FTA assigns a weight of 50 percent each to cost effectiveness and land use criteria, then averages them to get the summary project justification rating. If a project receives a "low" cost effectiveness rating, it may not advance in the FTA project development process. The financial commitment rating is also a weighted average based on proposed non-New Starts share (20 percent), strength and reliability of the capital plan (50 percent), and strength and reliability of the operating plan (30 percent). Failure to achieve a rating of at least "medium" on any of these three elements of the financial commitment rating will result in an overall rating of "Not Recommended."

Note that project ratings are not equivalent to project funding recommendations. An overall project rating of "Highly Recommended" or "Recommended" does not translate directly into a funding recommendation or commitment. It is also important to note that a proposed New Starts project that receives a "medium low" rating for cost effectiveness will not be recommended for funding by FTA – even if, the overall project rating is "Recommended."

A key factor in receiving a recommended rating for a project under the New Starts program is the project's cost effectiveness. This is measured in a number of ways under the New Starts criteria. A key measure that FTA uses is based on the concept of "user benefits." User benefits are computed based on all the differences attributed to the various coefficients and bias constants in the mode choice model. These differences are then converted to an equivalent change in minutes of travel time saved, which can be tabulated and compared between alternatives. Bias constants such as the "the premium transit" constant noted in Section 2.1 make up part of the conversion to minutes (or hours) of travel time savings, otherwise known as "user benefits". The user benefit values are then used as part of an overall project evaluation and compared to various cost measures attributed to the comparison of the build project to the TSM baseline to establish a cost-effectiveness ratio for the project. Currently, a project must have a transportation system user benefit of $21.99 or lower to receive a "medium" or better rating for cost-effectiveness (FTA *Reporting Instructions for the 5309 New Starts Criteria*, April 2005, p. 8).

5.3.1 Cost Effectiveness

Table 11 provides a summary of ridership, capital cost, operating cost and other factors that are used to develop the dollars per user benefit hour measure of cost effectiveness. Table 11 presents information for the Locally Preferred Alternative and a Minimum Operable Segment (light rail on an elevated guideway from the vicinity of Flamingo Road/I-595 to downtown Fort Lauderdale) reflecting use of different mode bias constants as discussed in Section 2.3. This initial consideration of an MOS was carried out in order to identify intermediate cost alternatives per FTA guidance, and also to try to identify an alternative that would meet the FTA cost effectiveness threshold as revised in the Spring of 2005.

As shown in Table 11, only the MOS with Metrorail bias constants achieves a dollar per user benefit hour figure that would receive a favorable rating under the thresholds established by FTA in the Spring 2005. Further refinement of both the LPA and the

MOS, an update to SERPM using 2030 demographic information, and development of station area plans that would improve the land use rating could improve the rating of both the LPA and the MOS. Further refinement of costs, travel demand modeling and station locations and plans will occur during the next stage of project development.

Table 12: Comparison of Key Data

	Locally Preferred Alternative (LPA)			Minimum Operating Segment (MOS)			
	TSM	Standard	Premium Transit	TSM	Standard	Premium Transit	Metrorail
Length (route miles)	62.1	20.74	20.74	62.1	13.05	13.05	13.05
# of Stations	17	15	15	17	9	9	9
Ridership							
Project Boardings							
Average Weekday		19,830	23,688		14,348	17,553	22,704
Work trips		12,252	14,902		9,483	11,745	13,059
Peak hour		3,063	3,726		2,371	2,936	3,265
Annual (@304.2)		6,032,286	7,205,890		4,364,662	5,339,623	6,906,557
Transit System Linked Trips							
Average Weekday	394,776	401,005	404,090	394,447	398,780	401,173	405,569
Annual (@304.2)	120,090,859	121,985,721	122,924,178	119,990,777	121,308,876	122,036,827	123,374,090
Annual New Riders		1,894,862	2,833,319		1,318,099	2,046,050	3,383,313
Capital Cost	$98,054,000	$1,063,976,000	$1,074,365,000	$98,054,000	$814,513,000	$818,669,000	$826,980,000
Annualized Capital Cost	$9,658,000	$79,206,000	$80,073,000	$9,658,000	$61,646,000	$61,994,000	$62,623,000
Operating Cost*	$123,559,632	$138,084,692	$138,955,731	$123,254,818	$132,928,381	$133,521,872	$134,342,733
Annual User Benefits		1,852,223	2,669,816		1,292,526	1,948,857	2,681,254
$/User Benefit Hour		$45.39	$32.14		$47.71	$32.12	$23.89
Zero-car user benefits							
Number		591	901		414	651	762
Percent		17.3%	16.9%		16.4%	16.0%	15.6%

*includes operating cost for the current BCt system

5.3.1 Financial Feasibility

The financial plan for the Central Broward East-West Transit Analysis project assumes a capital cost of $1,070.2 billion and an annual operating cost of $20.8 million per year. These funds would be provided as outlined below. Note that use of Flexible Federal Funds such as STP (Surface Transportation Program) and TCSP (Transportation Community System Preservation) could reduce the amount of New Starts funding needed. The Local Funds will have to be approved through a referendum.

Funding Source	**Amount (millions)**
Federal New Starts (50% Share)	$535.1
Flexible Federal Funds (STP-MM, TCSP)	To Be Determined
State Funds	$267.5
Local Funds (from proposed one cent sales tax)	$267.6
TOTAL	**$1,070.2**

A financial workshop was held in February of 2005. Information was presented at the workshop on potential local (county) sources of revenue and their potential to generate for sufficient capital and operating funds. Scenarios were developed based on varying assumptions regarding federal and state funding. Federal and state funding was assumed to apply only to capital costs. The revenue projections and funding source assumptions were applied to the alternatives under consideration at that time (BRT and LRT with varying amounts of at-grade guideway and elevated structure). The scenarios compared funding for the TSM and build alternatives only. No growth or expansion of the BCt fixed-route or paratransit services or facilities was assumed.

Potential local revenue sources that were considered included sales tax, real property tax, vehicle registration fees and fuel taxes. Based on the scenarios developed for the workshop, local revenues – with no federal or state funding – would be sufficient to build and operate any of the alternatives that were under consideration. Depending on the alternative selected and the assumed level of federal and state participation, a sales tax increase of one-tenth of a cent to just over three-tenths of a cent, or a vehicle registration fee of from $24 to just under $70 or motor fuel tax ranging from two to ten cents per gallon would generate enough revenue. Again, these scenarios did not account for any growth in the BCt system beyond current levels of service.

The Broward County Board of County Commissioners passed a resolution on June 21, 2005, directing County staff to prepare an item for the November 2006 ballot. This resolution calls for use of up to a one-cent sales surtax to fund a program of transit/transportation improvements including the LPA. It should be noted that the identification of a dedicated revenue source for capital and operating costs is a requirement under the New Starts criteria for obtaining a Full Grant Agreement from the FTA.

6.0 PUBLIC INVOLVEMENT

Public involvement throughout the Central Broward East-West Transit Analysis was continuous and comprehensive. Several methods were used to provide stakeholders and the public with information and with the opportunity to provide comments. The *Public Involvement Activities Report* documents all of the involvement efforts undertaken throughout the project. This chapter summarizes these activities.

The Steering Committee was responsible for the oversight and direction of the study as a whole and was the first point of contact between the project team and agencies participating in the study. The Steering Committee included representatives from the Florida Department of Transportation and each of the transportation agencies in Broward County. The Steering Committee held four meetings during the course of the study and assisted with the following:

1. Definition and evaluation of project alternatives;
2. Highlighted potential issues and concerns specific to their interests;
3. Reviewed technical studies and staff recommendations; and
4. Offered strategies to resolve issues between competing interests.

The Steering Committee was comprised of:

- Mario Aispuro, Broward County Transportation Planning
- David Anderton, Port Everglades
- Steve Braun, Planning and Environmental Management, District 4, FDOT
- Beatriz Caicedo-Madison, Planning and Environmental Management, District 4, FDOT
- David Daniels, Broward County Transit
- Mark Gelband, Broward County Aviation Department
- Daphne Georgiadis, Office of Modal Development, District 4, FDOT
- John Krane, Planning and Environmental Management, District 4, FDOT
- Paul Lampley, Planning and Environmental Management, District 4, FDOT
- Gerry O'Reilly, Director of Planning & Production, District 4, FDOT
- Kent Rice, Florida's Turnpike Enterprise
- Jonathan Roberson, Tri-Rail/South Florida Regional Transportation Authority
- Lloyd Robinson, Office of Modal Development, District 4, FDOT
- Michael Ronskavitz, Broward County Transit
- Jennifer Schaufele, Broward County Metropolitan Planning Organization Staff Director
- Gus Schmidt, Planning and Environmental Management, District 4, FDOT
- Howard Webb, Design, District 4, FDOT
- Jeff Weidner, Mobility Manager, Office of Modal Development, District 4, FDOT
- Michael Williams, Planning Director, Tri-Rail/South Florida Regional Transportation Authority
- Stephen Wilson, Broward County Aviation Department
- Enrique Zelaya, Broward County Transportation Planning
- Nancy (Bungo) Ziegler, Director of the Office of Modal Development, District 4, FDOT

The study also had a Study Advisory Committee (SAC) that consisted of representatives from study area local governments, civic organizations, and the business community. The SAC met four times throughout the course of the study and assisted with the following:

1. Definition and evaluation of project alternatives;

2. Monitored the study process from a community perspective;
3. Highlighted potential issues and concerns specific to their interests;
4. Disseminated information and generated interest in the study throughout the community; and
5. Disseminated information among their respective constituencies.

The SAC was comprised of representatives from:

- Florida Atlantic University Center for Urban and Environmental Solutions
- Local businesses
- Nova Southeastern University
- The cities of Fort Lauderdale, Plantation, and Sunrise
- The Realtors Association
- The South Florida Education Center Transportation Management Association
- The South Florida Regional Planning Council
- The South Florida Water Management District
- The Town of Davie
- Work Force One

Public involvement was targeted to the following groups:

- Elected officials to provide their perspective on potential issues and to promote evaluation of a locally preferred transportation system
- Neighborhood organizations and districts to provide comments on local issues and concerns
- Chambers of Commerce, business associations, and improvement districts to promote the evaluation of the options of a locally preferred transportation system
- Ethnic, cultural, low-income, physically challenged, and elderly group representatives to ensure involvement from traditionally under-represented and underserved groups
- Interested civic groups to provide their perspective on potential issues

Over 70 meetings were held with the groups listed above. Some of the civic organizations and homeowner's associations that participated in the project include:

- Marina Mile Business Association
- Boulevard Gardens Neighborhood Association
- Pine Island Ridge Homeowners Association
- South Florida Education Center Transportation Management Association
- South Andrews Business Association

Four newsletters were developed and distributed to a project mailing list via mass mailing and were posted on the project website. The newsletters were not only a means to disseminate information about the project, but also served to notify the public about upcoming public meetings.

Public workshops were held in June 2003 and February 2004. The workshops were conducted at the end of the Tier 1 and Tier 2 evaluations so as to inform the public at key decision points.

A public hearing was conducted in March 2005 to present the Locally Preferred Alternative options to the public and receive comments.

A project website (www.centralbrowardtransit.com) was established and linked to the Department's website. The website included project information, meeting announcements, newsletters, reports and maps related to the study, presentations from public meetings, and information about other transit studies in Broward County. The website was updated throughout the study to ensure that project information and meeting schedules were current.

As a result of these efforts, endorsements or resolutions of support were received from the following:

- The Broward Workshop
- The City of Plantation
- The City of Sunrise
- The Fort Lauderdale Chamber of Commerce
- The Town of Davie

7.0 ACTIVITY SINCE ADOPTION OF THE LOCALLY PREFERRED ALTERNATIVE

Following the MPO meeting on April 14, 2005, where a Locally Preferred Alternative was selected, the Federal Transit Administration (FTA) made significant revisions to the New Starts project evaluation process. The changes to New Starts include:

- A lower threshold for cost effectiveness. To receive a Recommended rating, a project's cost of Transportation System User Benefit (or TSUB) cannot exceed $21.99 per user benefit hour.

- Projects that do not receive a Recommended rating will not be approved for advancement into Preliminary Engineering.

- A new method for calculating capital costs.

- Restructuring of the land use evaluation criteria.

In May and June, FDOT coordinated with FTA to prepare an initial set of data and analysis for the LPA in order to be compatible with the revised New Starts guidance. A preliminary Minimum Operating Segment (MOS) was also defined and analyzed using the revised guidance. Based on these evaluations, neither the LPA nor the MOS met the new threshold to receive a Recommended rating.

On July 12, 2005, representatives from the Project Team met with FTA to review the LPA and MOS analyses. Based on the commitments of the Broward MPO and the Broward County Board of County Commissioners to both the project and the pursuit of transit funding, FTA agreed to be the lead agency in the preparation of a Draft Environmental Impact Statement (DEIS) for the project. The DEIS will provide an opportunity to:

- Identify station locations and develop station area plans that may improve the land use rating and produce higher ridership projections.

- Utilize the 2030 data for population and employment, as well as refinements to the transportation model (SERPM 6), which may result in higher ridership projections.

- Refine an MOS that could result in lower capital costs.

- Resolve alignment issues, such as:

    - Identifying alternatives to NW 136th Avenue

    - Determining the guideway configuration (elevated or at-grade) along SR 7 and Broward Boulevard

    - Considering expansion of the route to serve the City of Lauderhill along SR 7

    - Identifying the alignment through the Fort Lauderdale Central Business District. FDOT is coordinating with other on-going transit analyses in the area (passenger service on the FEC, the Downtown Development Authority's streetcar, and the Airport/Seaport IMC/People Mover) to eliminate redundancy and insure that a

coherent approach is taken to identifying and developing transit mobility options in the Andrews Avenue corridor between downtown Fort Lauderdale and the Fort Lauderdale – Hollywood International Airport.

FDOT will fund the DEIS in its fiscal year 2007 budget, with this phase beginning in August 2006. Once completed, the DEIS will be transmitted to the FTA for review and an application for New Starts funding will be prepared. It is anticipated that the refinements made to the project during the DEIS will improve the evaluation factors and enable the project to receive a Recommended rating from FTA and approval to enter into Preliminary Engineering.

Over the next several months, FDOT is continuing the project by coordinating with the staff and communities of Fort Lauderdale, Davie, Plantation, and Sunrise. Public meetings and workshops will be conducted to consider station locations, station area plans, and alignment issues.