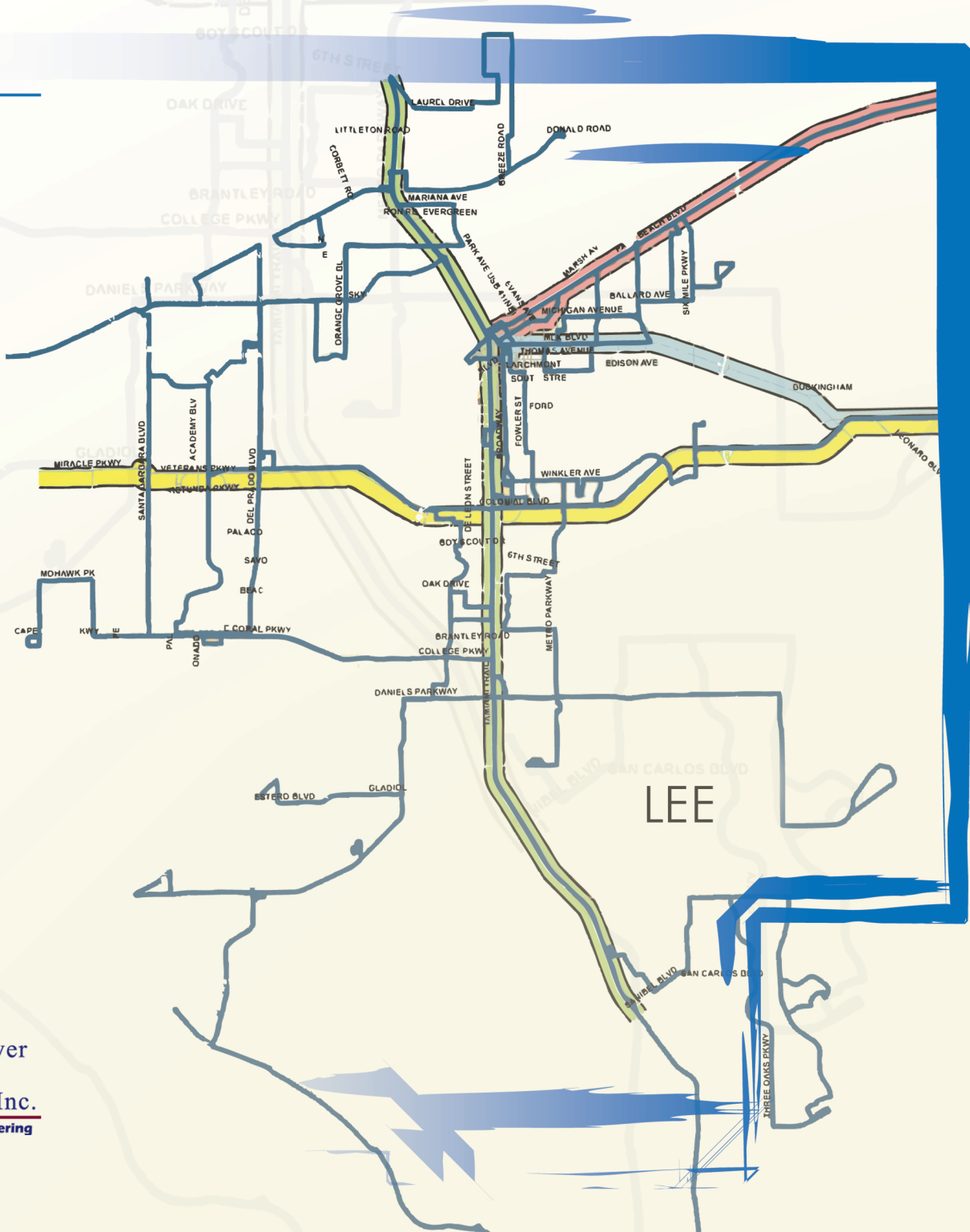
LEE COUNTY

Bus Rapid Transit Feasibility Study

Final Report



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Lee County Bus Rapid Transit Feasibility Study

Final Report

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Section 1
INTRODUCTION

The 2030 Lee County Metropolitan Planning Organization (MPO) Long Range Transportation Plan (LRTP) recommends that two corridors from among seven candidate Bus Rapid Transit (BRT) corridors be selected as the initial BRT network for the County. That plan recommends that the initial service consist of one north-south route and one east-west route.

The objective of this study is to determine the most appropriate north-south and east-west BRT corridors that will represent the initial BRT network in Lee County. The two selected corridors could then be carried forward in the County's planned BRT implementation process, which would include preliminary design and engineering, right-of-way acquisition, and eventual construction of appropriate BRT infrastructure.

PREVIOUS BRT PLANNING EFFORTS

As part of the LRTP, a BRT corridor screening assessment was performed to determine candidate corridors in Lee County for BRT implementation. Using a two-tier analysis that included an examination of route-by-route transit performance statistics and a set of corridor assessment criteria, four corridors were selected to be included in a more thorough BRT feasibility analysis. This study is that BRT feasibility analysis.

The two-tier BRT screening assessment conducted as part of the LRTP resulted in the following ranking of seven candidate BRT corridors from among all transit corridors considered.

- US 41
- Dr. Martin Luther King, Jr. Boulevard/Lehigh Acres
- Colonial Boulevard
- Seminole Gulf Railway (SGLR)
- Palm Beach Boulevard
- Del Prado Boulevard
- Beach Trolley

The SGLR and Colonial Boulevard corridors were added to the second tier of the LRTP analysis because of policy and roadway congestion issues, respectively. Based on the findings in the LRTP and on input from Lee County Transit (LeeTran), four corridors were selected for further evaluation. The four corridors selected for further evaluation include:

- US 41
- Palm Beach Boulevard
- Martin Luther King, Jr. Boulevard/Lee Boulevard

- Colonial Boulevard/Veterans Parkway/Lee Boulevard

It is important to note that the SGLR corridor was not selected for further evaluation despite having been ranked among the top four corridors in the LRTP assessment. As noted previously in this introduction, one of the major objectives of this study is to determine the most appropriate north-south and east-west BRT corridors that will represent the initial BRT network in Lee County. At this time, the US 41 corridor is the most productive north/south corridor in the County. The SGLR corridor will be excluded from the initial BRT network in Lee County because of its proximity to the US 41 corridor and because of the minimum amount of commercial and residential development immediately adjacent to the corridor at this time. However, exclusion of any candidate BRT corridors from this feasibility study does not preclude any corridor from future BRT consideration. As corridors continue to develop and transit demand rises, assessment of other BRT corridors should be performed.

OVERVIEW OF PROJECT APPROACH

The process for conducting the BRT feasibility analysis is composed of five major tasks. The five tasks are summarized below.

Task 1: Establish Study Review Committee – A review committee was convened to provide input throughout the study and to evaluate project deliverables.

Task 2: Facilitate Kickoff Meeting & Compile Data – Data were collected and reviewed in this task, the results of which serve as a starting point for the analysis to be performed in subsequent tasks of the project. Numerous studies and documents were reviewed in this task, including transportation plans, existing and future transit service, roadway conditions, output files from travel demand model, etc.

Task 3: Identify BRT System Elements & Develop Alternative BRT Scenarios – Two alternative scenarios were developed for each of the four corridors. Development of the alternative scenarios included the identification of appropriate BRT elements for each corridor and the determination of the implementation scale of the identified elements.

Task 4: Develop Preliminary Cost Estimates & Assess the Feasibility of Implementation – Various transportation improvement programs/plans were reviewed to determine potential joint project development opportunities. A preliminary cost estimate for each alternative scenario was developed based on the nature of the facility, capital, and operating needs identified for the alternative scenarios developed in Task 3. Each scenario was evaluated based on a series of criteria to determine the most favorable scenario for each corridor.

Task 5: Develop BRT Feasibility Report – This task involves the preparation of this BRT feasibility final report. The report details the study process for assessing the feasibility of BRT implementation in the selected corridors. The report includes recommendations on the prioritization of the study corridors, the preferred BRT alternatives for the priority corridors, and general guidance on the action steps necessary to implement the recommendations.

ORGANIZATION OF REPORT

This final report is organized into four major sections (including this introduction).

Section 2 describes the **Feasibility Assessment Methodology**. The assessment methodology describes the overall corridor evaluation and prioritization process. A flow chart is provided that illustrates the steps taken to conduct the feasibility analysis.

Section 3 documents the process used to **Identify BRT Elements and Alternative Scenarios** for each candidate corridor. Appropriate BRT elements for each candidate corridor are identified and the development and identification of alternative scenarios is described and illustrated in detail.

Section 4 presents the **Evaluation Criteria and Evaluation Process** used to conduct the feasibility analysis. Specific criteria, measures, and scoring are presented that are utilized to conduct a comparative analysis of the candidate corridor alternative scenarios.

Section 2
FEASIBILITY ASSESSMENT METHODOLOGY

A unique methodology was developed to assess the feasibility of implementing BRT along the candidate Lee County BRT corridors. The assessment methodology incorporates various aspects of BRT implementation, including identification of appropriate BRT elements for each corridor, specifications for the selected BRT elements, development of an objective comparative analysis tool, and a prioritization of corridors. This section documents the methodology applied to the overall analysis process. The methodology is organized into five major steps. Each of these steps is described below. Figure 2-1 illustrates the five-step methodology.

Step 1: Identification of BRT System Elements

Potential BRT system elements were evaluated in the context of each of the four candidate corridors. The noted BRT elements summarize in concept the basic BRT characteristics upon which alternative scenarios were developed and upon which the examination of alternative scenarios was performed. The elements included in the discussion include:

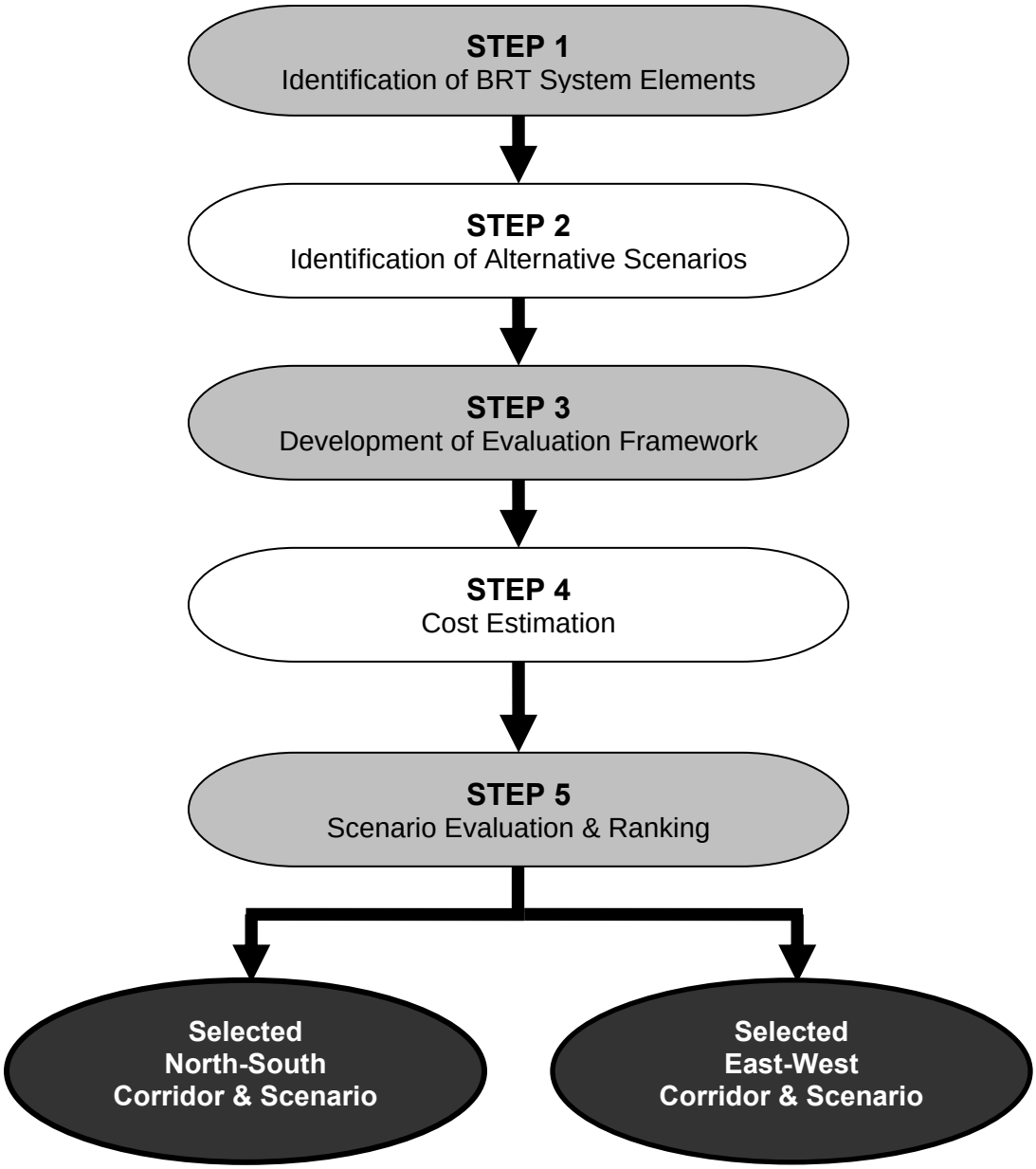
- Running ways;
- Station locations;
- Fare collection system;
- Service/operation plan;
- Vehicle design;
- Identity and image ("branding"); and
- Bus preferential treatments.

The varying scale and characteristics of each of these elements were assessed in terms of each element's applicability to the BRT candidate corridors.

Step 2: Identification of Alternative Scenarios

Based on the evaluation of BRT elements in Step 1, alternative scenarios were developed for each candidate corridor. Alternative scenarios specify the implementation scale of each of the elements identified for each corridor. Alternative scenarios were developed in as much detail as possible in order to facilitate the comparative analysis and cost estimation processes conducted as part of Steps 3 and 4 of this feasibility analysis. A detailed map series illustrates the various BRT components to be included along each corridor for each alternative scenario. In addition, development of detailed alternative scenarios provides a basis for possible future preliminary engineering and design efforts to be conducted as a result of this study.

Figure 2-1
Analysis Methodology Flow Chart



Step 3: Development of Evaluation Framework

In order to conduct an objective, comparative analysis of the identified alternative scenarios, an evaluation framework was developed. Analysis criteria, evaluation measures, and evaluation thresholds were developed to gauge the benefit of each alternative scenario versus other scenarios. The criteria used as part of the evaluation tool address, but are not limited to, each of the following issues.

- Improvement in access to employment, service, and facilities
- Improvement in bus travel times in the corridors
- Alleviation of traffic operational issues
- Alleviation of congested roadway conditions
- Increase in bus ridership (including attracting choice riders)
- Improvement in current transit service
- Coordination with implementation of future roadway improvements
- Coordination with future project development opportunities
- Enhancement of mobility

Each of these criteria was quantified utilizing objective measures. In addition, the evaluation framework was developed in a format where it can be utilized to conduct future assessments of BRT service in Lee County.

Step 4: Cost Estimation

Utilizing the results of Task 2, capital and operating cost estimates were developed for each alternative scenario. Estimates are based on the varying degree of implementation for the BRT elements within each corridor. Unit costs for capital elements, such as stations and signal priority components, are based on comparable BRT systems currently in operation. Cost estimates incorporate estimated right-of-way acquisition expenses and an estimate of operating costs are based on the alternative's selected service plan. Operating cost estimates are based on the current transit performance data. Resulting cost estimates were combined with the results of Step 3 to develop the final prioritization of corridors and identify the preferred north/south and east/west BRT corridors for the County.

Step 5: Scenario Evaluation and Ranking

Based on the results of Step 3, Development of Evaluation Framework, and Step 4, Cost Estimation, alternative scenarios were scored and ranked. Weighted scores were utilized to rank and prioritize from among the candidate alternative scenarios. As a result, the highest ranking north/south alternative scenario and the highest ranking east/west scenario were selected as the preferred initial BRT network candidates for implementation within Lee County.

Section 3
IDENTIFICATION OF BRT ELEMENTS & ALTERNATIVES

Generally, BRT systems around the world are tailored to meet the unique characteristics of the urban area into which they are implemented. As such, it is vital to the success of the service to select BRT components that are appropriate for the particular situation and that are financially and politically feasible to implement. This section includes the identification of appropriate BRT elements for each of the candidate Lee County BRT corridors and discussion of BRT alternative scenarios based on that selection of BRT elements. In order to facilitate the discussion of appropriate BRT elements, a brief description of each candidate corridor and a short summary of BRT and its major elements are provided.

It is important to note that the selection of elements presented here does not preclude the implementation of more sophisticated BRT technologies or the future expansion of the BRT service. Full-scale BRT operations are widely known to lend themselves to a phased incremental implementation approach. Some of the major advantages of a phased approach are the ability to adjust routing and revise service schedules, if necessary, and the opportunity to demonstrate potential benefits prior to making large capital investments. As such, BRT elements determined for initial implementation by Lee County are based on current corridor conditions.

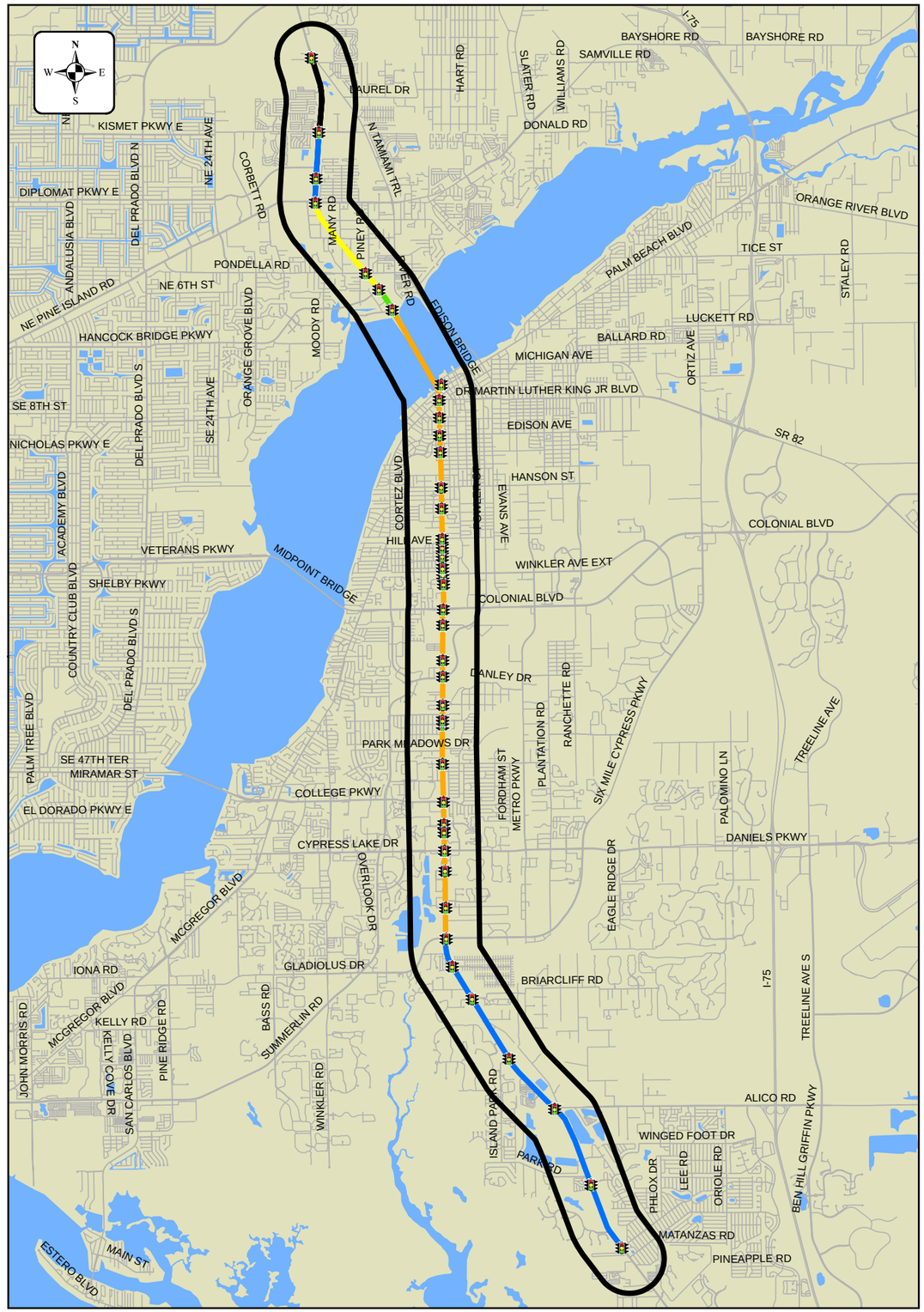
STUDY CORRIDORS

US 41 Corridor

Transit service along the US 41 corridor operates at the highest levels in the LeeTran fixed-route system. The current fixed-route service in the corridor makes connections to several major transfer hubs throughout the county and is structured in a simple north/south linear geometry, making it ideal for BRT service. Much of the corridor is developed with medium- to low-density urban commercial development with increasing intensities found near the Downtown Fort Myers. Map 3-1 illustrates the analysis corridor, signalized intersections, future adjacent land uses, and 2005 peak-hour, both-direction, roadway level of service along the corridor.

Palm Beach Boulevard Corridor

The Palm Beach Boulevard Corridor exhibits above average transit performance. In addition, the corridor cuts through urban, medium-density commercial development in the Fort Myers area. Its linear geometry provides direct access into Downtown Fort Myers and into the Rosa Parks Transportation Center. As the route approaches the downtown area, several complicated intersections and one-way streets may provide challenges for BRT implementation. Map 3-2 illustrates the analysis corridor, signalized intersections, future adjacent land uses, and 2005 peak-hour, both-direction, roadway level of service along the corridor.



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BRT Feasibility Study

Signalized Intersections

1/2 Mile Buffer of Corridor

Level of Service

- A
- B
- C
- D
- E
- F

Road

2020 Future Land Use

- Commercial
- Residential - Single-Family
- Residential - Multi-Family
- Agricultural
- Mining
- Industrial
- Preserve
- Conservation
- Water
- Unknown

Mixed Use Overlay District

Map 3-1

US 41 BRT Corridor - Level of Service and 2020 Future Land Use

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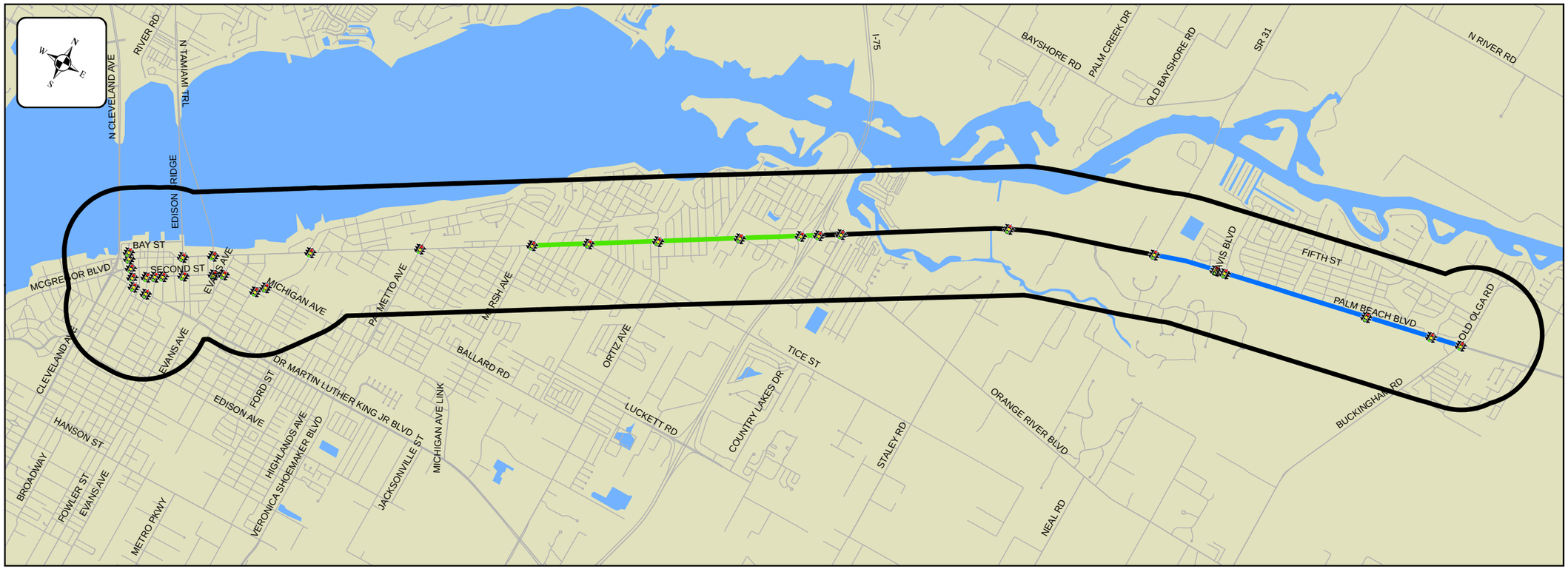

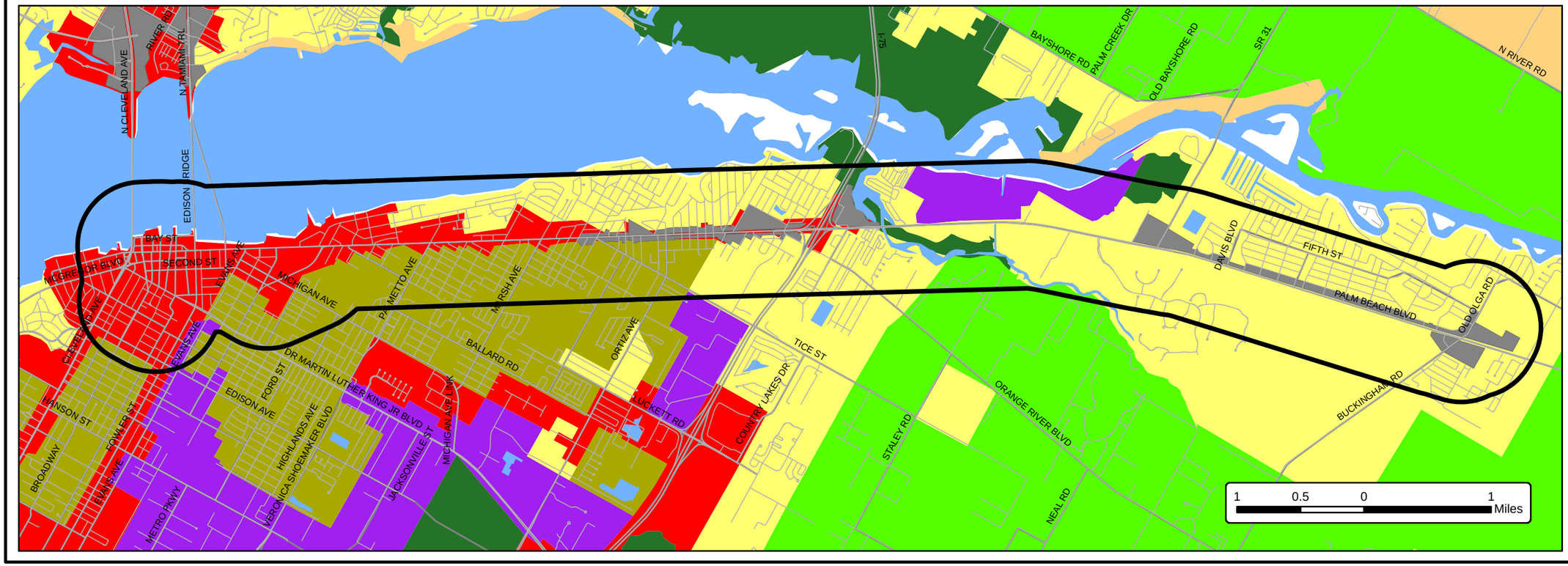

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BRT Feasibility Study

Signalized Intersections

Level of Service

- A
- B
- C
- D
- E
- F

1/2 Mile Buffer of Corridor

Road

2020 Future Land Use

- Commercial
- Residential - Single-Family
- Residential - Multi-Family
- Agricultural
- Mining
- Industrial
- Preserve
- Conservation
- Water
- Unknown

Mixed Use Overlay District

Map 3-2

Palm Beach Boulevard BRT Corridor - Level of Service and 2020 Future Land Use

Created: 11.13.06

Martin Luther King, Jr. Boulevard/Lehigh Acres Corridor

This candidate corridor would provide a direct BRT connection between Lehigh Acres and the City of Fort Myers. The corridor's east/west limits are Downtown Fort Myers and the Rosa Parks Transportation Center to the west and Lehigh Regional Medical Center to the east. This route would travel between these two points by utilizing Martin Luther King, Jr. Boulevard, SR 82, and the easternmost portion of Lee Boulevard into Lehigh Acres. Corridor characteristics can be organized into three roadway categories:

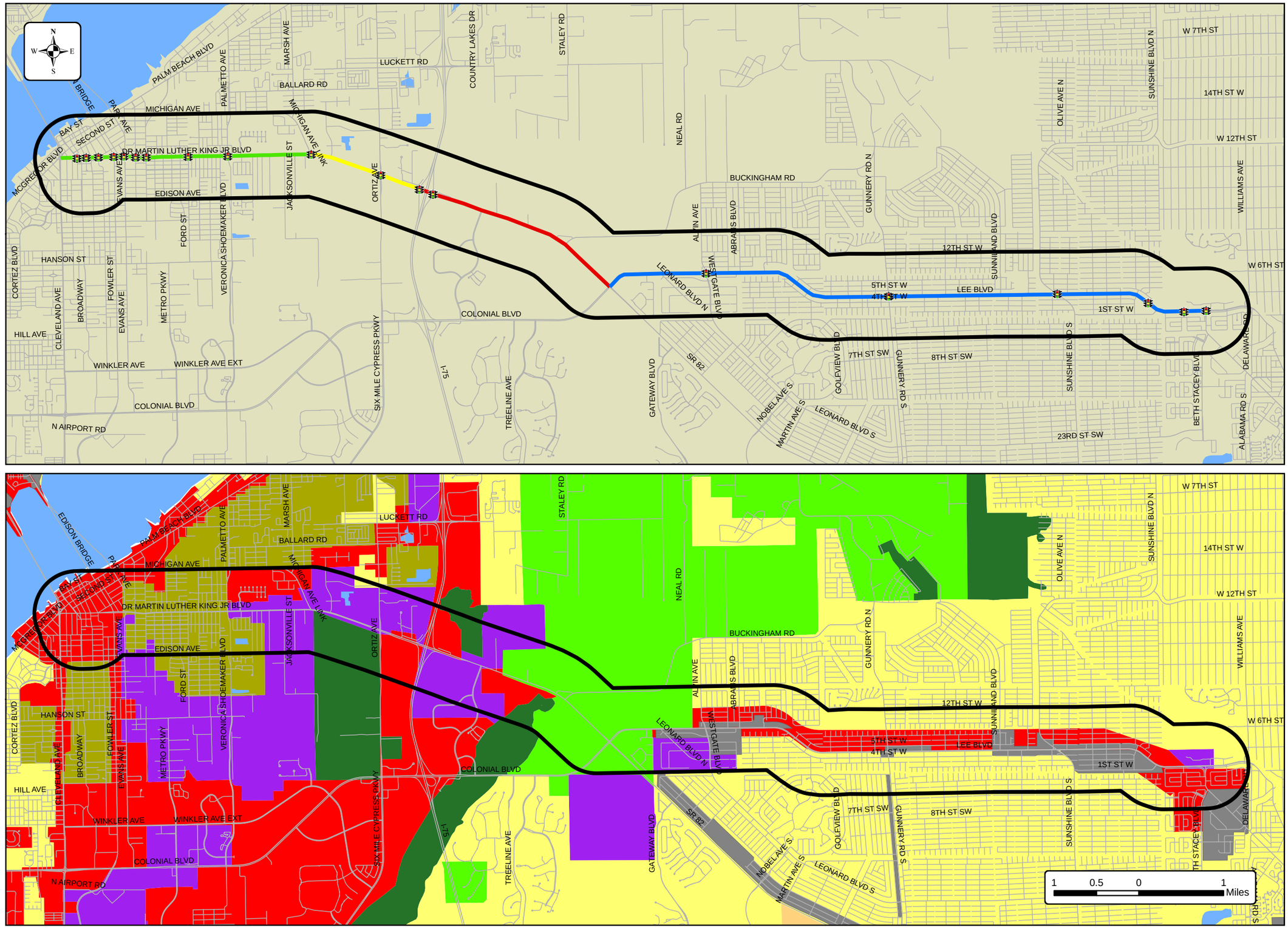
- Martin Luther King, Jr. Boulevard - Urban section consisting of three-lane and five-lane segments of roadway bordered by medium-density commercial and industrial development.
- SR 82 - Primarily undeveloped, unbuilt areas between the City of Fort Myers and Lehigh Acres.
- Colonial Boulevard – Wide, six-lane divided sections of roadway bordered by suburban residential and strip commercial development.

Map 3-3 illustrates the analysis corridor, signalized intersections, future adjacent land uses, and 2005 peak-hour, both-direction, roadway level of service along the corridor.

Colonial Boulevard/Veterans Parkway/Lehigh Acres Corridor

The Colonial Boulevard BRT corridor would be overlaid on two existing fixed bus routes and would serve as an east/west BRT route through Lee County. In the past, County staff has indicated that the heavily congested Colonial Boulevard corridor connecting the City of Fort Myers and the City of Cape Coral was in need of congestion mitigation treatments other than roadway capacity improvements. The route would begin in Lehigh Acres at the Lehigh Regional Medical Center and travel west through the southern part of the City of Fort Myers and then continue over the river and extend into the western part of the City of Cape Coral to the future Shops at Surfside. Travel on a bridge connection over the Caloosahatchee River and overpasses at Del Prado Boulevard, McGregor Boulevard, and US 41 would need to be redesigned for BRT buses and running ways. A toll booth is located on the Cape Coral side of the Caloosahatchee River. The corridor is a good candidate for the BRT analysis because of its location, straight-line alignment, connection to two major transfer hubs, and connection to a candidate BRT route on US 41.

Map 3-4 illustrates the analysis corridor, signalized intersections, future adjacent land uses, and the 2005 peak-hour, both-direction, roadway level of service along the corridor.



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BRT Feasibility Study

Signalized Intersections

1/2 Mile Buffer of Corridor

Level of Service

- A
- B
- C
- D
- E
- F

Road

2020 Future Land Use

- Commercial
- Residential - Single-Family
- Residential - Multi-Family
- Agricultural
- Mining
- Industrial
- Preserve
- Conservation
- Water
- Unknown

Mixed Use Overlay District

Map 3-3

MLK Jr. Boulevard
BRT Corridor
Level of Service and
2020 Future Land Use

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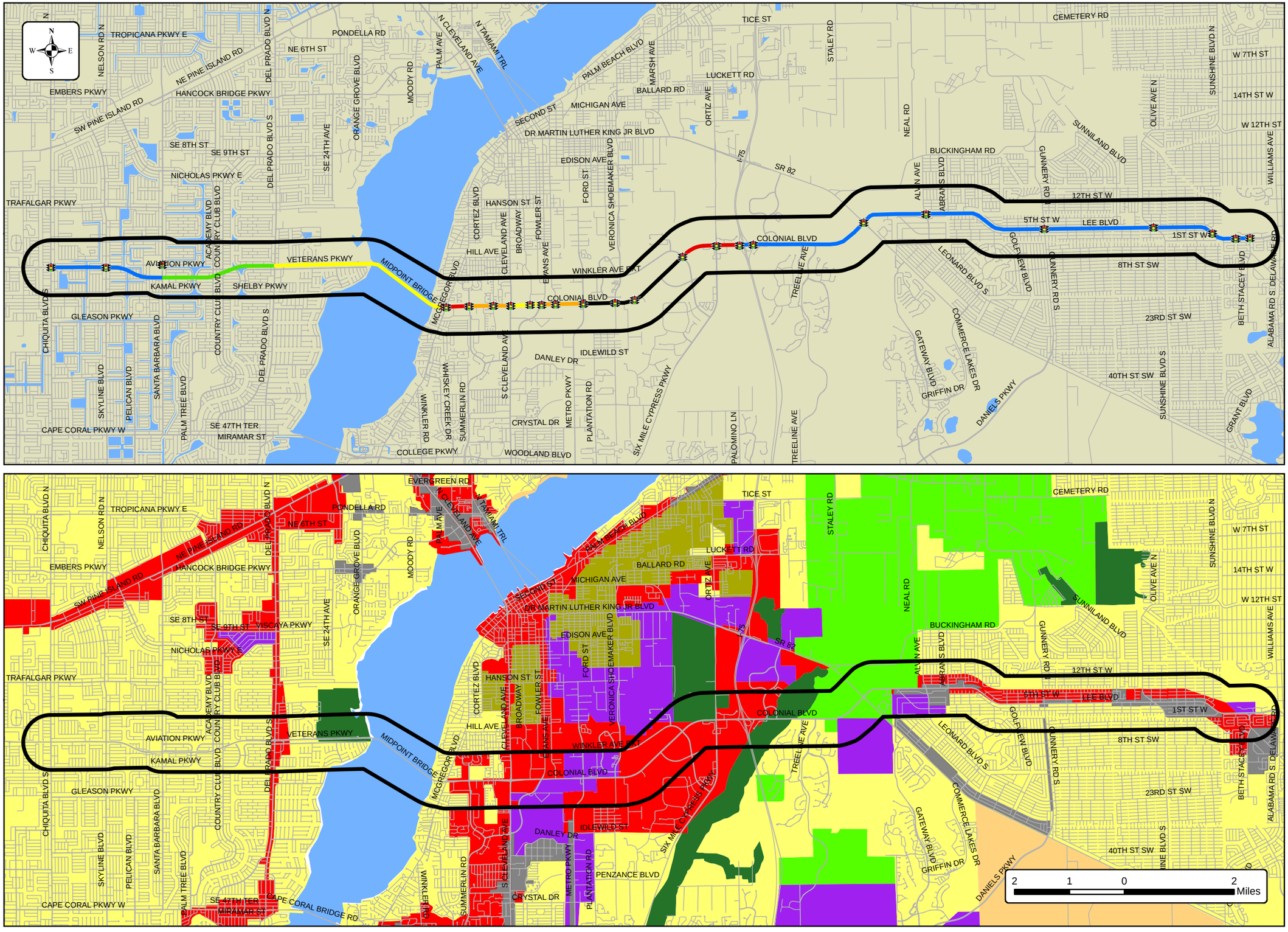

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BRT Feasibility Study

- Signalized Intersections
- 1/2 Mile Buffer of Corridor

Level of Service

- A
- B
- C
- D
- E
- F

Road

2020 Future Land Use

- Commercial
- Residential - Single-Family
- Residential - Multi-Family
- Agricultural
- Mining
- Industrial
- Preserve
- Conservation
- Water
- Unknown

Mixed Use Overlay District

Map 3-4

Colonial Boulevard
BRT Corridor
Level of Service
and
2020 Future Land Use

Created: 11.13.06

Initial Corridor Assessment and Adjustment

A field review of all four corridors was conducted on December 19, 2006. The field review was performed in order to complete a visual assessment of surrounding land use, intersection geometries, right-of-way availability, station and exclusive running way opportunities, and traffic conditions along each corridor. Data collected during the field review were compiled utilizing a field review data collection spreadsheet. The data collection sheet assisted in targeting specific physical features that could provide a challenge or benefit to the proposed BRT service. In addition, the field review assisted in evaluating on-street conditions that are not readily measurable through other available data sources.

The field review and the resulting data collected reveal that significant portions of the analysis corridors are currently not suited for BRT operation. Generally, BRT service is most efficient when operating in high-density, urban corridors. Based on the Federal Transit Administration's (FTA) *Transit Cooperative Research Program* (*TCRP) Report 90, Bus Rapid Transit: Implementation Guidelines*, suggested conditions that should be in place when BRT is being considered include:

- The proposed location is a large city with a strong urbanized area with dense patterns that facilitate transit use,
- Current total passenger flows that might support high service frequencies that are characteristic of rapid transit, and
- Sufficient "presence" of buses where bus lanes or busways are being considered.

Table 3-1 provides a cursory assessment of each BRT candidate corridor's ability to meet FTA's suggested conditions for BRT operation. The assessment is based on the full extent of each corridor and a full, partial, or limited score is given to each corridor based on the extent of the corridor that meets the corresponding condition. As noted, none of the corridors meet the criteria in terms of their full extent. The full, partial, and limited terms are defined below.

- Full – entire corridor length (or 75% or more of entire corridor length)
- Partial – 25% to 74% of entire corridor length
- Limited – less than 25% of entire corridor length

Table 3-1
Ability of Analysis Corridors to Meet Ideal BRT Conditions

Recommended Conditions for BRT	US 41	Palm Beach Blvd	Martin Luther King, Jr.	Colonial/ Veterans
The proposed location is a large city with a strong urbanized area with dense patterns that facilitate transit use	Partial	Partial	Partial	Partial
Current total passenger flows that might support high service frequencies that are characteristic of rapid transit	Partial	Partial	Limited	Limited
Sufficient "presence" of buses where bus lanes or busways are being considered	Partial	Partial	Limited	Limited

Subsequent to the field review, a population and employment density threshold assessment (DTA) was conducted. A DTA illustrates the relationship between the choice market, which includes potential riders living in higher density areas of the county, and the use of transit as a commuting alternative. As density increases, areas generally become more and more supportive of transit.

The DTA was conducted based on industry standard relationships between density and varying levels of transit investment. Table 3-2 presents the density thresholds (dwelling units per acre and employees per acre) for when to consider the following transit modes:

- Fixed-route bus
- Bus rapid transit
- Rail

Table 3-2
Density Thresholds by Transit Mode

Transit Mode	Population Density Threshold[(1)]	Employment Density Threshold[(2)]
Bus (Minimum to Enhanced Service)	3 - 5 dwelling units/acre	4 employees/acre
Bus Rapid Transit	6 - 7 dwelling units/acre	5 - 6 employees/acre
Rail	Population density >=8 dwelling units/acre	Employment density >=7 employees/acre

(1) TRB, National Research Council, TCRP Report 16, Volume 1 (1996), *Transit and Land Use Form;* November 2002, MTC Resolution 3434 TOD Policy for Regional Transit Expansion Projects.

(2) Based on a review of recent research on the relationship between transit technology and employment densities, thresholds were established for Lee County.

Dwelling unit and employment projections for 2015 were obtained by traffic analysis zone (TAZ) for all TAZs in Lee County. TAZs that meet either or both of the thresholds for a particular modal level are illustrated in Map 3-5. The candidate BRT analysis corridors are overlaid on the DTA map to determine the extent to which these proposed BRT corridors meet various thresholds supportive of BRT service (or higher mode). As shown in Map 3-5, areas of the county supportive of BRT services are largely found near the Downtown Fort Myers area. Although there are TAZs outside of the downtown area that do have the densities to support BRT, these TAZs are spread out and are not reflective of a contiguous BRT-supportive corridor.

The results of the choice market assessment are significant in terms of identifying what type of service, whether it be new routes, increased frequencies, or more substantial investments in other mode types, are appropriate for any given corridor. As such, some of the BRT-supportive TAZs not contiguous to other contiguous BRT-supportive TAZs may be better served by an alternative form of transit service to BRT, such as peak-hour express bus service.

Lee County Comprehensive Plan Mixed-Use Overlay Districts

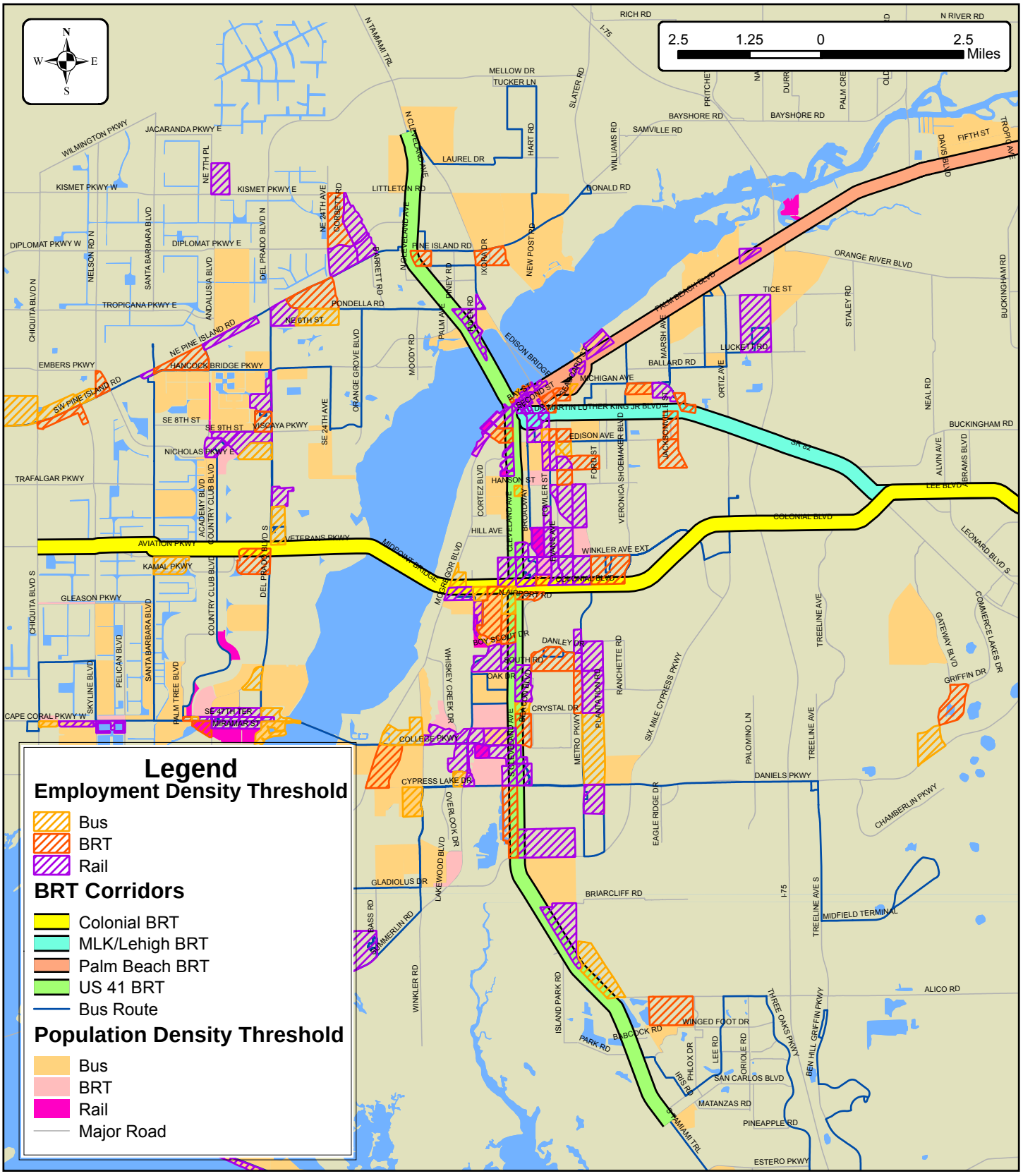
In April 2007, the Lee County Board of County Commissioners adopted an amendment to the Lee County Comprehensive Plan (Lee Plan) that encourages mixed-use, traditional neighborhood design (TND) and transit-oriented development TOD. The amendment consisted of text amendments to the Lee Plan and map amendments to the Lee County Future Land Use Map. The map amendments specify the special treatment districts where TND and TOD will be allowed. Map 3-6 illustrates the special treatment areas identified for mixed-use in the amended Future Land Use Map. It is important to note that the mixed-use districts are contained within the unincorporated areas of the county.

The County's selection of the mixed-use districts was based partly on the proximity to public transit routes. Other factors considered include existing residential, shopping, and employment centers. The identified mixed-use districts represent ideal transit trip generators and attractors; future development of transit services in Lee County should focus on supporting these areas with an adequate level of service. Of particular importance to BRT is the level, or intensity, of development that will be allowed within each mixed-use district. BRT service is corridor-based bus transit service that functions most efficiently in heavily urbanized areas characterized by dense residential and commercial development. The minimum residential and employment densities noted in Table 3-2 should be met prior to considering BRT for any particular area. At this time, Lee County has not established minimum residential density or commercial intensity standards in its Land Development Code that support the TND and TOD design concepts included in the Lee Plan. Such language is currently being drafted and the County has indicated that specific guidelines will be in place by 2009.

For the purposes of this feasibility study, the mixed-use districts identified in the Lee Plan will not be utilized to determine the limits or alignment of the proposed BRT corridors. Reasons for not including the mixed-use districts in the assessment include the following.

- Land development codes specifying the level of development within each mixed-use overlay district have not been adopted by the Lee County Board of County Commissioners.
- Build-out of the mixed-use districts is not expected to occur prior to implementation of the initial phases of Lee County's BRT service.
- Mixed-use pockets of development are not supportive of contiguous, corridor-based BRT service and may be better served by local bus service that connects to the BRT.

Future extension of BRT to the mixed-use districts in the County should be contingent on the level of development allowed within each district and should consider the corridor-based characteristics of BRT. The selection of an initial alignment for any BRT route should not preclude future extension of the BRT into transit supportive areas of the County. The flexibility offered by BRT combined with a phased incremental approach to service development allows for the opportunity to meet future transit demand generated by the mixed-use areas of the County.



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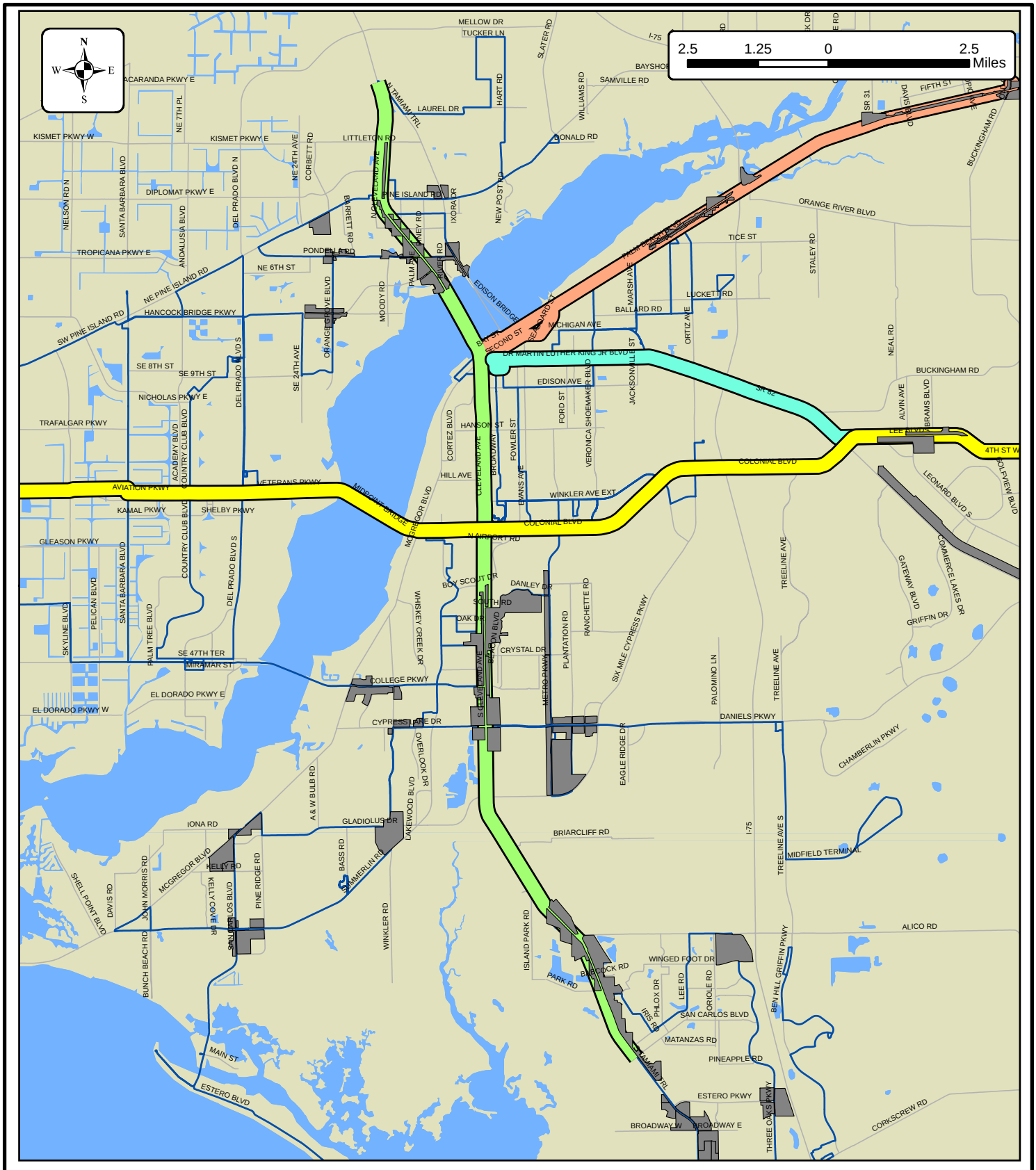
BRT Feasibility Study

Density Thresholds by Transit Mode

Transit Mode	Population Density Threshold	Employment Density Threshold
Bus (Minimum to Enhanced Service)	3 - 5 dwelling units/acre	4 employees/acre
Bus Rapid Transit	6 - 7 dwelling units/acre	5 - 6 employees/acre
Rail	≥ 8 dwelling units/acre	≥ 7 employees/acre

Map 3-5

2015 Density Threshold Assessment



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BRT Feasibility Study

Legend

Mixed Use Overlay District

BRT Corridors

- Colonial BRT
- MLK/Lehigh BRT
- Palm Beach BRT
- US 41 BRT
- Bus Route
- Major Road

Map 3-6

Lee County Mixed Use Overlay Districts

As a result of the findings from the field review and the DTA, various sections of the candidate BRT corridors that were not determined to be supportive of BRT are proposed to be eliminated as part of the full extent of each analysis corridor. Alternative transit service for these sections will be explored as part of the development of alternatives. Table 3-3 notes the segments from each analysis corridor proposed to be eliminated from the analysis, details the reason why each segment should be eliminated, and includes a photograph of the segment obtained from the field review.

Table 3-3
Corridor Segments Recommended for Elimination from BRT Consideration

Illustration	Segment Limits		Detail
	From	To	
US 41			
	San Carlos Boulevard	Gladiolus Drive	Low commercial and residential densities. Inadequate presence of transit service.
	Martin Luther King, Jr. Boulevard	Intersection with Business 41	Low commercial and residential densities.
Palm Beach Boulevard			
	I-75	SR 31	Low commercial and residential densities. Inadequate presence of transit service.
	SR 31	Buckingham Road	Low commercial and residential densities. Inadequate presence of transit service.
Martin Luther King, Jr. Boulevard			
	Michigan Avenue	I-75	Low commercial and residential densities.

Table 3-3
Corridor Segments Recommended for Elimination from BRT Consideration (Continued)

Illustration	Segment Limits		Detail
	From	To	
	I-75	SR 82/Lee Boulevard	Low commercial and residential densities. Insufficient presence of transit service.
	SR 82/Lee Boulevard	Lehigh Regional Medical Center	Low commercial and residential densities. Insufficient presence of transit service.
Colonial Boulevard/Veterans Parkway			
	Chiquita Boulevard	Del Prado Boulevard	Low commercial and residential densities.
	Del Prado Boulevard	McGregor Boulevard	Low commercial and residential densities.
	Metro Parkway	SR 82/Lee Boulevard	Low commercial and residential densities.
	SR 82/Lee Boulevard	Lehigh Regional Medical Center	Low commercial and residential densities. Insufficient presence of transit service.

Eliminating these segments from consideration for a full-scale BRT service can ensure that future BRT service operates along the most effective and efficient corridors. The adjusted limits for each of the four analysis corridors are described below.

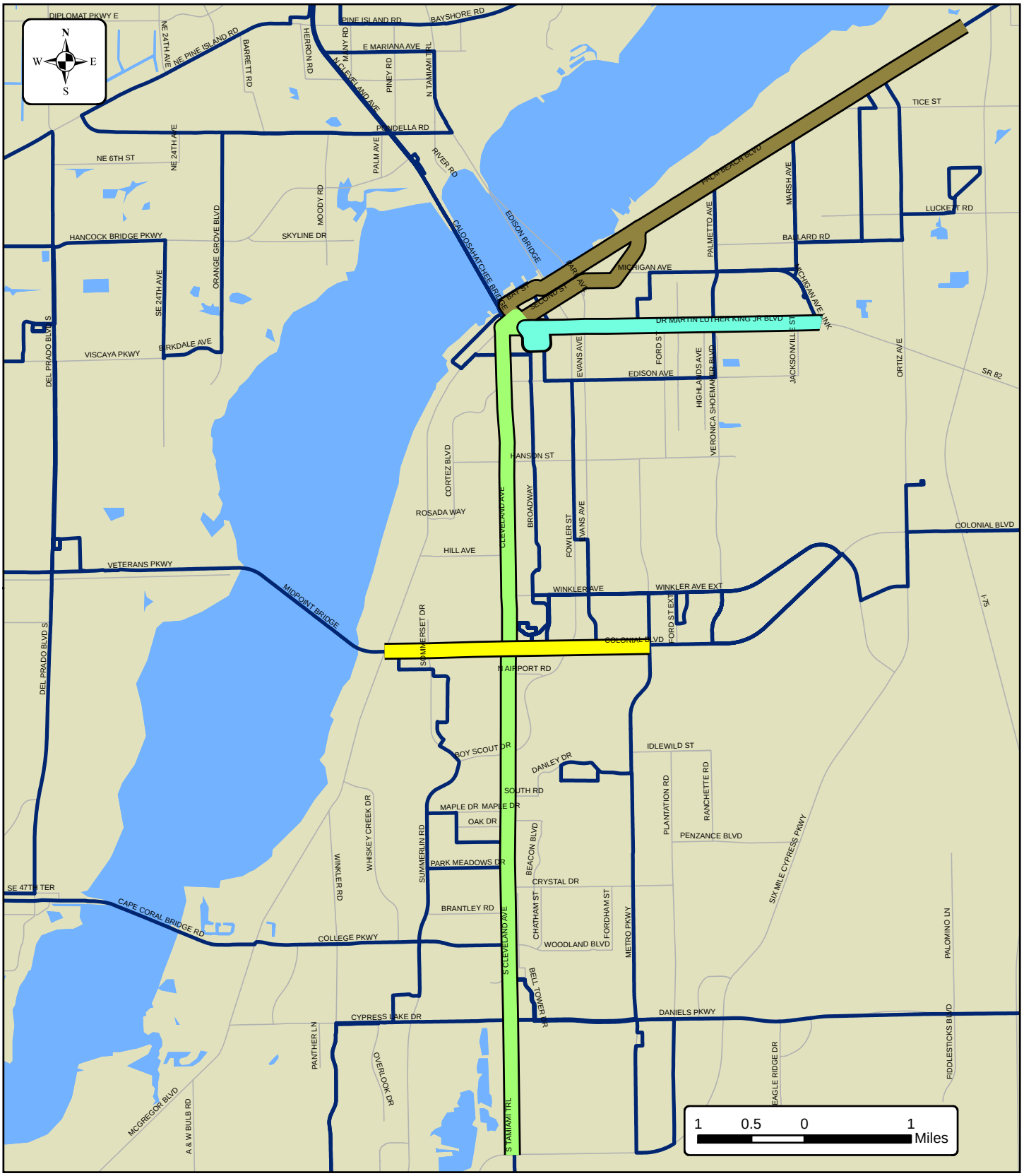
- US 41 Corridor – The adjusted corridor begins south of the intersection of Gladiolus Drive and US 41 and continues north to Downtown Fort Myers.

- Palm Beach Boulevard Corridor – The adjusted corridor begins at Morse Plaza, located on Alameda Drive and Palm Beach Boulevard, and continues west to Downtown Fort Myers.

- Martin Luther King, Jr. Boulevard/Lehigh Acres Corridor – The adjusted corridor begins at the intersection of Michigan Avenue and Martin Luther King, Jr. Boulevard and continues west to Downtown Fort Myers.

- Colonial Boulevard/Veterans Parkway/Lehigh Acres Corridor – The adjusted corridor begins at the intersection of Metro Parkway and Colonial Boulevard and continues west to the intersection of McGregor Boulevard and Colonial Boulevard.

Map 3-7 illustrates the adjusted extents for each of the four candidate BRT corridors. The new adjusted corridors will be utilized in the remainder of this feasibility analysis. Service alternatives for eliminated segments of roadway are discussed as part of that analysis.



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BRT Feasibility Study

LEGEND

- Bus Route
- Major Road

Revised BRT Corridors

- Colonial BRT
- MLK/Lehigh BRT
- Palm Beach BRT
- US 41 BRT

Map 3-7

Adjusted BRT Corridors

Created: 08.15.06

BRT ELEMENTS INTRODUCTION

BRT is generally characterized by several elements that support its normal operation. These elements include running ways, stations, fare collection systems, vehicle design, service/operation plans, bus preferential treatments, and identity/image ("branding"). Each of the elements is briefly described in this section. Major elements that will define the scale of the alternative scenarios for the candidate analysis corridors are also identified.

Running Ways

BRT running ways range from mixed traffic operation to fully grade-separated busways. They may be classified according to the degree of access control (traffic separation) or by type of facility. In many instances, running ways play a major role in determining the character and scale of the BRT service. Table 3-4 shows the possible facility types based on the extent of access control.

Table 3-4
Running Ways Classified by Extent of Access Control

Classification	Access Control	Facility Type
I	Uninterrupted Flow-Full Control of Access	• Bus Tunnel • Grade-Separated Busway • Reserved Freeway Lanes
II	Partial Control of Access	• At-Grade Busway
III	Physically Separated Lanes Within Street Rights-of-Way	• Arterial Median Busway • Bus Streets
IV	Exclusive/Semi-Exclusive Lanes	• Concurrent and Contra Flow Bus Lanes
V	Mixed Traffic Operations	

Source: TCRP Report 90, *Bus Rapid Transit-Implementation Guidelines*

Station Locations

The BRT station largely represents the physical and symbolic focal point of the BRT system. Stations operate as the nexus where a variety of BRT components, such as fare collection, level boarding, safety, and branding, come together and work to create a positive, or negative, experience for the system user. Because of the significance of the BRT station and the relationship stations hold with other BRT elements, existing BRT systems have placed a large emphasis on designing stations that meet BRT operational needs and fit into the character of the surrounding community.

BRT station location and spacing strongly affect system patronage and system operating speeds. Certain fundamental planning principles can be applied to ensure system operating efficiencies. BRT stations should be placed as far apart as possible in order to achieve high

operating speeds and also to minimize trip times. Table 3-5 provides suggested guidelines for BRT station spacing. In general, access to BRT stations by pedestrians occurs most often in urban cores, and access to stations via automobiles is most often observed in the suburbs. Since BRT operates in a wide variety of urban environments, a combination of different station spacings will be considered along various segments of each alternative corridor.

Table 3-5
Typical BRT Station Spacing

Main Arrival Mode	Spacing (Miles)
Pedestrians	0.25-0.33
Bus	0.5-1.0
Automobile	2.0

Source: TCRP Report 90, *Bus Rapid Transit-Implementation Guidelines*

Fare Collection System

There are generally two major fare collection methods, on-board fare collection and off-board fare collection, of which on-board fare collection is the most commonly used method among North American BRT systems. Off-board fare collection minimizes any delay related to on-board fare payment and allows for the implementation of multi-door boarding strategies. In addition, off-board fare collection systems have been shown to reduce station dwell times and bus travel times. On-board fare collection systems are preferred for new BRT systems because they allow transit agencies to continue using existing fare collection hardware, they operate well at low-volume stations and/or during off-peak hours, and they eliminate the need for special fare collection provisions on sidewalks and at stations.

Vehicle Design

BRT vehicles should be carefully planned and selected for various reasons. Vehicles strongly impact nearly every aspect of transit system performance, from attraction of riders to operating and maintenance costs. For instance, vehicle design has been shown to affect the speed and reliability of BRT service, which indirectly influence ridership and related benefits such as congestion reduction and air quality improvements. A vehicle's mechanical attributes also have an impact on operating and maintenance costs. In addition, proper door and interior design (e.g., a low floor, a wide aisle, and multiple-stream doors) can have an impact on vehicle requirements, which may in turn reduce the number of drivers and maintenance staff needed. Table 3-6 presents typical U.S. and Canadian BRT vehicle dimensions and capacities. In addition, a variety of different propulsion systems are being utilized by various BRT systems. Types of propulsion systems include internal combustion engines (ICE), catenary-delivered electric trolley systems, dual-mode ICE/trolley systems, coupled thermal-electric drives, hybrid engines, and fuel cells.

Table 3-6
Typical U.S. and Canadian BRT Vehicle Dimensions and Capacities

Length	Width	Floor Height	Number of Door Channels	Number of Seats[1]	Maximum Capacity[2]
40 ft	96-102 in.	13-36 in.	2-5	35-44	50-60
45 ft	96-102 in.	13-36 in.	2-5	35-52	60-70
60 ft	96-102 in.	13-36 in.	4-7	31-65	80-90
80 ft	96-102 in.	13-36 in.	7-9	40-70	110-130

[1]Including seats in wheelchair tie-down areas

[2]Seats plus standing

Source: TCRP Report 90, *Bus Rapid Transit-Implementation Guidelines*

Service/Operation Plan

BRT service should be clear, direct, frequent, and rapid. Consequently, BRT routes, frequencies, and hours of service should complement running way types, locations of major activities, and available resources. Tables 3-7 and 3-8 note typical service frequencies and service spans for various BRT service types and running ways, respectively.

Table 3-7
Typical Service Frequencies

Service Type	Frequency (Minutes) (Per Route)			
	Rush Hours	Midday	Evening	Sat-Sun
All-Stop (Base Service)	5-8	8-12	12-15	12-15
Express	8-12	10-15	-	-
Feeder	5-15	10-20	10-30	10-30
Commuter Express	10-20	-	-	-
Connecting Bus Routes	5-15	5-20	10-30	10-30

Source: TCRP Report 90, *Bus Rapid Transit-Implementation Guidelines*

Bus Preferential Treatments

Bus preferential treatments give buses priority over other vehicles whenever they arrive at an intersection. Treatments include queue bypass lanes, queue jump operations, and transit signal priority (TSP). The intent of bus preferential treatments at intersections is to reduce bus travel time and improve schedule adherence by reducing bus delay at congested intersections. Generally, bus delays at traffic signals account for 10 to 20 percent of overall bus travel times and 50 percent or more of all delays. Therefore, implementing intersection improvements that expedite BRT can improve bus speeds and reliability.

Table 3-8
Service Types and Span

Principal Running Way	Service Pattern	Service		
		Weekdays	Saturday	Sunday
Arterial Streets				
Mixed Traffic Bus Lanes	All Stop	All Day	All Day	All Day
Median Busways (No Passing)	Connecting Bus Routes	All Day	All Day	All Day
Freeways				
Mixed Traffic	Non-Stop With Local District	All Day	All Day	-
Bus/HOV Lanes	Commuter Express	Peak Hours	-	-
Busways				
Dedicated Busways	All Stop	All Day	All Day	All Day
	Express	Day Time OR Peak Hours[1]	-	-
	Feeder Service	Day Time All Day OR Off-Peak Hours	Day Time	Day Time
	Connecting Bus Routes	All Day	All Day	All Day

Notes:
All Day - typically 18 to 24 hours
Daytime - typically 7 a.m. to 7 p.m.
Peak Hours - typically 6:30 to 9 a.m. and 4 to 6 p.m.
[1]Feeder Service in off-peak and express service in peak
Source: TCRP Report 90, *Bus Rapid Transit-Implementation Guidelines*

Identity/Image ("Branding")

Creation of a unified system image and identity is very important in order to emphasize and market the unique features of the BRT service and, thus, attract more ridership. The general image associated with BRT should underline its unique attributes of speed, reliability, and identity. Examples of systems that have developed a distinct BRT identity include Metro Rapid in Los Angeles, California, and the Silver Line in Boston, Massachusetts. Distinctive logos, color combinations, and other graphic standards should be established for use on vehicles, at stations, and on printed materials.

BRT ELEMENTS FOR ALTERNATIVE SCENARIO DEVELOPMENT

BRT elements for alternative scenario development were identified from the group of elements described previously based on each element's ability to provide comparatively distinctive features. Several of the described elements reflect system-wide BRT features that are not conducive to the development of an objective comparative analysis between study corridors. Those elements that are considered system-wide features and cannot be scaled to provide distinguishing corridor-to-corridor characteristics include:

- Branding;
- Vehicle Design; and
- Fare Collection Systems.

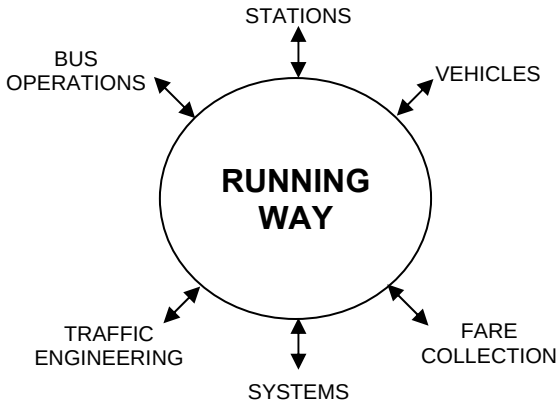
The remaining BRT elements provide a wide range of implementation options with which a comparative evaluation framework can be developed. As such, the development of alternative scenarios is based on varying features and characteristics for the following BRT elements:

- Running Ways;
- Stations;
- Bus Preferential Treatments; and
- Service/Operation Plans.

More specifically, running ways play a central role in all BRT systems. Many planning and design issues associated with BRT implementation are determined based on the type of running way to be used for the service (see Figure 3-1). As such, development of BRT alternative scenarios for the study corridors hinges on the types of running way to be implemented within those corridors.

To determine appropriate alternative scenarios, running ways have been grouped into two major categories: mixed traffic operations and dedicated running ways. Because of the central role characterized by BRT running ways, these two categories allow for the development of a number of differing BRT element features within each alternative.

Figure 3-1
The Central Role of Running Ways



Source: TCRP Report 90, *Bus Rapid Transit-Implementation Guidelines*

Additionally, a preliminary assessment of right-of-way availability and development patterns within the study corridors indicates that exclusive running ways may not be feasible along the full length of each of the corridors. For example, as Palm Beach Boulevard, Martin Luther King, Jr. Boulevard, and US 41 approach the Downtown Fort Myers area, medium-density commercial development and limited right-of-way availability are apparent. For this reason, further refinement of the alternatives based on running way types has been completed and applied to each corridor for comparative evaluation purposes. Alternative scenarios for each corridor include the following:

- ***Mixed Traffic BRT Operations*** - The mixed traffic scenario assumes that the BRT service does not operate along a designated running way, but on the right lane of current road right-of-way with other vehicle traffic. This scenario minimizes the capital cost to acquire the additional right-of-way that would be otherwise needed for the exclusive running way, but also reduces travel time savings due to the mixed traffic operation.

- ***Combination Exclusive Running Way and Mixed Traffic BRT Operations*** - This scenario assumes that the BRT service will operate on exclusive running ways, as long as roadway conditions permit, and in mixed traffic wherever exclusive running ways cannot be accommodated and/or justified.

The following discussion of BRT alternative scenarios details the varying features of each of the four BRT elements for each scenario by corridor to be evaluated and compared as part of this BRT corridor assessment and prioritization process.

BRT CORRIDOR ALTERNATIVE SCENARIOS

The following discussion of BRT alternative scenarios details the selection and application of BRT elements and features to each of the alternative corridors. Each element selected for BRT alternative scenario development is identified and the criteria utilized to determine the scale and application of each BRT feature are noted. In addition, a map series, Maps 3-8 through 3-11, is included in this section to illustrate each alternative and its distinguishing BRT features and characteristics.

Running Ways

Running way types were determined utilizing two criteria: 2005 peak-hour both-direction roadway level of service and right-of-way availability. Segments of roadway operating at a level of service (LOS) D or worse were determined to be eligible for the application of exclusive running ways. Proposed exclusive running ways will consist primarily of concurrent flow curb bus lanes located on the outside of roadway travel lanes. Based on FDOT's *Functional Classification of Bus Rapid Transit* (2003), the preferred right-of-way

width for such a facility is 140 feet. A detailed breakdown of components and minimum widths is presented in Table 3-9.

Table 3-9
Right-of-Way Components

Description	Dimension (feet)	
	Preferred	Constrained
	4L*	4L*
BRT/BUS lane	12	12
Travel lane*	12	11
Sidewalk	6	6
Planting strip	6	0
Curb and gutter	2	2
Bike lane	5	4
Median	30	22
Total right-of-way width	140	114

* 4L = Four general traffic lanes

In applying the LOS criteria, it is important to note that three of the analysis corridors have segments of roadway that operate at LOS D or worse (US 41, MLK, and Colonial/Veterans) and one corridor operates at LOS C or better (Palm Beach Boulevard) along the full extent of the corridor. As a result, running way extents for the Combination Exclusive Running Way and Mixed Traffic BRT Operations alternative for each corridor were determined by using right-of-way availability data collected during the field review. By combining roadway geometries, visible right-of-way constraints, and 2005 peak-hour, both-direction, roadway level-of-service, corridor alternatives were developed that provide enough running way distinction to conduct a reasonable comparative analysis between alternatives.

Stations

Station locations for each alternative corridor were identified based on the field review identification of transit trip attractors and generators. In addition, station spacing was applied consistent with guidelines provided in FTA's *TCRP Report 90, Bus Rapid Transit-Implementation Guidelines.* To emphasize the premium service offered by BRT, enhanced stations were identified as the preferred station type at each station location. Enhanced stations differ from simple local bus stops in terms of design, BRT branding, and amenities such as more weather protection and lighting. Detailed ridecheck data collection should be performed to refine the selection and need of various BRT station types as implementation of the BRT service proceeds.

Bus Preferential Treatments

Bus preferential treatments for the alternative corridor scenarios consist of two types: transit signal priority (TSP) and combined queue jump and TSP opportunities. Candidate intersections for TSP treatments were selected based on the approaching segment's volume-to-capacity ratio (v/c). Generally, an intersection v/c between 0.85 and 1.0 is utilized to identify TSP candidates. Because data to determine the v/c ratio for all intersections along each of the alternative corridors were not available at the time of this study, the peak-hour, peak direction v/c ratio was utilized to select TSP candidates. Candidate intersections for combined queue jump and TSP treatments were selected based on two criteria: v/c between 0.85 and 1.00 and the presence or opportunity for continuous right-hand turn lanes.

Mainline TSP treatments consisting of red truncation and green extension signal timing modifications and interruptions have been proposed for candidate intersections along segments of the BRT service proposed to operate on exclusive running ways. Combined queue jump and TSP treatments have been proposed for candidate intersections along segments of the BRT service operating in mixed traffic environments. Although mainline TSP can also be applied to mixed traffic operations, its effectiveness can be hampered in highly congested areas. As such, queue jump operations are the preferred TSP treatment for mixed traffic segments of the proposed corridors.

The assessment of candidate TSP and queue jump intersections revealed that two of the four alternative corridors, Palm Beach Boulevard and Martin Luther King, Jr. Boulevard, do not contain intersections that have qualifying v/c ratios. In addition, the two other analysis corridors, US 41 and Colonial Boulevard, contain two and three qualifying intersections, respectively. In order to distinguish the BRT service from traditional express service and in order to maintain its rapid transportation characteristics, it is recommended that some level of signal priority be considered at all intersections once the BRT service is in operation. This can include mainline TSP, conditional TSP, or combined TSP and queue jump operations. Future engineering phases associated with the implementation of the BRT service should incorporate intersection v/c and intersection LOS in order to more appropriately determine TSP candidates and treatments. For the purposes of this feasibility analysis, those intersections that qualify for bus preferential treatments based on the given criteria will be included in the alternatives evaluation and prioritization.

Service/Operations Plans

Service plans for the BRT alternative corridors are distinguished based on running way type. BRT service operating on exclusive running ways is proposed to run at shorter headways during peak hours of service. The service span for the BRT service has been proposed to include all-day weekday service from 6:30 AM to 7:00 PM.

In addition to the BRT service span, it is proposed that peak hour express bus service be provided as a feeder line service to the proposed BRT service lines. Express bus service would support transit demand in areas not included as part of the adjusted corridors but that were included in the original corridor extents. These areas include:

- US 41 – San Carlos Boulevard to Gladiolus Drive
- Palm Beach Boulevard – Buckingham Road to I-75
- Martin Luther King, Jr. Boulevard – Lehigh Acres to Michigan Avenue
- Colonial Boulevard – Lehigh Acres to Metro Parkway and Chiquita Boulevard to McGregor Boulevard

US 41 Corridor Alternatives

Corridor alternatives for the US 41 corridor are summarized in Table 3-10. In addition, bus preferential treatment and station opportunity details are provided in Tables 3-11 and 3-12, respectively.

Table 3-10
US 41 Bus Rapid Transit Alternatives

BRT Element	Alternative U1: Mixed Traffic Operations	Alternative U2: Combination Exclusive Running Way & Mixed Traffic Operations
Running Ways	The full extent of the service corridor will operate under a mixed traffic operation.	Exclusive running ways are proposed from Gladiolus Drive to Edison Mall. Mixed traffic operations are proposed from Edison Mall to Downtown Fort Myers.
Service Characteristics	Service Span: All Day Monday through Friday (6:30 AM to 7:00 PM) Service Frequencies: Peak: 10 Minutes Off-Peak: 15 Minutes	Service Span: All Day Monday through Friday (6:30 AM to 7:00 PM) Service Frequencies: Peak: 8 Minutes Off-Peak: 15 Minutes
Bus Preferential Treatments*	Queue Jump/TSP 2	Queue Jump/TSP 0 Transit Signal Priority 2
Stations**	Enhanced 26 (two directions)	Enhanced 26 (two directions)
Other Service	Peak-Hour Express Service	Peak-Hour Express Service

*Bus preferential treatment locations for both US 41 alternatives are noted in Table 3-11

**Station locations for both US 41 alternatives are noted in Table 3-12

See Table 3-8 for peak and off-peak hours of service

Table 3-11
US-41 Queue Jump and Transit Signal Priority Opportunities

Intersections	V/C Ratio	Right Turn Lane Availability	Queue Jump/TSP Opportunity	TSP Opportunity
Daniels Rd @ US 41	0.66	Yes (Continuous)	NA**	NA**
College Pkwy @ US 41	0.82	Yes (Continuous)	NA**	NA**
South Rd @ US 41	0.93	Yes (Continuous)	U1	U2
Fowler St @ US 41	0.85	Yes (Continuous)	U1	U2
N Airport Rd @ US 41	0.62	Yes (Continuous)	NA**	NA**
Colonial Blvd @ US 41	0.67	Yes	NA**	NA**
Winkler Ave @ US 41	0.75	Yes	NA**	NA**
Hanson Ave @ US 41	0.58	Yes	NA**	NA**
MLK Blvd @ US 41	0.68	Yes	NA**	NA**

**Queue Jump/TSP or TSP not applicable due to unqualified v/c ratio

U1 or U2 indicates which alternative is applicable to the corresponding Bus Preferential Treatments

Table 3-12
US 41 Station Opportunities

Station #	Station Locations	Distance from Previous Station (miles)	Major Attractors
1	Gladiolus Dr @ US 41	0.00	Home Depot/Shopping Center
2	0.08 miles south of Daniels Pkwy @ US 41	1.28	Target Stores/CVS Pharmacy/Beall's Dept Store
3	0.1 miles north of Woodland Blvd @US 41	0.90	Walgreen's Drug Store
4	Oak Dr. @ US 41	0.99	Eastern Foods/Little India
5	0.49 miles south of N. Airport Rd @ US 41	0.96	Colonial Bank/Best Buy
6	0.08 miles north of Colonial Blvd @ US 41	0.82	Edison Mall/Albertson's Food & Drug
7	Jefferson Ave @ US 41	0.62	K-mart Store
8	Maravilla Dr @ US 41	0.65	Publix Supermarket
9	Stella St @ US 41	0.82	Lee Memorial Hospital
10	Edison Ave @ US 41	0.28	Holiday Inn Historic District/CVS Pharmacy
11	Victoria Ave @ US 41	0.30	International Grocery
12	Monroe St @ Main Street	0.45	County Administration Building
13	Jackson St @ Union St	0.38	Rosa Parks Transportation Center
	Average distance between stations	0.65	

Palm Beach Boulevard Corridor Alternatives

Corridor alternatives for the Palm Beach Boulevard corridor are summarized in Table 3-13. In addition, bus preferential treatment and station opportunity details are provided in Tables 3-14 and 3-15, respectively.

Table 3-13
Palm Beach Boulevard Bus Rapid Transit Alternatives

BRT Element	Alternative P1: Mixed Traffic Operations	Alternative P2: Combination Exclusive Running Way & Mixed Traffic Operations
Running Ways	The full extent of the service corridor will operate under a mixed traffic operation.	Exclusive running ways are proposed from Kingston Drive to Seaboard Street. Mixed traffic operations are proposed from Seaboard Street into Downtown Fort Myers.
Service Characteristics	Service Span: All Day Monday through Friday (6:30 AM to 7:00 PM) Service Frequencies: Peak: 10 Minutes Off-Peak: 15 Minutes	Service Span: All Day Monday through Friday (6:30 AM to 7:00 PM) Service Frequencies: Peak: 8 Minutes Off-Peak: 15 Minutes
Bus Preferential* Treatments	Queue Jump /TSP 0	Queue Jump/TSP 0 Transit Signal Priority 0
Stations**	Enhanced 20 (two directions)	Enhanced 20 (two directions)
Other Service	Peak-Hour Express Service	Peak-Hour Express Service

*Bus preferential treatment locations for both Palm Beach Boulevard alternatives are noted in Table 3-14

**Station locations for both Palm Beach Boulevard alternatives are noted in Table 3-15

See Table 3-8 for peak and off-peak hours of service

Table 3-14
Palm Beach Boulevard Queue Jump and Transit Signal Priority Opportunities

Intersections	V/C Ratio	Right Turn Lane Availability	Queue Jump/TSP Opportunities	TSP Opportunities
Monroe St @ PB Blvd	0.24	One-way	NA**	NA**
Broadway @ PB Blvd	0.24	One-way	NA**	NA**
Hendry St @ PB Blvd	0.24	One-way	NA**	NA**
Jackson St @ PB Blvd	0.24	One-way	NA**	NA**
Lee St @ PB Blvd	0.24	One-way	NA**	NA**
Fowler St @ PB Blvd	0.24	One-way	NA**	NA**
Park Ave @ PB Blvd	0.24	One-way	NA**	NA**
Oritz Ave @ PB Blvd	0.78	One-way	NA**	NA**
Monroe St @ 2nd St	NA*	No	NA**	NA**
Broadway @ 2nd St	NA*	No	NA**	NA**
Hendry St @ 2nd St	NA*	No	NA**	NA**
Jackson St @ 2nd St	NA*	No	NA**	NA**
Lee St @ 2nd St	NA*	No	NA**	NA**
Fowler St @ 2nd St	NA*	No	NA**	NA**

* V/C not available due to no traffic counters for these segments because of current construction in downtown

**Queue Jump/TSP or TSP not applicable due to unqualified v/c ratio or unavailable v/c data

Table 3-15
Palm Beach Boulevard Station Opportunities

Station #	Station Locations	Distance from Previous Station (miles)	Major Attractors
	Stations along Palm Beach Blvd		
1	Kingston Dr @ Palm Beach Blvd	0.00	Publix Super Market/Beall's Dept Store
2	Pine St @ Palm Beach Blvd	1.80	Walgreen's Drug Store
3	Veronica Shoemaker Ave @ Palm Beach Blvd	0.76	Restaurants/Food Center
4	Seaboard St @ Palm Beach Blvd	0.83	Recreation/Restaurants
5	Royal Palm Ave @ 1st St	0.40	Downtown Area
6	Fowler St @ 1st St	0.64	Downtown Area
7	Monroe St @ 1st St	0.40	Downtown Area
	Stations along Seaboard St and 2nd St		
4	Seaboard St @ Palm Beach Blvd	0.00	
8	Evans Ave @ 2nd St	0.83	Medium Density Residential
9	Royal Palm Ave @ 2nd St	0.38	Downtown Area
10	Monroe St @ 2nd St	0.33	Downtown Area
	Average distance between stations	0.64	

Martin Luther King, Jr. Boulevard Corridor Alternatives

Corridor alternatives for the Martin Luther King, Jr. Boulevard corridor are summarized in Table 3-16. In addition, bus preferential treatment and station opportunity details are provided in Tables 3-17 and 3-18, respectively.

Table 3-16
Martin Luther King, Jr. Boulevard Bus Rapid Transit Alternatives

BRT Element	Alternative M1: Mixed Traffic Operations	Alternative M2: Combination Exclusive Running Way & Mixed Traffic Operations
Running Ways	The full extent of the service corridor will operate under a mixed-traffic operation.	Exclusive running ways are proposed from Michigan Avenue to Lee Street. Mixed traffic operations are proposed from Lee Street to Downtown Fort Myers.
Service Characteristics	Service Span: All Day Monday through Friday (6:30 AM to 7:00 PM) Service Frequencies: Peak: 10 Minutes Off-Peak: 15 Minutes	Service Span: All Day Monday through Friday (6:30 AM to 7:00 PM) Service Frequencies: Peak: 8 Minutes Off-Peak: 15 Minutes
Bus Preferential* Treatments	Queue Jump/TSP 0	Queue Jump/TSP 0 Transit Signal Priority 0
Stations**	Enhanced 12 (two directions)	Enhanced 12 (two directions)
Other Service	Peak-Hour Express Service	Peak-Hour Express Service

*Bus preferential treatment locations for both MLK alternatives are noted in Table 3-17

**Station locations for both MLK alternatives are noted in Table 3-18

See Table 3-8 for peak and off-peak hours of service

Table 3-17
Martin Luther King, Jr. Boulevard Queue Jump and Transit Signal Priority Opportunities

Intersections	V/C Ratio	Right Turn Lane Availability	Queue Jump/TSP Opportunities	TSP Opportunities
Broadway St @ MLK Blvd	NA*	No	NA**	NA**
Hendry St @ MLK Blvd	NA*	No	NA**	NA**
Jackson St @ MLK Blvd	NA*	No	NA**	NA**
Lee St @ MLK Blvd	NA*	No	NA**	NA**
Fowler St @ MLK Blvd	NA*	Yes	NA**	NA**
Evans Ave @ MLK Blvd	0.76	Yes	NA**	NA**
Michigan Ave @ MLK Blvd	0.63	Yes	NA**	NA**

* V/C not available due to no traffic counters for these segments because of current construction in downtown

**Queue Jump/TSP or TSP not applicable due to unqualified v/c ratio or unavailable v/c data

Table 3-18
Martin Luther King, Jr. Boulevard Station Opportunities

Station #	Station Locations	Distance from Previous Station (miles)	Major Attractors
1	Michgan Ave @ MLK Blvd	0.00	Carousel Markets
2	Starness Ave @ MLK Blvd	1.10	Family Dollar Store
3	Evans Ave @ MLK Blvd	1.11	Restaurants
4	Lee St @ MLK Blvd	0.30	Downtown Area
5	Broadway Ave @ MLK Blvd	0.21	Downtown Area
6	Jackson St @ Union St	0.22	Rosa Parks
	Average distance between stations	0.49	

Colonial Boulevard Corridor Alternatives

Corridor alternatives for the Colonial Boulevard corridor are summarized in Table 3-19. In addition, bus preferential treatment and station opportunity details are provided in Tables 3-20 and 3-21, respectively.

Table 3-19
Colonial Boulevard Bus Rapid Transit Alternatives

BRT Element	Alternative C1: Mixed Traffic Operations	Alternative C2: Combination Exclusive Running Way & Mixed Traffic Operations
Running Ways	The full extent of the service corridor will operate under a mixed traffic operation.	Exclusive running ways are proposed from Metro Parkway to US 41 @ Edison Mall. Mixed traffic operations are proposed from US 41 @ Edison Mall to McGregor Boulevard.
Service Characteristics	Service Span: All Day Monday through Friday (6:30 AM to 7:00 PM) Service Frequencies: Peak: 10 Minutes Off-Peak: 15 Minutes	Service Span: All Day Monday through Friday (6:30 AM to 7:00 PM) Service Frequencies: Peak: 8 Minutes Off-Peak: 15 Minutes
Bus Preferential* Treatments	Queue Jump/TSP 3	Queue Jump/TSP 1 Transit Signal Priority 2
Stations**	Enhanced 10 (two directions)	Enhanced 10 (two directions)
Other Service	Peak-Hour Express Service	Peak-Hour Express Service

*Bus preferential treatment locations for both Colonial Boulevard alternatives are noted in Table 3-20

**Station locations for both Colonial Boulevard alternatives are noted in Table 3-21

See Table 3-8 for peak and off-peak hours of service

Table 3-20
Colonial Boulevard Queue Jump and Transit Signal Priority Opportunities

Intersections	V/C Ratio	Right Turn Lane Availability	Queue Jump/TSP Opportunities	TSP Opportunities
Summerlin Rd @ Colonial Blvd	1.03	Yes (Continuous)	C1 and C2	C2
US 41 @ Colonial Blvd	0.98	Yes (Continuous)	C1	C2
Fowler St @ Colonial Blvd	0.91	Yes (Continuous)	C1	C2

C1 or/and C2 means which alternative(s) are applicable to the corresponding Bus Preferential Treatments

Table 3-21
Colonial Boulevard Station Opportunities

Station #	Station Locations	Distance from Previous Station (mile)	Major Attractors
1	McGregor Blvd @ Colonial Blvd	0.00	Medium Density Residential
2	0.02 miles west of Summerlin Rd @ Colonial Blvd	0.40	Walgreen's Drug Store
3	0.09 miles east of US 41 @ Colonial Blvd (Serve as transfer station connecting US 41 BRT corridor)	0.80	Edison Mall/Albertson's Food & Drug
4	0.06 miles west of Fowler St @ Colonial Blvd	0.40	General Commercial
5	0.06 miles west of Metro Parkway @ Colonial Blvd	0.77	Car lots/7-Eleven Food Store
	Average distance between stations	0.59	

Alternative U1: Mixed Traffic Operations

Alternative U2: Combination Exclusive Running Way and Mixed Traffic Operations

Downtown Fort Myers

Downtown Fort Myers

1 0.5 0 1 Miles

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BRT Feasibility Study

Candidate Signal Priority Intersections

BRT Station Locations

Express Service

Running Way Type

- Exclusive Running Way
- Mixed Traffic Running Way

LeeTran Administration Facility

Park-and-Ride Lot

Airport

Major Transfer Center

Lee ADA Facility

- Signalized Intersections
- Bus Route
- Road

Map 3-8

US 41 BRT Corridor Alternatives

Created: 11.13.06

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BRT Feasibility Study

BRT Station Locations

ExpressService

Running Way Type

- Exclusive Running Way
- Mixed Traffic Running Way

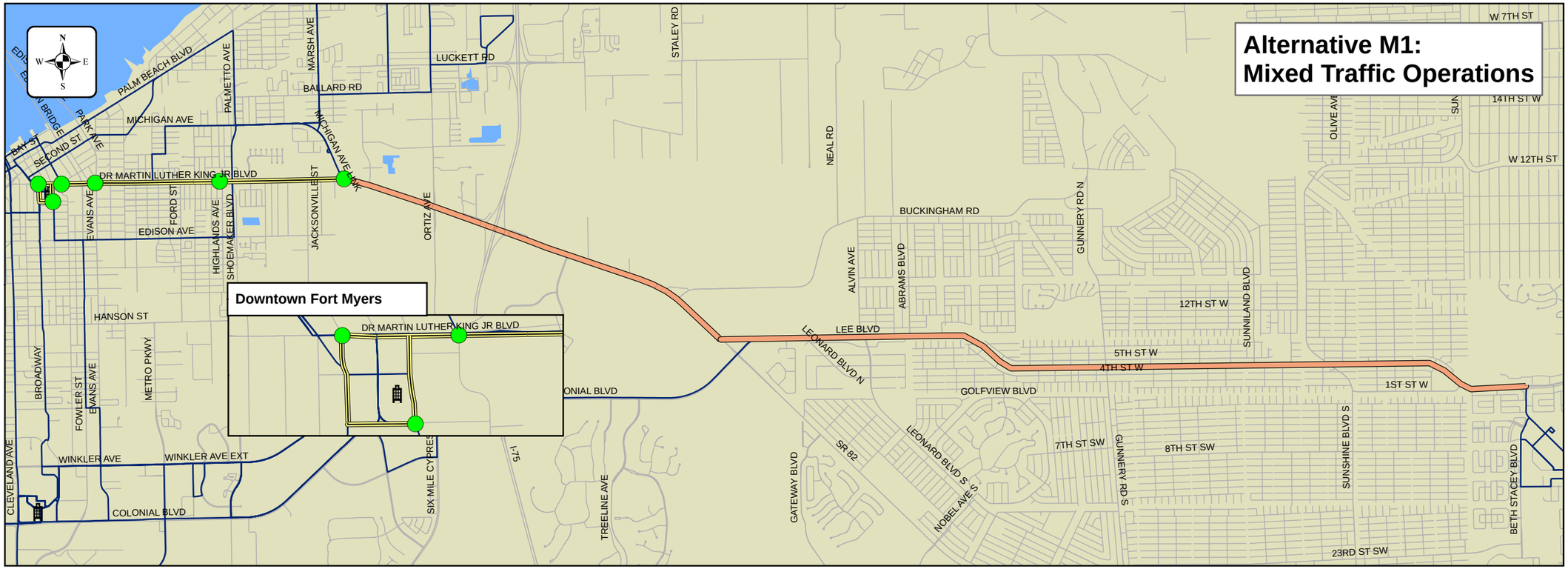
Major Transfer Center

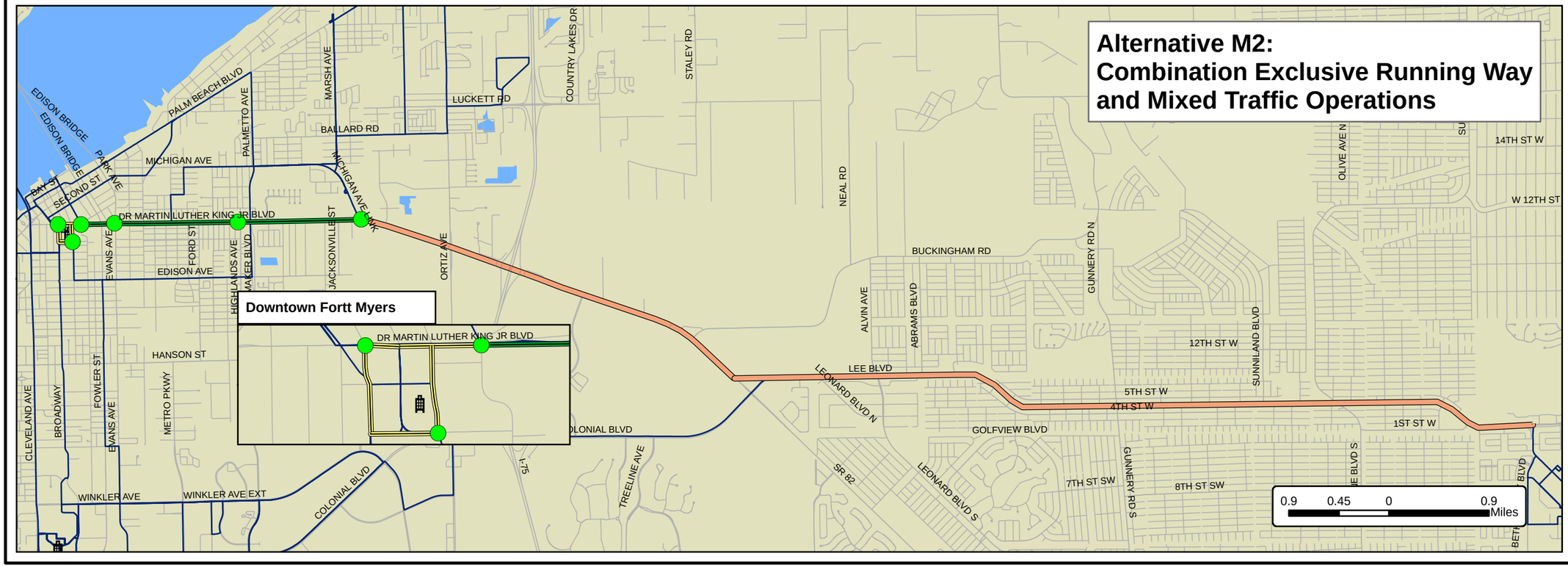
- Bus Route
- Road

Map 3-9

Palm Beach Boulevard
BRT Corridor
Alternatives

Created: 11.13.06





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BRT Feasibility Study

BRT Station Locations

Express Service

Running Way Type

- Exclusive Running Way
- Mixed Traffic Running Way

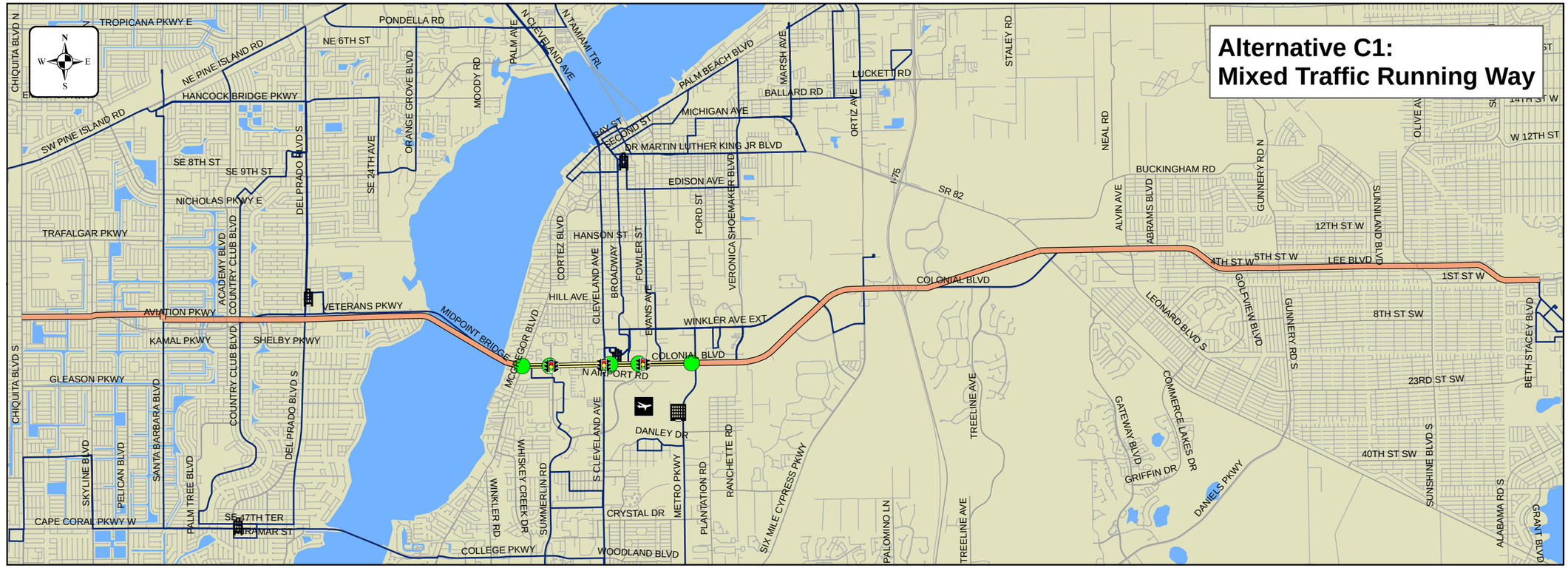
Major Transfer Center

- Bus Route
- Road

Map 3-10

MLK Jr. Boulevard
BRT Corridor
Alternatives

Created: 11.13.06



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BRT Feasibility Study

Candidate Signal Priority Intersections

BRT Station Locations

Express Service

Running Way Type

- Exclusive Running Way
- Mixed Traffic Running Way

LeeTran Administration Facility

Airport

Park-and-Ride Lot

Major Transfer Center

Lee ADA Facility

- Bus Route
- Road

Map 3-11

Colonial Boulevard BRT Corridor Alternatives

Created: 11.13.06

Section 4
CORRIDOR ALTERNATIVES EVALUATION FRAMEWORK

An evaluation framework was developed to assist in prioritizing between the BRT alternative corridor scenarios outlined in Section 3 of this report. The evaluation framework has been designed to meet several major objectives. The major objectives include:

- distinction between alternative corridor scenarios that will provide the best travel time improvements;
- identification of alternatives that will provide the best increases in ridership;
- identification of alternatives that will improve accessibility to transit and other services in the county;
- identification of corridor alternatives that maximize the opportunities for the efficient operation of BRT service; and
- identification of alternative corridor scenarios that will be most cost-effective.

This section details the evaluation approach, describes each of the selected criteria proposed to be applied as part of the corridor alternatives evaluation framework, and notes the weighting and scoring process to be used in ranking and prioritizing between the BRT corridor alternative scenarios.

EVALUATION APPROACH & CRITERIA

The methodology for prioritizing between the corridor alternatives is a multi-criteria analysis. The criteria selected are comprehensive, non-redundant, and mutually-exclusive to the greatest extent possible. The criteria also have been designed to be quantifiable or classifiable in order to score individual corridors. In addition, each criterion is given a weight (high of 3 to low of 1) to reflect the comparative importance of carrying out the objectives of the analysis as identified above.

Evaluation Approach

Table 4-1 is an evaluation matrix developed to guide the evaluation of the BRT corridor alternatives. Included in the matrix are the criteria and specific measures that address the noted objectives. Weights are assigned to each criterion to determine the relevance of each. In the table, capital and operating costs are scored separately from the other criteria. By excluding capital and operating costs from the other criteria, a comparison between corridor alternatives using corridor alternative operational and physical characteristics can be achieved. The weights designated in Table 4-1 are based on the professional judgment of the project team and on the input received from LeeTran staff.

Table 4-1
Evaluation Framework and Criteria

	Criterion	Measure	Weights	Score 1	Score 3	Score 5	Weighted Score
1	Ridership	Annual BRT ridership per mile	3	<25,328	25,328-38,821	>38,821	
2	Coordination with Roadway Improvement	Number of intersection improvements	1	<0.75	0.75-1.64	>1.64	
		Percent of total corridor with planned capacity improvements		<19.12%	19.12%-52.82%	>52.82%	
3	Right-of-Way Availability	Percent of proposed exclusive running way sections with adequate ROW	2	<50.0%	50.0%-87.0%	>87.0%	
4	Congestion Delay Improvement	Percent of corridor proposed for exclusive running way	2	<29.8%	29.8%-62.9%	>62.9%	
5	Intersection Delay Reduction	Percent of TSP/Queue jump candidate intersections per total signalized intersections	2	<31.0%	31.0%-75.0%	>75.0%	
6	Trip Generators & Attractors (GA)	Total number of current GA within 1/4-mile service area	3	<16.25	16.25-23.75	>23.75	
7	Connection with Existing LeeTran Transit Service	Total number of transfer opportunities with current transit system	2	<8.50	8.50-10.95	>10.95	
8	Traffic Congestion	Average Roadway Level of Service	1	<1.90	1.90-3.06	>3.06	
						Total	

	Criterion	Measure	Weights	1	3	5	Weighted Score
9	Estimated Capital Cost	Estimated cost of initial capital needs per mile	3	> $4,297,742	$4,297,742 - $2,332,319	< $2,332,319	
10	Estimated Operating Cost	Estimated annual cost of BRT operation per estimated BRT passenger trip	3	>10.28	$10.28-$6.95	<6.95	
						Combined Total	

Each corridor is evaluated according to each criterion using the threshold levels and corresponding scores (1, 3, and 5, which have been chosen to enhance the distinction among the corridor alternatives) as shown in Table 4-1. The composite score, or sum, is used to rank and prioritize the eight corridor alternatives.

It is important to note that during the analysis of each criterion, it was necessary to calibrate the threshold levels to reflect the conditions in the analysis corridor alternatives. As a result, the threshold levels for the criteria were indexed to a "high" (5), "medium" (3), or "low" (1) score based on the following scoring scheme:

- Corridors scoring greater than one standard deviation from the average threshold level received a **High (5)** score. This scoring scheme is reversed for the capital and operating costs criteria, which received a **Low (1)** score.
- Corridors better than the average threshold level but within one standard deviation received a **Medium (3)** score.
- Corridors scoring below the average threshold level received a **Low (1)** score. This scoring scheme is reversed for the capital and operating costs criteria, which received a **High (5)** score.

Evaluation Criteria Overview

As shown in Table 4-1, 10 criteria were developed to conduct the alternatives evaluation. The 10 criteria include:

- Ridership
- Coordination with Roadway Improvements
- Right-of-Way Availability
- Congestion Delay Improvement
- Intersection Delay Reduction
- Trip Generators & Attractors
- Connection with Existing LeeTran Transit Service
- Traffic Congestion
- Estimated Capital Cost
- Estimated Operating Cost

Significant to the evaluation was the development of criteria that would provide enough distinction ***between*** alternative corridors, and criteria that would provide enough distinction between alternatives ***within*** the same corridor. As such, the selection of criteria and the formulation of measures for each criterion were examined in detail so that the criteria remained comprehensive and mutually exclusive, met the noted major

evaluation objectives, and also provided enough distinction between and within analysis corridors and the alternatives.

All criteria were determined to provide a comparative analysis that distinguishes ***between*** the analysis corridors. Those criteria that address differences between alternatives ***within*** the same corridor include:

- Ridership
- Right-of-Way Availability
- Estimated Capital Cost
- Congestion Delay Improvement

Evaluation Methodology

A specific methodology was developed to estimate and assess each criterion. A detailed description of the methodology employed for each criterion is documented below.

Ridership

BRT ridership projections are based on a methodology adapted from the *Bus Rapid Transit Practitioner's Guide (2007)*. That methodology utilizes several adjustment factors and local bus boardings to estimate future BRT ridership.

Current annual ridership for each corridor alternative was obtained from FY 2006 route-by-route ridership data. In order to determine the number of existing LeeTran transit trips occurring along each of the analysis corridors, it was necessary to determine what proportion of each existing route currently operates within each corridor. It was assumed that the annual ridership per route was distributed equally across the length of each existing LeeTran route. Annual base ridership for the analysis corridors was then calculated by summing the ridership for all the segments of LeeTran transit routes that overlap the corresponding analysis corridor.

One of the major advantages of BRT systems over traditional all-stop local bus service is that BRT provides a host of premium service amenities, infrastructure, and technology. A modern and sophisticated BRT system draws more riders than traditional bus routes because of the integration of improved service and infrastructure characteristics. To account for new riders due to premium BRT characteristics, an attractiveness factor was calculated. The relative attractiveness of the proposed BRT system on each corridor alternative was estimated using service attractiveness factors noted in the *Bus Rapid Transit Practitioner's Guide (2007).* Table 4-2 includes a list of various BRT features

and notes an adjustment score for each. An attractiveness factor for each corridor alternative was calculated using the scores in that table consistent with various elements proposed for the BRT service.

In order to standardize the evaluation process for all the corridor alternatives, several assumptions were made:

1. BRT stations are assumed to consist of enhanced shelters for all corridor alternatives.

2. An all-day service span is assumed to apply to all the alternative scenarios for all the corridors. High-frequency service is applicable to the combination of exclusive running way and mixed-traffic scenario.

3. All the corridor alternatives have the same BRT branding application.

Based on the above assumptions, the BRT attractiveness factors were estimated by adding up all the applicable features for each corridor alternative scenario in Table 4-2. As indicated in that table, running way feature scoring is not additive. This is because running way facilities are mutually exclusive of each other. Other features within each BRT component type can be implemented concurrently and, as such, the score for each feature is summed to obtain a total attractiveness factor score for the corresponding BRT component. The last row of Table 4-2 summarizes the attractiveness factors for each of the corridor alternatives.

In addition to the attractiveness factor, a headway regularity adjustment factor was utilized to address the benefits of providing consistent headways generally associated with premium BRT service. Providing consistent on-time service tends to attract more passengers than a service with long waits and/or unreliable schedules. Based on *the Transit Capacity and Quality of Service Manual (2003)*, improvements in headway regularity due to the implementation of the new service were assumed to increase the existing ridership by 10 percent, reflecting a combination of new riders and existing riders using the service more.

The attractiveness factor noted in Table 4-2 for each corridor alternative was then multiplied by the annual base ridership for each analysis corridor to obtain the net ridership gains in Table 4-3. The sum of original current ridership and net ridership gains was further refined by applying the headway regularity adjustment to obtain the final estimated BRT ridership. The final BRT ridership estimate was then normalized by corridor length to obtain the final BRT ridership per route mile for each corridor alternative.

Table 4-2
BRT Attractiveness Factor Estimation

	Component	Percent	US 41 Corridor		Colonial Corridor		MLK Corridor		Palm Beach Corridor	
			U1	U2	C1	C2	M1	M2	P1	P2
1	**Running ways (not additive)***	20								
	Grade separated busways	(20)								
	At-grade busways	(15)								
	Median arterial busways	(10)								
	All-day bus lanes	(5)		◆		◆		◆		◆
	Rush hour bus lanes	--								
	Mixed traffic	--	◆		◆		◆		◆	
2	**Stations (additive)**	15								
	Conventional shelter	--								
	Unique/attractively designed shelter	2	◆	◆	◆	◆	◆	◆	◆	◆
	Illumination	2								
	Telephones/security phones	3								
	Climate controlled waiting area	3								
	Passenger amenities	3								
	Passenger services	2								
3	**Vehicles (additive)**	15								
	Conventional vehicles	--	◆	◆	◆	◆	◆	◆	◆	◆
	Uniquely designed vehicles	5								
	Air conditioning	--								
	Wide multi-door configuration	5								
	Level boarding	5								
4	**Service patterns (additive)**	15								
	All day service span	4	◆	◆	◆	◆	◆	◆	◆	◆
	High-frequency service	4		◆		◆		◆		◆
	Clear, simple, service span	4								
	Off-vehicle fare collection	3								
5	**ITS applications (additive)**	10								
	Passenger information at stops	7								
	Passenger information on vehicles	3								
6	**BRT branding (additive)**	10								
	Vehicles & stations	7	◆	◆	◆	◆	◆	◆	◆	◆
	Brochures/schedules	3	◆	◆	◆	◆	◆	◆	◆	◆
	Subtotal (Maximum of 85)	85	16	25	16	25	16	25	16	25
7	**Synergy (for scores >60 points)**	15								
	Total	100	21	30	21	30	21	30	21	30
Attractiveness Factor (0.25 x Total)			5%	7.5%	5%	7.5%	5%	7.5%	5%	7.5%

Source: *Bus Rapid Transit Practitioner's Guide, 2007*

*Running way types are mutually exclusive. Consequently, scoring is not additive.

Table 4-3
BRT Ridership Estimate for Each Corridor by Alternative Scenarios

		US 41 Corridor		Palm Beach Blvd Corridor		MLK Blvd Corridor		Colonial Blvd Corridor	
		U1	U2	P1	P2	M1	M2	C1	C2
A	Total Attractiveness Adjustment Factor	5%	7.50%	5%	7.50%	5%	7.50%	5%	7.50%
B	Current Annual Ridership	339,240	339,240	86,631	86,631	77,684	77,684	27,056	27,056
C	Estimated Net Ridership Gains (B*A)	17,810	25,443	4,548	6,497	4,078	5,826	1,420	2,029
D	Estimated Annual Ridership (C+B)	357,050	364,683	91,179	93,128	81,762	83,510	28,477	29,086
E	Headway Regularity Adjustment Factor	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
F	Final BRT Ridership (E*D+D)	392,755	401,151	100,297	102,441	89,939	91,861	31,325	31,994
G	Corridor Length (miles)	8.93	8.93	6.64	6.64	3.15	3.15	2.48	2.48
H	BRT Ridership per Mile (F/G)	43,967	44,907	15,112	15,435	28,548	29,158	12,612	12,882
I	Score	5	5	1	1	3	3	1	1

Coordination with Future Roadway Capacity Improvements

Future roadway capacity improvements provide the opportunity to potentially leverage BRT development in conjunction with planned roadway improvements. The Lee County 2030 Long Range Transportation Plan and 2007/08-2011/12 Transportation Improvement Program were reviewed to identify different types of roadway improvements that can benefit future BRT development. For the analysis, two types of improvements were considered to offer benefits with regard to future BRT service development. The two improvements include intersection improvements and roadway capacity improvements. Weighting was assigned to the two improvement types in the following manner:

- Intersection Improvements – 1
- Roadway Capacity Improvements – 2

Composite weighted scores in Table 4-4 were obtained by summing the weighted scores for each improvement type for each corridor alternative. Table 4-4 presents the type of roadway improvements for each corridor, scores, weighted scores, and composite weighted scores.

Table 4-4

Roadway Improvement Analysis

	A	B	C	D	E	F	G	H	I
Alternative Scenarios	**Number of Intersection Improvement**	**Score**	**Weight**	**Weighted Score**	**Percent of Corridor with Roadway Capacity Improvement**	**Score**	**Weight**	**Weighted Score**	**Composite Weighted Score**
US 41 Corridor									
U1	2	5	1	5	2.80%	1	2	2	**7**
U2	2	5	1	5	2.80%	1	2	2	**7**
Palm Beach Blvd Corridor									
P1	0	1	1	1	0	1	2	2	**3**
P2	0	1	1	1	0	1	2	2	**3**
MLK Blvd Corridor									
M1	0	1	1	1	0	1	2	2	**3**
M2	0	1	1	1	0	1	2	2	**3**
Colonial Blvd Corridor									
C1	1	3	1	3	73.68%	5	2	10	**13**
C2	1	3	1	3	73.68%	5	2	10	**13**

Right-of-Way Availability

Right-of-way availability was determined using guidelines published in FDOT's *Functional Classification of Bus Rapid Transit* (2003). That report provides mid-block and intersection section design standards for various BRT running way facility types. Guidelines in that report indicate that a preferred 140-foot right-of-way is needed for a typical mid-block section of a BRT facility consisting of concurrent flow median or curb bus lanes, four additional lanes of vehicular travel, bike lanes, and a 30-foot median.

For this criterion, alternatives were treated differently based on whether exclusive running ways were being proposed. Mixed-traffic operations alternatives were assumed to have adequate right-of-way. Combination exclusive running way and mixed-traffic operations alternatives were assumed to need a right-of-way assessment only along portions of the alternatives on which BRT were proposed to operate in exclusive running ways. In order to determine adequate right-of-way availability along the portions of the alternative scenarios proposed for exclusive running way operations, parcel data available through the Lee County GIS website were obtained and reviewed. Estimated right-of-way availability was then measured along each segment of road within the corridors based on the widths of the right-of-way reflected in the parcel data. The lengths of those segments of road that met the 140-foot minimum width were then summed. That total was then divided by the total length of the corridor to calculate the proportion of the corridor with adequate right-of-way. Table 4-5 presents the percent of each corridor with adequate ROW and the scores.

Table 4-5
ROW Availability Analysis

	A	B
Alternative Scenarios	**Percent of Corridor With Adequate ROW**	**Score**
US 41 Corridor		
U1	100.00%	**3**
U2	95.20%	**3**
Palm Beach Blvd Corridor		
P1	100.00%	**3**
P2	6.29%	**1**
MLK Blvd Corridor		
M1	100.00%	**3**
M2	29.13%	**1**
Colonial Blvd Corridor		
C1	100.00%	**3**
C2	69.67%	**1**

Congestion Delay Improvement

Roadway congestion, delay at traffic signals, and station dwell time all contribute to bus travel delay. For analysis purposes, only delays due to traffic congestion and traffic signals at intersections were considered to evaluate travel time improvements for each corridor alternative.

The mixed-traffic operation alternative has little influence on the bus delays stemming from traffic congestion in that BRT must operate with concurrent-flow automobiles. However, the exclusive running way operation alternative can alleviate the impact of traffic congestion on BRT since it can operate without the disturbance of concurrent-flow automobiles. Therefore, traffic congestion delay improvements were measured by the portion of each corridor that is eligible for exclusive running way operation. It should be noted that mixed-traffic operation alternatives for each corridor receive equal treatment for this measure. Table 4-6 presents the proportion of each corridor alternative that is eligible for exclusive running way operation and the corresponding scores.

Table 4-6
Congestion Delay Improvement Analysis

	A	B
Alternative Scenarios	**Percent of Corridor with Exclusive Running Way**	**Score**
US 41 Corridor		
U1	0.00%	**1**
U2	53.29%	**3**
Palm Beach Blvd Corridor		
P1	0.00%	**1**
P2	52.35%	**3**
MLK Blvd Corridor		
M1	0.00%	**1**
M2	79.93%	**5**
Colonial Blvd Corridor		
C1	0.00%	**1**
C2	52.78%	**3**

Intersection Delay Reduction

Bus preferential treatments such as transit signal priority with queue jump opportunities can reduce bus travel delay at signalized intersections. Consequently, corridor alternatives can be compared based on the number of signalized intersections eligible for transit signal priority or intersections with opportunities for combined transit signal priority and queue jump lanes. The intersection delay reduction measure was quantified by the number of signalized intersections eligible for transit signal priority with queue jump or transit signal priority per total signalized intersections. Tables 3-11, 3-14, 3-17, and 3-20 presented in Section 3 indicate the intersections with transit signal priority-only opportunities and those with opportunities for combined transit signal priority and queue jump lanes for each corridor. Table 4-7 presents the number of signalized intersections eligible for transit signal priority with queue jump or transit signal priority applications, the total number of signalized intersections per corridor, and the score for each corridor.

Table 4-7
Intersection Delay Reduction Analysis

	A	B	C	D
Alternative Scenarios	**Number of Intersections Qualified for TSP/QJ or TSP**	**Total Number of Signalized Intersections**	**Percent of A per B**	**Score**
US 41 Corridor				
U1	2	32	6%	**1**
U2	2	32	6%	**1**
Palm Beach Blvd Corridor				
P1	0	21	0%	**1**
P2	0	21	0%	**1**
MLK Blvd Corridor				
M1	0	14	0%	**1**
M2	0	14	0%	**1**
Colonial Blvd Corridor				
C1	4	8	50%	**5**
C2	4	8	50%	**5**

Trip Generators & Attractors

BRT trip generators and attractors include major employment, commercial, and residential developments in the county. To obtain a comparative measure of trip generators and attractors for each corridor, the number of trip generators and attractors (GA) within a ¼-mile buffer of the service area along each corridor was counted. Trip generators and attractors for Lee County were obtained from the *Lee County 2030 Long Range Transit Element*. The number of trip generators and attractors for each corridor alternative is shown in Table 4-8, along with the scores for each corridor alternative.

Table 4-8
BRT Corridor Accessibility Analysis

	A	B
Alternative Scenarios	**Number of Generators & Attractors**	**Score**
US 41 Corridor		
U1	28	**5**
U2	28	**5**
Palm Beach Blvd Corridor		
P1	15	**1**
P2	15	**1**
MLK Blvd Corridor		
M1	10	**1**
M2	10	**1**
Colonial Blvd Corridor		
C1	12	**1**
C2	12	**1**

Transfer Opportunities with LeeTran Transit System

This criterion captures the BRT service's contribution to system-wide transit accessibility as measured by transfer opportunities with the current LeeTran transit system. Transfer opportunities represent the number of times an existing fixed-route LeeTran bus route intersects with or overlaps each alternative corridor. Table 4-9 notes the number of transfer opportunities for each corridor and the ranking value for this criterion.

Table 4-9
Transfer Opportunities Analysis

	A	B
Alternative Scenarios	**Number of Transfer Opportunities**	**Score**
US-41 Corridor		
U1	12	**5**
U2	12	**5**
Palm Beach Blvd Corridor		
P1	7	**1**
P2	7	**1**
MLK Blvd Corridor		
M1	9	**3**
M2	9	**3**
Colonial Blvd Corridor		
C1	6	**1**
C2	6	**1**

Traffic Congestion

The level of congestion was measured using 2005 peak-hour, both-direction, roadway level of service data obtained from Lee County. Those roadways that operate at a better roadway level of service were presumed to have more sufficient capacity to allow for the efficient operation and implementation of arterial-based BRT service on mixed flow or dedicated lanes along the corridor. In order to gauge the traffic conditions along the length of each corridor, an average corridor LOS score was developed for each corridor. Initially, a score was assigned to each segment LOS level as described below.

- LOS A – 5
- LOS B – 4
- LOS C – 3
- LOS D – 2

- LOS E – 1
- LOS F – 0

Each segment LOS score was multiplied by the proportion of the segment length to the corresponding total corridor length. The outputs of each segment were then summed to obtain the average corridor LOS score for each corridor. The final average corridor LOS scores for the corridors were compared with each other to determine which corridor has the lowest corridor LOS score. It should be noted that alternatives within the same corridor equally receive the same score regardless of BRT running way type. Since the LOS data are not available for the corridor segments in Downtown Fort Myers, as previously stated, the LOS score calculation is based on the available LOS information for each corridor. Table 4-10 presents the LOS score for each corridor and the score value.

Table 4-10
Level-of-Service Analysis

A	B	C
Alternative Scenarios	**Average Corridor LOS Score**	**Score**
US 41 Corridor		
U1	1.00	**1**
U2	1.00	**1**
Palm Beach Blvd Corridor		
P1	3.44	**5**
P2	3.44	**5**
MLK Blvd Corridor		
M1	2.40	**3**
M2	2.40	**3**
Colonial Blvd Corridor		
C1	0.75	**1**
C2	0.75	**1**

COST ESTIMATES

BRT costs addressed in this section include capital costs, such as running way construction, station construction, vehicles, bus preferential treatment applications, and operating costs for each corridor alternative. The methodologies for developing each of these costs are documented along with the applicable unit cost assumptions. The unit cost data are based on information obtained from the *Bus Rapid Transit Practitioner's Guide (2007)* and LeeTran staff.

Capital Cost

Running Way – Bus Lanes

Exclusive running way facilities for cost estimation purposes are assumed to be designated arterial lanes. Costs associated with the construction of arterial lanes range from $2.5 million to $2.9 million per lane mile. For this cost estimation effort, the unit cost was assumed to be $2.5 million per lane mile for running way construction.

Vehicles

Conventional standard bus vehicles with a unit cost of $525,000 were assumed for future BRT service in Lee County. The numbers of vehicles necessary to provide service was based on corridor lengths, peak headways, and assumed operating speeds identified for each corridor alternative. Peak headways identified in Section 3 are indicated in Table 4-11. According to TCRP Report 90 – *Bus Rapid Transit Volume 1: Case Studies in Bus Rapid Transit*, an average operating speed of 15 miles per hour for the mixed-traffic scenario and 20 miles per hour for the combination of mixed-traffic and exclusive running way scenario are used for each corridor. The number of BRT vehicles operating in maximum service for each corridor alternative is estimated in Table 4-11.

Table 4-11
Vehicle Cost Estimate for Each Corridor Alternative Scenario

	Corridor Length (Mi)	Operating Speed (MPH)*	Peak Headways (Min)	Number of Peak Vehicles (2-way)	Total Cost ($000s)
US 41 Corridor					
U1	8.9218	15	10	8	$4,200
U2	8.9218	20	8	7	$3,675
Palm Beach Corridor					
P1	7.5676	15	10	6	$3,150
P2	7.5676	20	8	5	$2,625
MLK/Lehigh Corridor					
M1	3.2277	15	10	3	$1,575
M2	3.2277	20	8	3	$1,575
Colonial/Veterans Corridor					
C1	2.4928	15	10	2	$1,050
C2	2.4928	20	8	2	$1,050

Note: Assumes that recovery time equals 10% of the total round-trip running time
*BRT operating speeds of 20 mph and 15 mph are assumed for Scenario 1 and 2, respectively *(TCRP Report 90 – Bus Rapid Transit Volume 1: Case Studies in Bus Rapid Transit)*

Stations

Station types for BRT include simple stations, enhanced stations, designated stations, and transfer/intermodel centers. The estimated unit cost for each of those station types is provided below.

- Simple Station

  This station type consists of a "basic" transit stop with a simple shelter to protect waiting passengers from the weather. It provides the lowest number of passenger amenities and costs $15,000 to $20,000 per station.

- Enhanced Station

  Enhanced BRT stations include enhanced shelters, which are often specially designed for BRT to differentiate it from other transit stations and to provide additional features such as weather protection and lighting. Costs range from $25,000 to $35,000 per station.

- Designated Station

This station type may include level passenger boarding and alighting, a grade separated connection from one platform to another, and a full range of passenger amenities including retail service and a complete array of passenger information. Typical single designated station cost ranges from $150,000 to $2.5 million.

- Transfer/Intermodel Center

The intermodal center is the most complex and costly of the BRT stations. This type of BRT facility often has level boarding, provides a host of amenities, and accommodates the transfers from BRT service to local bus and other public transit modes. The cost of a transfer or intermodal center ranges from $5 million to $20 million.

Enhanced stations with a unit cost of $25,000 were applied to all the corridor alternatives. Based on the number of stations identified in Section 3, station costs for each corridor alternative were estimated and are presented in Tables 4-13 to 4-16.

TSP/Queue Jump

The following unit costs were assumed for the implementation of bus preferential treatments (BPT) in the identified intersections for the US 41 corridor and Colonial/Veterans Boulevard corridor.

- Signal Priority (full implementation at one intersection) - $13,500
- Queue Jump/Bypass Lane/Signal Priority- $113,500

The BPT costs for each corridor were estimated based on the selection of bus preferential treatment technology at each intersection and the number of applicable intersections for each corridor. These costs are presented in Tables 4-13 through 4-16.

Right-of-Way Acquisition

The combination of exclusive running way and mixed-traffic scenario requires the acquisition of right-of-way for the exclusive running way portion of each corridor. The cost associated with the right-of-way acquisition is estimated based on the just value of each land use category obtained from the Lee County Property Appraiser's office. Table 4-12 presents a cursory estimate of right-of-way acquisition cost for the combination of exclusive running way and mixed-traffic scenario for each corridor.

Table 4-12

ROW Acquisition Cost Estimates for Each Corridor

Corridor	Land Use	Area (sq ft)	Just Value	Total
Colonial	Commercial	21,063	$291,066	
	Industrial	5,739	$111,881	
	Institutional	264	$6,243	
	Residential	391	$36	$409,226
MLK	Commercial	133,505	$1,074,209	
	Governmental	38,265	$646,286	
	Industrial	12,249	$99,289	
	Institutional	29,100	$323,460	
	Miscellaneous	1,176	$18,176	
	Residential	4,832	$29,345	
	Unknown	3,656	$0	$2,190,765
Palm Beach	Commercial	641,733	$7,383,916	
	Governmental	82,218	$495,379	
	Industrial	33,766	$393,309	
	Institutional	29,069	$379,916	
	Miscellaneous	9,926	$181,021	
	Residential	16,706	$168,748	$9,002,289
US 41	Commercial	27,270	$540,833	
	Governmental	888	$57	
	Miscellaneous	815	$0	$540,890

Table 4-13
Capital Cost Summary for US 41 Corridor Alternative Scenarios

		Station	TSP (per intersection)	TSP w/ Queue Jump (per intersection)	Right-of-Way Construction (per lane mile)	Right-of-Way Acquisition	Vehicle	Total Capital Cost
U1	Unit Cost	$25,000	$13,500	$113,500			$525,000	
	Number of Units	22	0	2			8	
	Total Cost	$550,000	$0	$227,000	NA	$0	$4,200,000	$4,977,000
U2	Unit Cost	$25,000	$13,500	$113,500	$2,500,000		$525,000	
	Number of Units	22	2	0	9.52		7	
	Total Cost	$550,000	$27,000	$0	$23,803,159	$540,890	$3,675,000	$28,596,049

Table 4-14
Capital Cost Summary for Palm Beach Boulevard Corridor Alternative Scenarios

		Station	TSP (per intersection)	TSP w/ Queue Jump (per intersection)	Right-of-Way Construction (per lane mile)	Right-of-Way Acquisition	Vehicle	Total Capital Cost
P1	Unit Cost	$25,000	$13,500	$113,500			$525,000	
	Number of Units	20	0	0			6	
	Total Cost	$500,000	$0	$0	NA	$0	$3,150,000	$3,650,000
P2	Unit Cost	$25,000	$13,500	$113,500	$2,500,000		$525,000	
	Number of Units	20	0	0	6.95		5	
	Total Cost	$500,000	$0	$0	$17,371,674	$9,002,289	$2,625,000	$29,498,963

Table 4-15

Capital Cost Summary for MLK Jr. Boulevard Corridor Alternative Scenarios

		Station	TSP (per intersection)	TSP w/ Queue Jump (per intersection)	Right-of-Way Construction (per lane mile)	Right-of-Way Acquisition	Vehicle	Total Capital Cost
M1	Unit Cost	$25,000	$13,500	$113,500			$525,000	
	Number of Units	10	0	0			3	
	Total Cost	$250,000	$0	$0	NA	$0	$1,575,000	$1,825,000
M2	Unit Cost	$25,000	$13,500	$113,500	$2,500,000		$525,000	
	Number of Units	10	0	0	5.04		3	
	Total Cost	$250,000	$0	$0	$12,591,201	$2,190,765	$1,575,000	$16,606,966

Table 4-16

Capital Cost Summary for Colonial Boulevard Corridor Alternative Scenarios

		Station	TSP (per intersection)	TSP w/ Queue Jump (per intersection)	Right-of-Way Construction (per lane mile)	Right-of-Way Acquisition	Vehicle	Total Capital Cost
C1	Unit Cost	$25,000	$13,500	$113,500			$525,000	
	Number of Units	8	0	4			2	
	Total Cost	$200,000	$0	$454,000	NA	$0	$1,050,000	$1,704,000
C2	Unit Cost	$25,000	$13,500	$113,500	$2,500,000		$525,000	
	Number of Units	8	3	1	2.62		2	
	Total Cost	$200,000	$40,500	$113,500	$6,554,186	$409,226	$1,050,000	$8,367,412

Operating Cost

A methodology was developed to estimate the annual operating cost for BRT service running along each corridor alternative. The application of this methodology requires the determination of a base operating cost per revenue hour. Three approaches for developing an operating cost per revenue hour estimate were considered, as described below.

Approach I – Combined Operating Cost per Revenue Hour (For Bus Service Operating within Each Corridor)

LeeTran's FY 2006 annual per-route operating cost and revenue hour data are used for the purpose of developing general operating cost estimates for potential BRT service.

- Average weekday operating cost by route is determined utilizing the number of weekday service days operated by LeeTran during the given fiscal year. Average weekday revenue hours are obtained by dividing total annual weekday revenue hours by the number of weekday service days. Average daily operating cost per revenue hour can therefore be determined.

- In order to determine revenue hours of service for overlapping local bus routes along each BRT alternative corridor, an assumption is made regarding the distribution of revenue hours of service for each local bus route. Weekday revenue hours of service for overlapping segments are assumed to be proportional to the percent of the bus route length that overlapped each BRT alternative.

- It was assumed that, if two routes overlap with a certain BRT corridor, a distributed relationship-based formula could be used to estimate the average weekday operating cost per revenue hour for BRT service in that corridor. Consider that if Route A has **x** percent overlapped segment(s) with this BRT corridor while Route B has **y** overlapped segment(s) with the same BRT corridor, and average weekday operating cost per revenue hour for Route A is ***a*** and for Route B is ***b***, and weekday revenue hours for Route A is **α** and for Route B is **β**, then the average weekday operating cost per revenue hour (**C/R**) for the BRT service running along this corridor can be obtained from Formula 1:

$$\mathbf{C/R} = \frac{(a \times \alpha \times x) + (b \times \beta \times y)}{(\alpha \times x) + (\beta \times y)} \qquad 1$$

The formula is also applicable to a corridor with more than two overlapped bus routes as long as the appropriate parameters of the additional bus routes are utilized in the formula as indicated in the previous discussion.

Approach II – Average BRT Operating Cost per Revenue Hour for Major Cities

The BRT performance statistics (average operating cost per revenue hour) for several major BRT systems from the Government Accounting Office's (GAO) 1999 report entitled, "Mass Transit: Bus Rapid Transit Shows Promise," has also been considered. The average BRT operating cost per revenue hour for these agencies can be utilized to estimate the proposed LeeTran BRT operating cost. Table 4-17 shows the average operating cost per revenue hour derived from this study document.

Table 4-17
BRT Operating Cost per Revenue Hour for Major Cities

City	Dallas	Denver	Pittsburgh	San Diego	Los Angeles	San Jose
Operating cost per revenue hour	$96	$78	$143	$100	$56	$109
Average	$97					

Source: 1999 GAO Report

Approach III – LeeTran 2006 System-Wide Operating Cost per Revenue Hour

The LeeTran system-wide operating cost per revenue hour may also be considered for use in estimating BRT operating cost. The 2006 operating cost per revenue hour for LeeTran is **$71.36** according to the 2006 National Transit Database.

Once the base BRT operating cost per revenue hour has been determined, the specific steps to estimate the proposed BRT operating cost are provided below.

- The weekday operating cost per revenue hour must be multiplied by the estimated revenue hours for the BRT service running along each corridor alternative to obtain the weekday operating cost for each corridor alternative. The total number of BRT revenue hours (**T**) for each corridor alternative is determined using corridor length (**L**), service span (**D**), peak hour service headway (**f1**), off-peak service headway (**f2**), average operating speed (**S**), and Formula 2. Average speeds of 15 mph and 20 mph are recommended for the mixed-traffic operation and the combination of exclusive running way and mixed-traffic operation, respectively. Morning and evening peak hours also are assumed to total a combined seven-hour duration. (The total duration of AM peak and PM peak hours added up to eight hours, as indicated in 2006 LeeTran

NTD report. As the beginning time of the proposed BRT service is one hour later than that of the system AM Peak, the peak duration for BRT service is seven hours.)

$$\mathbf{T} = \left(\frac{2L}{f1 \times S} \times 7\right) + \left(\frac{2L}{f2 \times S}\right) \times (D - 7) \qquad 2$$

- Applying the corresponding parameters of each corridor alternative to Formula 2 produces the weekday revenue hours. The resulting revenue hours (**T**) are then multiplied by the previously estimated weekday operating cost per revenue hour (**C/R**) to obtain the average weekday operating cost (**OCW**). The final annual operating cost (**OCA**) can be obtained by multiplying the weekday operating cost (**OCW**) with the assumed service days per year (255) for all of the corridor alternatives. Finally, the annual operating cost is divided by the estimated annual BRT ridership to generate an operating cost per passenger trip estimate in order to facilitate the comparison between each corridor alternative.

Selected Operating Cost per Revenue Hour for Analysis

In order to select the best approach to determining the operating cost per revenue hour, three other agencies that are currently operating BRT service were contacted to find out the operating cost per revenue hour for their BRT service and local, full-stop, fixed-route bus service, respectively. These agencies include:

- Los Angeles County Metropolitan Transportation Authority (Los Angeles, California)
- Kansas City Area Transportation Authority (Kansas, Missouri)
- Port Authority of Allegheny County (Pittsburgh, Pennsylvania)

Responses from these agencies indicated that the agencies do not distinguish the operating cost between local bus service and BRT service. Alternatively, they integrate the BRT service as a part of the whole fixed-route bus service for operating cost statistics purposes. Based on this fact, Approach III was selected to estimate the operating cost of the BRT service in Lee County. Tables 4-18 to 4-21 present the detailed operating cost estimates based on the 2006 LeeTran system-wide operating cost per revenue hour ($71.36).

Table 4-18
Operating Cost Estimate for US 41 BRT Corridor

	Operating Cost per Revenue Hour for BRT (C/R)	Corridor Length (L)	Service Span (D)	Peak Hour Duration	Peak Hour Frequency (f1)	Off-Peak Hour Frequency (f2)	Average Speed (S)	Revenue Hours (T)	Weekday Operating Cost (OCW)	Service Days	Annual Operating Cost (OCA)	OCA per Passenger Trip
U1	$71.36	8.93	12.50	7.00	0.20	0.25	15.00	67.89	$4,845	255	$1,235,392	3.15
U2	$71.36	8.93	12.50	7.00	0.13	0.25	20.00	67.75	$4,835	255	$1,232,892	3.07

Table 4-19
Operating Cost Estimate for Palm Beach Boulevard BRT Corridor

	Operating Cost per Revenue Hour for BRT (C/R)	Corridor Length (L)	Service Span (D)	Peak Hour Duration	Peak Hour Frequency (f1)	Off-Peak Hour Frequency (f2)	Average Speed (S)	Revenue Hours (T)	Weekday Operating Cost (OCW)	Service Days	Annual Operating Cost (OCA)	OCA per Passenger Trip
P1	$71.36	6.64	12.50	7.00	0.20	0.25	15.00	50.44	$3,600	255	$917,877	$9.15
P2	$71.36	6.64	12.50	7.00	0.13	0.25	20.00	50.34	$3,592	255	$916,019	$8.94

Table 4-20
Operating Cost Estimate for MLK Boulevard BRT Corridor

	Operating Cost per Revenue Hour for BRT (C/R)	Corridor Length (L)	Service Span (D)	Peak Hour Duration	Peak Hour Frequency (f1)	Off-Peak Hour Frequency (f2)	Average Speed (S)	Revenue Hours (T)	Weekday Operating Cost (OCW)	Service Days	Annual Operating Cost (OCA)	OCA per Passenger Trip
M1	$71.36	3.15	12.50	7.00	0.20	0.25	15.00	23.94	$1,709	255	$435,694	$4.84
M2	$71.36	3.15	12.50	7.00	0.13	0.25	20.00	23.89	$1,705	255	$434,812	$4.73

Table 4-21
Operating Cost Estimate for Colonial Boulevard BRT Corridor

	Operating Cost per Revenue Hour for BRT (C/R)	Corridor Length (L)	Service Span (D)	Peak Hour Duration	Peak Hour Frequency (f1)	Off-Peak Hour Frequency (f2)	Average Speed (S)	Revenue Hours (T)	Weekday Operating Cost (OCW)	Service Days	Annual Operating Cost (OCA)	OCA per Passenger Trip
C1	$71.36	2.48	12.50	7.00	0.20	0.25	15.00	18.88	$1,347	255	$343,474	$10.96
C2	$71.36	2.48	12.50	7.00	0.13	0.25	20.00	18.84	$1,344	255	$342,778	$10.71

Capital Cost Analysis

The estimated capital costs for each corridor were divided by each corresponding corridor's length to normalize the results for comparative purposes. Table 4-22 presents the final result for capital cost per mile for each corridor alternative and the corresponding score value.

Table 4-22
Capital Cost Analysis

Alternative Scenarios	Total Capital Cost per Mile	Score
US 41 Corridor		
U1	$557,149	**5**
U2	$3,201,176	**3**
Palm Beach Blvd Corridor		
P1	$549,942	**5**
P2	$4,444,581	**1**
MLK Blvd Corridor		
M1	$579,282	**5**
M2	$5,271,294	**1**
Colonial Blvd Corridor		
C1	$686,095	**5**
C2	$3,369,038	**3**

Operating Cost Analysis

In order to compare the cost-effectiveness of BRT service along each corridor, the estimated annual operating costs were divided by the estimated annual BRT ridership. Table 4-23 presents the annual operating cost per passenger trip for each corridor alternative and the corresponding score value.

Table 4-23
Operating Cost Analysis

Alternative Scenarios	Operating Cost per Estimated BRT Ridership	Score
US 41 Corridor		
U1	$3.15	**5**
U2	$3.07	**5**
Palm Beach Blvd Corridor		
P1	$9.15	**3**
P2	$8.94	**3**
MLK Blvd Corridor		
M1	$4.84	**5**
M2	$4.73	**5**
Colonial Blvd Corridor		
C1	$10.96	**1**
C2	$10.71	**1**

CORRIDOR ALTERNATIVES PRIORITIZATION ANALYSIS

Based on the corridor alternative scores for each evaluation criterion, the final corridor alternatives prioritization process is carried out using the following steps.

a) Corridor scores for each evaluation criterion range from a high of 5 to a low of 1.

b) Each evaluation criterion is then assigned a weight of 1 to 3 to reflect the overall importance of that criterion. A weight of 3 signifies the highest level of importance.

c) Corresponding corridor scores are multiplied by the appropriate weight to produce a weighted score ranging from 1 to 15 for each criterion for each corridor alternative.

d) Weighted scores are totaled for each corridor alternative scenario to obtain the composite scores.

All corridor alternatives then are ranked based on the resultant composite weighted scores. Table 4-24 presents the weighted scores, the composite rank scores, and the final rank for each corridor alternative. Table 4-25 integrates the capital and operating costs criteria into the prioritization analysis.

Table 4-24
Corridor Alternative Prioritization on Analysis (Without Capital and Operating Costs Criteria)

Alternative Scenarios	Ridership Weighted Score	Roadway Improvement Weighted Score	ROW Availability Weighted Score	Congestion Delay Improvement Weighted Score	Intersection Delay Reduction Weighted Score	Coverage Weighted Score	Transfer Opportunity Weighted Score	Traffic Congestion Weighted Score	Composite Score	Final Rank
US 41 Corridor										
U1	**15**	**7**	**6**	**2**	**2**	**15**	**10**	**1**	58	***2***
U2	**15**	**7**	**6**	**6**	**2**	**15**	**10**	**1**	62	***1***
Palm Beach Blvd Corridor										
P1	**3**	**3**	**6**	**2**	**2**	**3**	**2**	**5**	26	***7***
P2	**3**	**3**	**2**	**6**	**2**	**3**	**2**	**5**	26	***7***
MLK Blvd Corridor										
M1	**9**	**3**	**6**	**2**	**2**	**3**	**6**	**3**	34	***6***
M2	**9**	**3**	**2**	**10**	**2**	**3**	**6**	**3**	38	***5***
Colonial Blvd Corridor										
C1	**3**	**13**	**6**	**2**	**10**	**3**	**2**	**1**	40	***3***
C2	**3**	**13**	**2**	**6**	**10**	**3**	**2**	**1**	40	***3***

Table 4-25
Corridor Alternative Prioritization Analysis (With Capital and Operating Costs Criteria)

Alternative Scenarios	Ridership Weighted Score	Roadway Improvement Weighted Score	ROW Availability Weighted Score	Capital Cost Weighted Score	Operating Cost Weighted Score	Congestion Delay Improvement Weighted Score	Intersection Delay Reduction Weighted Score	Coverage Weighted Score	Transfer Opportunity Weighted Score	Traffic Congestion Weighted Score	Composite Score	Final Rank
US 41 Corridor												
U1	**15**	**7**	**6**	**15**	**15**	**2**	**2**	**15**	**10**	**1**	88	***1***
U2	**15**	**7**	**6**	**9**	**15**	**6**	**2**	**15**	**10**	**1**	86	***2***
Palm Beach Blvd Corridor												
P1	**3**	**3**	**6**	**15**	**9**	**2**	**2**	**3**	**2**	**5**	50	***7***
P2	**3**	**3**	**2**	**3**	**9**	**6**	**2**	**3**	**2**	**5**	38	***8***
MLK Blvd Corridor												
M1	**9**	**3**	**6**	**15**	**15**	**2**	**2**	**3**	**6**	**3**	64	***3***
M2	**9**	**3**	**2**	**3**	**15**	**10**	**2**	**3**	**6**	**3**	56	***5***
Colonial Blvd Corridor												
C1	**3**	**13**	**6**	**15**	**3**	**2**	**10**	**3**	**2**	**1**	58	***4***
C2	**3**	**13**	**2**	**9**	**3**	**6**	**10**	**3**	**2**	**1**	52	***6***

Based on the rankings shown in Table 4-25, if capital and operating costs are included in the analysis, the four corridor alternatives that are most supportive of BRT service are:

1. US 41 corridor – Mixed-traffic running way scenario (U1).
2. US 41 corridor – Combination of mixed-traffic and exclusive running way scenario (U2).
3. MLK Boulevard corridor – Mixed-traffic running way scenario (M1).
4. Colonial Boulevard corridor – Mixed-traffic running way scenario (C1).

However, as shown in Table 4-24, the exclusion of capital and operating costs from the analysis presents a slightly different result. The top four corridor alternatives after removing capital and operating costs from the analysis are:

1. US 41 corridor – Combination of mixed-traffic and exclusive running way scenario (U2).
2. US 41 corridor – Mixed-traffic running way scenario (U1).
3. Colonial Boulevard corridor – Combination of mixed-traffic and exclusive running way scenario (C2)
4. Colonial Boulevard corridor – Mixed-traffic running way scenario (C1).

RECOMMENDATIONS AND NEXT STEPS

The results of the feasibility analysis indicate that the following two corridors present the most ideal opportunities for implementing bus rapid transit service in Lee County at this time and should represent the initial BRT network in the county.

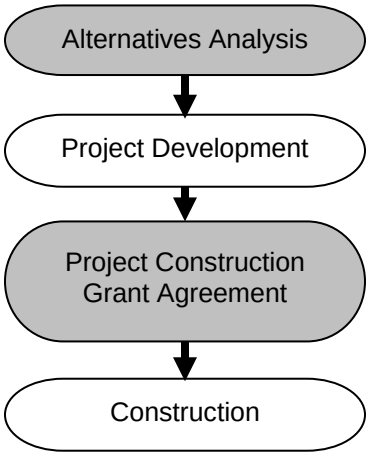
- **US 41** – Recommended north/south BRT corridor
- **Colonial Boulevard** – Recommended east/west BRT corridor

Although one of the alternative scenarios for the MLK Boulevard corridor ranks within the top four alternative scenarios when cost is considered, it is important to note that at least one alternative scenario for each of the US 41 and Colonial Boulevard corridors ranks within the top corridor alternatives in both ranking schemes, with and without the integration of capital and operating costs.

Although the rankings suggest that one corridor is preferred over another, the rankings should be used as a guide in determining the appropriate corridor for initial implementation. Similarly, as the implementation of BRT in Lee County moves forward into design and engineering, decisions on preferred implementation corridors and BRT elements should be adapted to meet the desired character and scale of the BRT service to be implemented in Lee County.

A series of action steps is identified here that serve as guidelines for the County to follow in developing the proposed BRT service. To prepare the outline of steps, a review of the Federal Transit Administration's (FTA) Section 5309 Capital Investment Grant Program Small Starts and Very Small Starts requirements was performed. The Section 5309 Small Starts and Very Small Starts programs provide capital funds on a competitive basis for new fixed guideway transit facilities, such as light rail transit lines, bus rapid transit, commuter rail, or heavy rail transit. To receive funding under either of the two programs, applicants must conduct a series of planning and analysis steps. Both programs follow a similar process, as shown in Figure 4-1, but differ in terms of the project rating process and evaluation criteria. Additional detail on the rating process, criteria, and project development process planning and analysis steps can be obtained from FTA at: www.fta.dot.gov/planning/newstarts/planning_environment_222.html.

Figure 4-1
FTA Section 5309 Small Starts and Very Small Starts Development Process



Based on the type and scale of the BRT alternative scenarios considered for the feasibility analysis presented in this report, Lee County should pursue capital funding under the Section 5309 Very Small Starts program. The Very Small Starts program distinguishes itself from the Small Starts program in that the total cost of the project must not exceed $50 million and must be less than $3 million per mile (excluding vehicles). The Small Starts program caps the total cost of eligible projects at $250 million. The second major distinction between the two programs is the requirement under Very Small Starts that existing corridor ridership that would benefit from the more premium transit service exceeds 3,000 per day.

FDOT has programmed BRT-related funding for Lee County for FY 2009/2010. The Lee County MPO's Transportation Improvement Program identifies two preliminary engineering and design projects for bus preference lanes in the amounts of $125,000

each. The action steps indicated below integrate the preliminary engineering and design projects and the required Section 5309 Very Small Starts planning and analysis steps.

1. Select preferred BRT alternative for initial implementation and Very Small Starts projects consideration
2. Conduct preliminary design and engineering
3. Prepare and submit alternatives analysis report to FTA
4. Receive approval from FTA to enter into project development
5. Prepare project final design
6. Receive approval from FTA and enter into FTA Project Construction Grant Agreement
7. Construct project

The typical project development process under the FTA New Starts program is six to twelve years. Considering that the Lee BRT project would fall under the Very Small Starts program, that timeframe could be considerably shorter depending on the identification of local funding and the approval of a grant agreement through the FTA Small Starts or Very Small Starts program.

Appendix A
Evaluation Scoring Detail

Table A-1
Corridor Alternatives Prioritization Analysis

	Ridership			Roadway Improvement			Right-of-Way Availability			Capital Cost			Operating Cost		
Alternative Scenarios	**Score**	**Weight**	**Weighted Score**	**Score**	**Weight**	**Weighted Score**	**Score**	**Weight**	**Weighted Score**	**Score**	**Weight**	**Weighted Score**	**Score**	**Weight**	**Weighted Score**
US 41 Corridor															
U1	5	3	**15**	7	1	**7**	3	2	**6**	5	3	**15**	5	3	**15**
U2	5	3	**15**	7	1	**7**	3	2	**6**	3	3	**9**	5	3	**15**
Palm Beach Blvd Corridor															
P1	1	3	**3**	3	1	**3**	3	2	**6**	5	3	**15**	3	3	**9**
P2	1	3	**3**	3	1	**3**	1	2	**2**	1	3	**3**	3	3	**9**
MLK Blvd Corridor															
M1	3	3	**9**	3	1	**3**	3	2	**6**	5	3	**15**	5	3	**15**
M2	3	3	**9**	3	1	**3**	1	2	**2**	1	3	**3**	5	3	**15**
Colonial Blvd Corridor															
C1	1	3	**3**	13	1	**13**	3	2	**6**	5	3	**15**	1	3	**3**
C2	1	3	**3**	13	1	**13**	1	2	**2**	3	3	**9**	1	3	**3**

Table A-1
Corridor Alternatives Prioritization Analysis (Continued)

	Congestion Delay Improvement			Intersection Delay Reduction			Coverage			Transfer Opportunity			Traffic Congestion				
Alternative Scenarios	**Score**	**Weight**	**Weighted Score**	**Score**	**Weight**	**Weighted Score**	**Score**	**Weight**	**Weighted Score**	**Score**	**Weight**	**Weighted Score**	**Score**	**Weight**	**Weighted Score**	**Composite Score**	**Final Rank**
US 41 Corridor																	
U1	1	2	**2**	1	2	**2**	5	3	**15**	5	2	**10**	1	1	**1**	88	***1***
U2	3	2	**6**	1	2	**2**	5	3	**15**	5	2	**10**	1	1	**1**	86	***2***
Palm Beach Blvd Corridor																	
P1	1	2	**2**	1	2	**2**	1	3	**3**	1	2	**2**	5	1	**5**	50	***7***
P2	3	2	**6**	1	2	**2**	1	3	**3**	1	2	**2**	5	1	**5**	38	***8***
MLK Blvd Corridor																	
M1	1	2	**2**	1	2	**2**	1	3	**3**	3	2	**6**	3	1	**3**	64	***3***
M2	5	2	**10**	1	2	**2**	1	3	**3**	3	2	**6**	3	1	**3**	56	***5***
Colonial Blvd Corridor																	
C1	1	2	**2**	5	2	**10**	1	3	**3**	1	2	**2**	1	1	**1**	58	***4***
C2	3	2	**6**	5	2	**10**	1	3	**3**	1	2	**2**	1	1	**1**	52	***6***