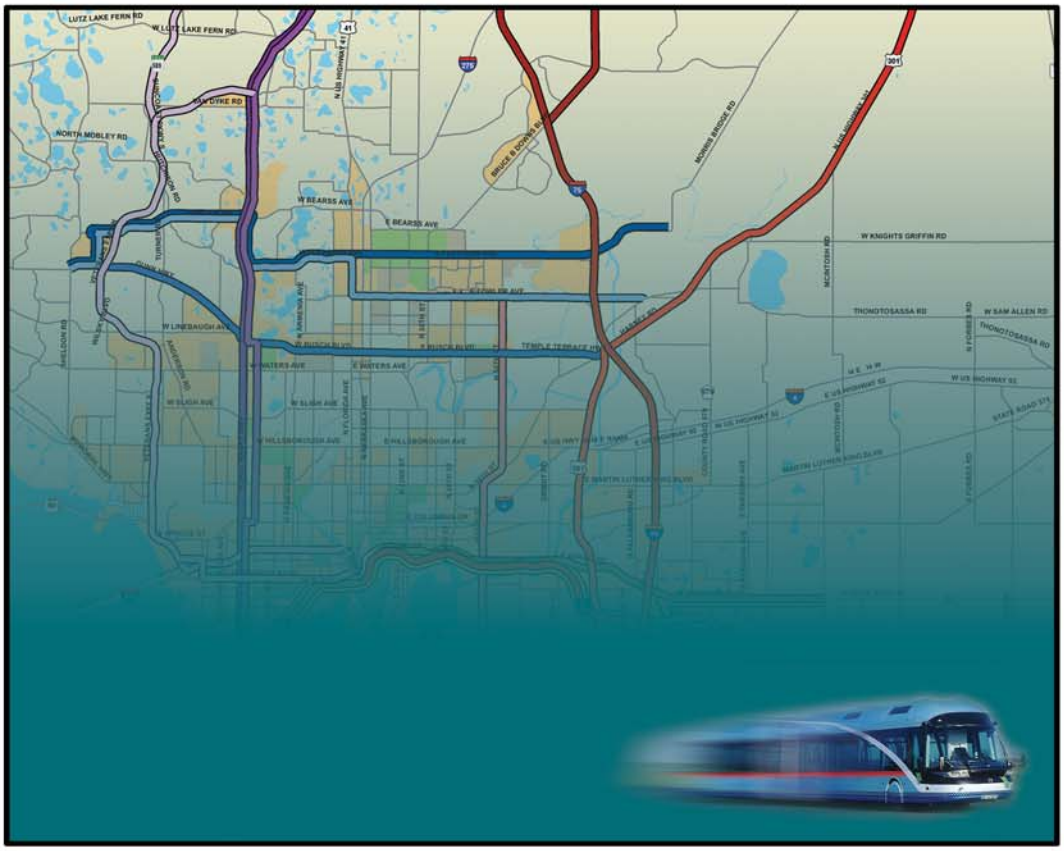
Bus Rapid Transit Corridor Assessment In Hillsborough County



Final Report Assessment & Prioritization of Corridor Alternatives

August 2007

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BUS RAPID TRANSIT CORRIDOR ASSESSMENT IN HILLSBOROUGH COUNTY

Final Report
Assessment & Prioritization of Corridor Alternatives

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EXECUTIVE SUMMARY

STUDY PURPOSE

As a part of larger countywide transit study being undertaken by the Hillsborough County Metropolitan Planning Organization (MPO), this particular study was undertaken to help expand the geographic area for exploring the potential for Bus Rapid Transit (BRT) service in Hillsborough County. A study team comprised of Tindale-Oliver & Associates and the National Bus Rapid Transit Institute at the Center for Urban Transportation Research worked closely with MPO staff and the transit study's project team to assess the need for and viability of BRT service in four major corridors identified in the larger transit study. The corridors (with alternatives shown in parentheses) are listed below and also are illustrated in Map ES-1.

- I-75 from county line to county line (US 301, US 41)
- Fletcher Avenue/Fowler Avenue (Busch Boulevard)
- Dale Mabry Highway (Veterans Expressway, Himes Avenue)
- Downtown (Selmon Expressway) to South Brandon

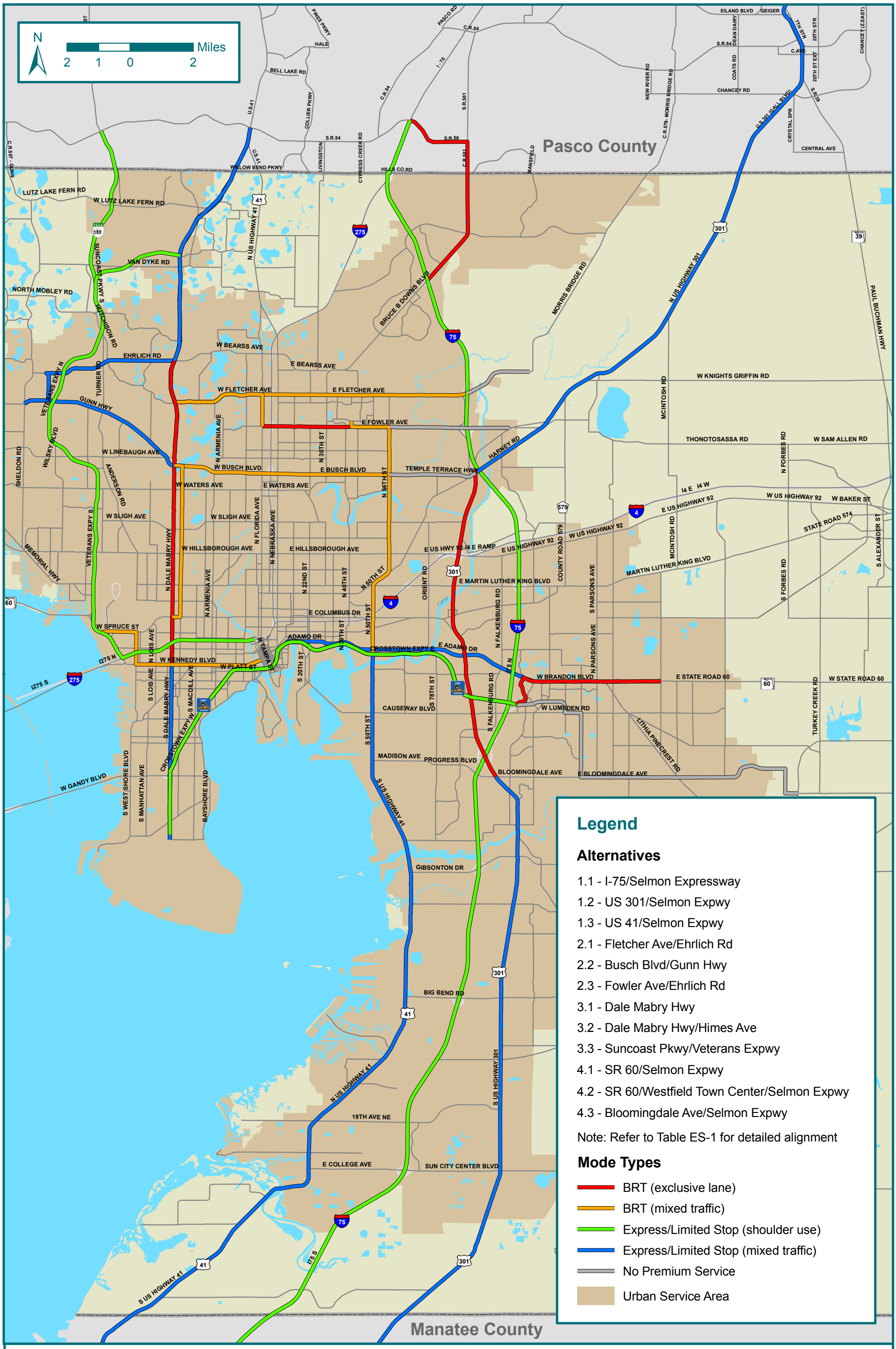
It is important to note that this particular analysis did not consider any of the Hillsborough Area Regional Transit Authority's Transit Emphasis Corridors since they already have been assessed for the potential implementation of BRT and continue to be studied for this purpose.

CORRIDOR ANALYSIS

Starting with the four major corridors, various land use, demographic, multimodal, and roadway characteristics data were used to identify three specific alternatives for each corridor. A sketch-level, planning-based assessment methodology then was used to evaluate the alternatives and identify the best near-term option within each corridor for potential premium transit service implementation. A series of assessment criteria were selected to evaluate the alternatives for five key objectives, including:

- Ridership
- Capital cost effectiveness
- Operating cost efficiency
- Rider potential
- Accessibility

The assessment results are intended to offer preliminary feasibility for BRT investments on these corridors in the MPO's long range transit plan. Ultimately, this study's findings will be integrated by MPO staff into a comprehensive plan for a network of transit investments throughout Hillsborough County.



Legend

Alternatives

1.1 - I-75/Selmon Expressway
1.2 - US 301/Selmon Expwy
1.3 - US 41/Selmon Expwy
2.1 - Fletcher Ave/Ehrlich Rd
2.2 - Busch Blvd/Gunn Hwy
2.3 - Fowler Ave/Ehrlich Rd
3.1 - Dale Mabry Hwy
3.2 - Dale Mabry Hwy/Himes Ave
3.3 - Suncoast Pkwy/Veterans Expwy
4.1 - SR 60/Selmon Expwy
4.2 - SR 60/Westfield Town Center/Selmon Expwy
4.3 - Bloomingdale Ave/Selmon Expwy

Note: Refer to Table ES-1 for detailed alignment

Mode Types

- BRT (exclusive lane)
- BRT (mixed traffic)
- Express/Limited Stop (shoulder use)
- Express/Limited Stop (mixed traffic)
- No Premium Service
- Urban Service Area

Metropolitan Planning Organization for Transportation

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map ES-1: All Corridors

Recommended Alternatives,
Transit Mode Types and Urban Service Area

ASSESSMENT RESULTS

As noted, the assessment was used to identify the priority corridor alternatives. Results of the prioritization process are summarized in Table ES-1, with the four priority alternatives shaded.

Table ES-1
Prioritization of All Corridor Alternatives

Corridor Alternative	General Description	Total Score	Rank
Alternative 1.1	I-75 from SR 54 to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa • Option 1 - SR 56 from SR 54 to BBD to I-75	45	1
Alternative 2.1	Fletcher Avenue from US 301 to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall	43	2
Alternative 4.2	SR 60 from Valrico Road to Brandon Westfield Town Center to Brandon Parkway to Selmon Expressway to Gandy Boulevard to Dale Mabry Highway to MacDill Air Force Base	43	2
Alternative 1.2	US 301 from Zephyrhills to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa	39	4
Alternative 1.3	US 41 from USF to Sarasota/Manatee and Selmon Expressway from US 41 to Downtown Tampa	39	4
Alternative 2.2	Busch Boulevard from US 301 to Gunn Highway to Citrus Park Mall	37	6
Alternative 3.2	Dale Mabry Highway from Pasco County to Busch Boulevard to Himes Avenue to Columbus Drive to Dale Mabry Highway to MacDill Air Force Base	35	7
Alternative 3.3	Veterans Expressway from Pasco County to I-275 to Downtown Tampa • North Option 1 - Veterans Expressway from Dale Mabry • South Option 2 - Boy Scout Boulevard from Memorial Highway to Westshore Boulevard to Kennedy Boulevard to Downtown Tampa	35	7
Alternative 4.1	SR 60 from Valrico Road to Downtown Tampa to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base	33	9
Alternative 3.1	Dale Mabry Highway from Pasco County to MacDill Air Force Base	31	10
Alternative 2.3	Fowler Avenue from US 301 to Florida Avenue to Fletcher Avenue to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall	29	11
Alternative 4.3	Bloomingdale Avenue to Kings Avenue to Lumsden Road to Brandon Parkway to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base	27	12

ORDER-OF-MAGNITUDE COSTS

Order-of-magnitude cost projections were developed for four specific investment levels of premium service along the corridor alternatives, ranging from express/limited stop bus service operating in mixed traffic to BRT operating along an exclusive running way. Due to their conceptual nature, the order-of-magnitude cost projections were based on a range of typical capital costs for each of three standard element cost categories: (1) construction of running ways, (2) station costs, and (3) transit signal priority treatments. Information from the Federal Transit Administration's *Characteristics of Bus Rapid Transit for Decision-Making* (August 2004), as well roadway construction cost information from the Florida Department of Transportation for 2006/2007 for District 7, was used in developing the unit costs.

Using general assumptions about which elements apply to each of the four levels of transit investment, an overall unit cost per mile was estimated for each of four transit implementation scenarios: express/limited stop service in mixed traffic, express/limited stop service using shoulders, BRT in mixed traffic, and BRT on an exclusive running way. These unit costs are presented in Table ES-2. For each transit investment, a low and high unit cost is provided.

Table ES-2
Order-of-Magnitude Capital Unit Costs by Level of Transit Investment (2007 $)

Transit Investment	Unit Capital Cost per Mile	
	Low	High
Express/Limited Stop (mixed traffic)	$97,000	$352,000
Express/Limited Stop (shoulder use)	$317,000	$495,000
BRT (mixed traffic)	$1,580,000	$1,770,000
BRT (exclusive running way)	$23,050,000	$23,520,000

Note: The unit capital costs do not reflect the acquisition of right-of-way or vehicles. In addition, there are other infrastructure and/or technology costs that are not included, as well, but may be desired for various service implementations. These include such items as specialized farebox equipment, ticket vending machines, real-time passenger information system, automatic passenger counters, automatic vehicle location system, on-board security cameras, and advanced communications system, among others.

Based on these unit costs and assumed levels of modal investment by roadway segment for each of the corridor alternatives, the order-of-magnitude total capital cost for each of the 12 alternatives is presented in Table ES-3.

Table ES-3
Order-of-Magnitude Capital Costs for Corridor Alternatives

Corridor Alternative	General Description	Assumed Levels of Modal Investment	Total Capital Cost	Capital Cost per Mile
Priority Corridors				
1.1	I-75/Selmon Expressway • Bruce B. Downs BRT Option	Exp/Lim Stop – Shoulder BRT – Exclusive Lane	$20,050,000 $180,400,000	$397,000 $3,470,000
2.1	Ehrlich Road/Fletcher Avenue	Exp/Lim Stop – Mixed BRT – Mixed Traffic BRT – Exclusive Lane	$49,680,000	$2,650,000
3.2	Dale Mabry Highway/Himes Avenue	Exp/Lim Stop – Mixed BRT – Mixed Traffic BRT – Exclusive Lane	$128,100,000	$5,380,000
4.2	SR 60/Westfield Town Center/Selmon Expressway	Exp/Lim Stop – Shoulder BRT – Exclusive Lane	$133,830,000	$6,160,000
Other Corridors				
1.2	US 301/Selmon Expressway	Exp/Lim Stop – Mixed Exp/Lim Stop – Shoulder BRT – Exclusive Lane	$238,510,000	$4,400,000
1.3	US 41/Selmon Expressway	Exp/Lim Stop – Mixed Exp/Lim Stop – Shoulder BRT – Mixed Traffic	$19,570,000	$515,000
2.2	Gunn Highway/Busch Boulevard	Exp/Lim Stop – Mixed BRT – Mixed Traffic	$13,690,000	$908,000
2.3	Ehrlich Road/Fowler Avenue	Exp/Lim Stop – Mixed BRT – Mixed Traffic BRT – Exclusive Lane	$135,290,000	$7,170,000
3.1	Dale Mabry Highway	Exp/Lim Stop – Mixed BRT – Exclusive Lane	$231,280,000	$9,920,000
3.3	Suncoast Parkway/Veterans Expressway/I-275 • From Dale Mabry Option • Boy Scout/Westshore/ Kennedy BRT Option	Exp/Lim Stop – Shoulder • Exp/Lim Stop – Shoulder • BRT – Mixed Traffic	$9,780,000 $8,930,000 $17,190,000	$419,000 $419,000 $714,000
4.1	SR 60/Selmon Expressway	Exp/Lim Stop – Mixed BRT – Mixed Traffic BRT – Exclusive Lane	$107,470,000	$5,340,000
4.3	Bloomingdale Avenue/Selmon Expressway	Exp/Lim Stop – Mixed BRT – Mixed Traffic BRT – Exclusive Lane	$6,800,000	$239,000

Note: All costs shown are estimates based on the application of unit costs to assumed levels of transit investment.

Section 1
INTRODUCTION

The primary objective of this project is to expand the geographic area for exploring the potential for Bus Rapid Transit (BRT) service in Hillsborough County, as part of a larger countywide transit study being undertaken by the Hillsborough County Metropolitan Planning Organization (MPO). The consulting team, which includes Tindale-Oliver & Associates and the National Bus Rapid Transit Institute at the Center for Urban Transportation Research, worked closely with MPO staff and the overall project team to assess the need for and viability of BRT service in four major corridors identified in the MPO transit study. The corridors are described in general terms as follows:

- I-75 from county line to county line (US 301, US 41)
- Fletcher Avenue/Fowler Avenue (Busch Boulevard)
- Dale Mabry Highway (Veterans Expressway, Himes Avenue)
- Downtown (Selmon Expressway) to South Brandon

It is important to note that the assessment of these corridors is intended to involve sketch level planning and be conceptual in nature. The results of this assessment will offer preliminary feasibility for BRT investments on these corridors in the MPO's long range transit plan. The conclusions of this study will be integrated by MPO staff into a comprehensive plan for a network of transit investments throughout Hillsborough County. It also is important to recognize that the assessment did not consider any of the Hillsborough Area Regional Transit Authority's (HART) Transit Emphasis Corridors since they already have been assessed for the potential implementation of BRT and continue to be studied for this purpose.

PROJECT APPROACH

The following data were compiled to support the identification and evaluation of corridor alternatives. Key findings associated with the identification of corridor alternatives are summarized in this report.

- Existing and proposed transit services and facilities on the corridors (routes and service characteristics, stop locations, passenger amenities at stops)
- Existing and future land use data adjacent to corridors
- Existing and future population and employment levels and densities
- Existing demographics within the corridors
- Major activity centers and transit trip generators/attractors (major employers, shopping malls, shopping centers, hospitals, etc.)
- Roadway inventory (corridors and major intersecting streets), including number of lanes, traffic signals, and right-of-way information
- Planned roadway improvements

- Traffic counts and roadway level of service information
- Bicycle facilities and sidewalks data
- Current HART fixed-route bus boarding/alighting data

The next step is the evaluation and prioritization of the alternatives defined in this document. The alternatives will be evaluated using criteria that address the following:

- Ridership
    - Current transit ridership
    - Potential future transit ridership

- Capital cost effectiveness
    - Right-of-way availability
    - Planned roadway improvements
    - Order-of-magnitude costs

- Operating cost efficiency
    - Intersection delay potential
    - Level of congestion

- Rider potential
    - Choice riders
    - Traditional transit patrons

- Accessibility
    - Access to activity centers
    - Transfer opportunities
    - Regional transfer opportunities
    - Bicycle/pedestrian access

Additional brainstorming sessions are planned to review and refine the evaluation and prioritization of corridor alternatives. Priorities will be established within each corridor and for all 12 corridors as a whole.

LAYOUT OF THIS REPORT

This report consists of an executive summary, three primary sections, including this introduction, and several appendices of support information.

Section 2 presents the **Identification of Corridor Alternatives**, which details the process that was used to select the specific corridor alternatives that are reviewed in this study. Previously, an interim document, *Technical Memorandum #1, Identification of Corridor Alternatives*, was

prepared to help facilitate the review and refinement of potential corridor alternatives. This particular document is the basis for Section 2. Due to the critical nature of this step in the overall evaluation process, agreement by the project stakeholders on the corridor alternatives was sought and achieved prior to moving forward with the evaluation and prioritization of alternatives. Hence, Section 2 summarizes the method and results for determining the corridor alternatives that are evaluated and prioritized in Section 3.

Section 3 presents the **Prioritization of Corridor Alternatives**, which details the evaluation criteria and process used to prioritize the corridor alternatives and identify the best near-term option within each of the four study corridors for potential premium transit service implementation. Also included is the development of an order-of-magnitude capital cost related to the implementation of various assumed levels of premium transit service investment for each of the 12 corridor alternatives.

Section 2
IDENTIFICATION OF CORRIDOR ALTERNATIVES

This section includes a summary of the methodology and resulting corridor alternatives that were identified for the BRT assessment. This effort includes the identification of three alternatives for each of the four corridors being evaluated in this study.

PRELIMINARY CORRIDOR ALTERNATIVES

Numerous preliminary corridor alternatives were developed initially for each corridor using the following:

- Review of existing and future population and employment densities
- Review of concentrations of transit-oriented populations (elderly, youth, low-income, no vehicle)
- Consideration of major activity centers
- Consideration of the broader county-wide transit network

The initial alternatives were then reviewed and refined through a brainstorming session with the MPO project team. The preliminary alternatives for each corridor are discussed later in this section and illustrated in Appendix A.

REFINEMENT OF CORRIDOR ALTERNATIVES

The next step was to narrow and refine the range of alternatives to three for each corridor. This was accomplished through a more extensive transit market assessment and discussions at a brainstorming session with the project team (MPO staff and consulting team). The transit market assessment of the corridors includes an evaluation of markets from two major perspectives. These include:

- **Discretionary Transit Market** - This market considers potential riders living in higher density areas of the county that may choose to use transit as a commuting alternative

- **Traditional Transit Market** - This market considers the potential for traditional transit patrons, including elderly, youth, low-income, households with no vehicle, and population density.

Discretionary Transit Market

The discretionary market includes potential riders living in higher density areas of the county that may choose to use transit as a commuting alternative. As density increases, areas generally become more and more supportive of transit. To illustrate this relationship, a Density

Threshold Assessment (DTA) was conducted based on industry standard relationships between population and employment densities and varying levels of transit investment. Table 2-1 presents the density thresholds (dwelling units per acre and employees per acre) for when to begin considering investments in the following transit modes:

- Bus (minimum to enhanced service)
- Bus Rapid Transit
- Rail

It is important to note that these thresholds provide a starting point for understanding the potential feasibility of transit investments. These thresholds do not consider detailed information on land use, development patterns, and other issues that may play an important role in the feasibility of transit. The subsequent evaluation and prioritization of corridor alternatives will begin consideration of some of these additional issues.

Table 2-1
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, these thresholds were established for the assessment.

Using the 2025 dwelling unit and employment projections by zone, areas of Hillsborough County, which meet the threshold for a BRT or rail investment, are illustrated in the map series of preliminary and recommended alternatives for each corridor.

Traditional Transit Market

As indicated previously, the traditional transit market refers to population segments that have historically had a higher propensity to use transit. These segments include:

- Elderly population
- Youth population
- Low-income population

- Zero-vehicle households
- High population density

Using data from the 2000 Census, a Transit Orientation Index (TOI) was developed for Hillsborough County. The five population segments were used to develop an index that identifies areas of the county with higher concentrations of transit-oriented population relative to other areas in the county.

The results of the Hillsborough County TOI are illustrated in the map series of preliminary alternatives for each corridor (see Appendix A). The preliminary corridor alternatives are overlaid on the TOI to portray how each alternative provides coverage for the higher concentrations of transit-oriented populations. Each map illustrates locations throughout the county where the proportion of the transit-oriented population is very high, high, medium, low, and very low.

Corridors and Transit Service Technologies

While the focus of this assessment is on the feasibility of BRT, the corridor alternatives will ultimately reflect investments in various types of transit service along a given corridor, including BRT operating in mixed traffic and/or along an exclusive running way, express/local bus service operating in mixed traffic, express/local bus service operating along roadway shoulders, local circulation/feeder service, and flex-route services.

OVERVIEW OF CORRIDOR ALTERNATIVES

The results of the data review and market assessment were used to narrow the focus to three recommended alternatives for each corridor, resulting in a total of 12 alternatives. In the remainder of this section, the following information is presented for each corridor.

- Overview of corridor
- Preliminary corridor alternatives
- Recommended corridor alternatives

Corridor 1: I-75/US 301/US 41

Overview of Corridor - Corridor 1 supports north/south travel through Hillsborough County with connections to Pasco County to the north and Manatee County to the south. Major service areas include Wesley Chapel, New Tampa, Brandon, and South Hillsborough County. Six preliminary alternatives were developed to serve areas along the three major north/south roadways (I-75, US 301, and US 41). Alternatives were developed to ensure service to downtown Tampa (5 of 6 alternatives), the Brandon area (4 of 6 alternatives), and Temple

Terrace/USF (2 of 6 alternatives). The six preliminary alternatives were narrowed to three recommended alternatives by:

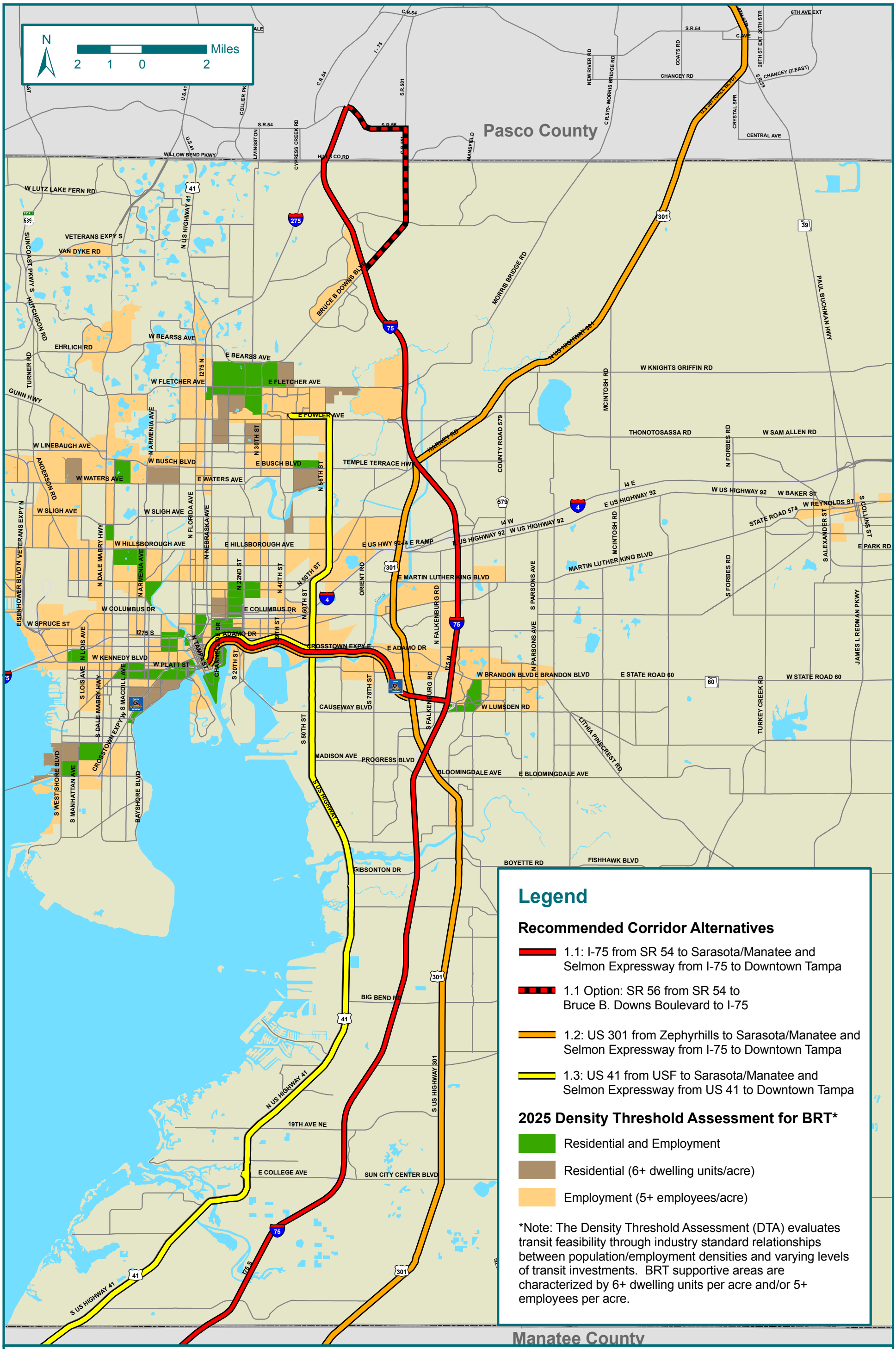
- Aggregating some of the preliminary corridor alternative segments into the recommended alternatives.
- Reducing potential direct connections to the Temple Terrace/USF area, but ensuring transfer opportunities to the Corridor 2 alternatives, which provide direct service to the Temple Terrace/USF area.
- Ensuring that the recommended corridor alternatives provide service to areas that are designated as BRT supportive or having very high/high transit orientation.

Preliminary Corridor Alternatives - The preliminary alternatives for Corridor 1 are listed below and illustrated in Appendix A (Maps A-1 and A-2). Map A-1 includes an overlay of the DTA and Map A-2 reflects an overlay of the TOI.

- 1.1 - I-75 from SR 56 to the Selmon Expressway to Downtown Tampa
- 1.2 - US 41 from Sarasota/Manatee to the Selmon Expressway to Downtown Tampa
- 1.3 - US 301 from Sarasota/Manatee to Fowler Avenue to University of South Florida (USF)
- 1.4 - SR 56 from I-75 to Bruce B. Downs (BBD), BBD from SR 56 to I-75, I-75 from BBD to Selmon Expressway, to Downtown Tampa
- 1.5 - US 301 from Zephyrhills to Temple Terrace Highway to Fowler Ave to Busch Boulevard to 56th Street to 50th Street to I-4 to Downtown Tampa
- 1.6 - I-75 from Sarasota Manatee to the Selmon Expressway to Downtown Tampa

Recommended Corridor Alternatives - The recommended corridor alternatives are listed below and illustrated in Maps 2-1 (includes overlay of DTA) and 2-2 (includes overlay of TOI).

- 1.1 - I-75 from SR 54 to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa
    - Option 1 - SR 56 from SR 54 to BBD to I-75
- 1.2 - US 301 from Zephyrhills to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa
- 1.3 - US 41 from USF to Sarasota/Manatee and Selmon Expressway from US 41 to Downtown Tampa



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Recommended Corridor Alternatives

- 1.1: I-75 from SR 54 to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa
- 1.1 Option: SR 56 from SR 54 to Bruce B. Downs Boulevard to I-75
- 1.2: US 301 from Zephyrhills to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa
- 1.3: US 41 from USF to Sarasota/Manatee and Selmon Expressway from US 41 to Downtown Tampa

2025 Density Threshold Assessment for BRT*

- Residential and Employment
- Residential (6+ dwelling units/acre)
- Employment (5+ employees/acre)

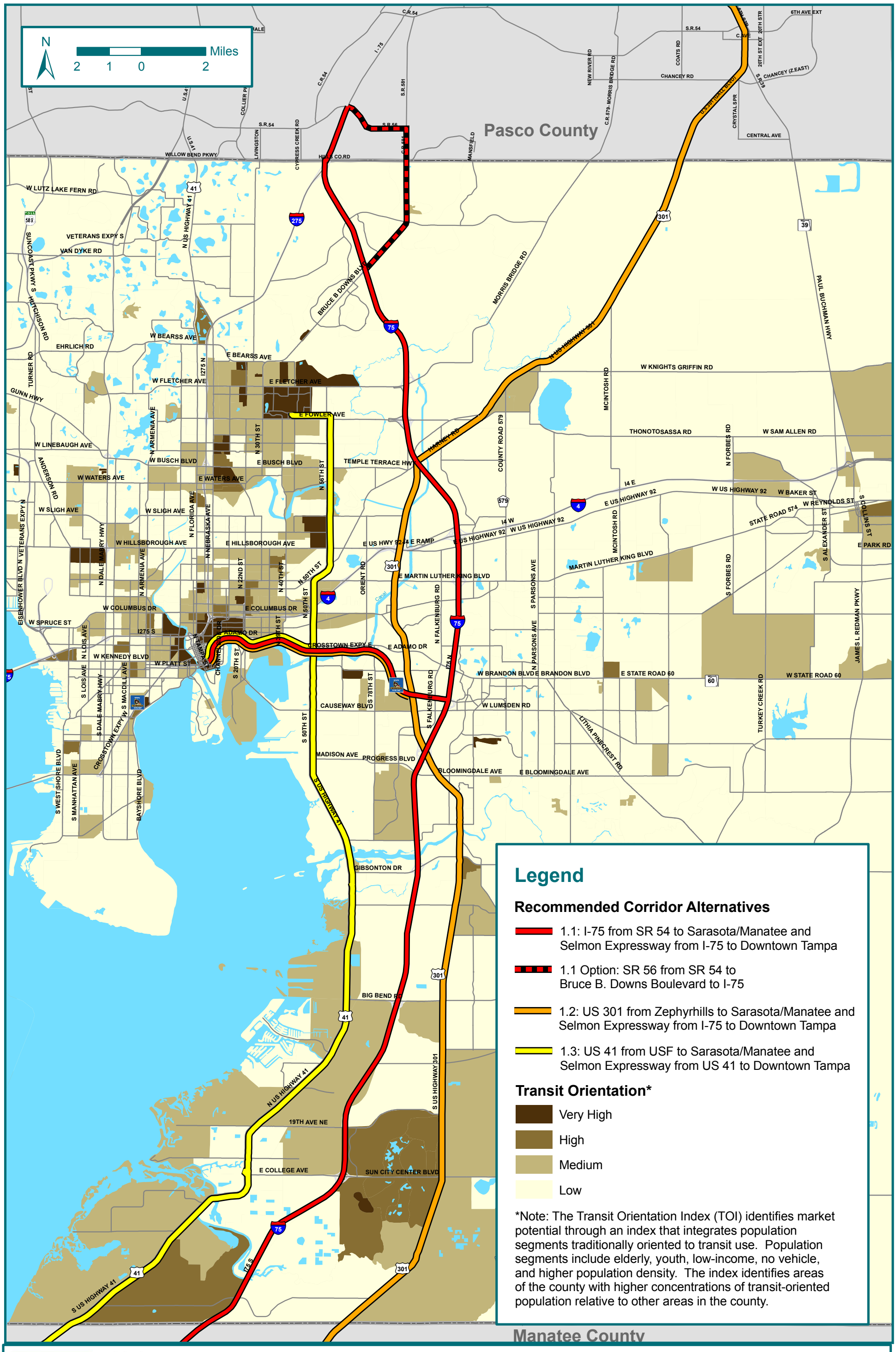
*Note: The Density Threshold Assessment (DTA) evaluates transit feasibility through industry standard relationships between population/employment densities and varying levels of transit investments. BRT supportive areas are characterized by 6+ dwelling units per acre and/or 5+ employees per acre.

METROPOLITAN PLANNING ORGANIZATION FOR TRANSPORTATION

Hillsborough County Bus Rapid Transit Corridor Assessment

Map 2-1: Corridor 1 (I-75/US 301/US 41)

Recommended Alternatives and Density Threshold Assessment for BRT



METROPOLITAN PLANNING ORGANIZATION FOR TRANSPORTATION

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map 2-2: Corridor 1 (I-75/US 301/US 41)

Recommended Alternatives
and Transit Orientation Index

Corridor 2: Fletcher Avenue/Fowler Avenue/Busch Boulevard

Overview of Corridor - Corridor 2 facilitates east/west travel in northern Hillsborough County, providing connections from the I-75 corridor in the east to the Citrus Park area in the northwest part of the county. Major activity centers include the areas of Temple Terrace, USF/University North, Dale Mabry, and Citrus Park. Three preliminary alternatives were identified to facilitate an east/west transit connection, with transfer opportunities anticipated near I-75 (Corridor 1) and the Veterans Expressway (Corridor 3). Since only three preliminary corridor alternatives were identified, it was not necessary to reduce the alternatives. It was confirmed, however, that one or more of the three recommended corridor alternatives provide service to all areas that are BRT supportive and/or characterized by very high/high transit orientation.

Preliminary Corridor Alternatives - The preliminary alternatives for Corridor 2 are listed below and illustrated in Appendix A (Maps A-3 and A-4). Map A-3 includes an overlay of the DTA and Map A-4 reflects an overlay of the TOI.

- 2.1 - Fletcher Avenue from US 301 to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall
- 2.2 - Busch Boulevard from US 301 to Gunn Highway to Citrus Park Mall
- 2.3 - Fowler Avenue from US 301 to Florida Avenue to Fletcher Avenue to Dale Mabry Highway to Ehrlich Road to Gun Highway to Citrus Park Mall

Recommended Corridor Alternatives - The recommended corridor alternatives are listed below and illustrated in Maps 2-3 (includes overlay of DTA) and 2-4 (includes overlay of TOI).

- 2.1 - Fletcher Avenue from US 301 to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall
- 2.2 - Busch Boulevard from US 301 to Gunn Highway to Citrus Park Mall
- 2.3 - Fowler Avenue from US 301 to Florida Avenue to Fletcher Avenue to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall

Legend

Recommended Corridor Alternatives

- 2.1: Fletcher Avenue from US 301 to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall
- 2.2: Busch Boulevard from US 301 to Gunn Highway to Citrus Park Mall
- 2.3: Fowler Avenue from US 301 to Florida Avenue to Fletcher Avenue to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall

2025 Density Threshold Assessment for BRT*

- Residential and Employment
- Residential (6+ dwelling units/acre)
- Employment (5+ employees/acre)

*Note: The Density Threshold Assessment (DTA) evaluates transit feasibility through industry standard relationships between population/employment densities and varying levels of transit investments. BRT supportive areas are characterized by 6+ dwelling units per acre and/or 5+ employees per acre.

N

Miles: 1 0.5 0 1

NEW E/W ROAD (NEW TAMPA)
HANNA RD
VANDERVORT RD
I-275
TAMPA PALMS BLVD
COMPTON DR
TAMPA PALMS BLVD S
LIVINGSTON AVE
75
VETERANS EXPWY
LYNN TURNER
CASEY RD
BEARSS AVE
EHRLICH RD
GUNN HWY
S VILLAGE DR
N VILLAGE DR
LAKE MAGDALENE BLVD
SKIPPER RD
30TH ST
46TH ST
FLETCHER AVE
22ND ST
131ST AVE
HOLLY DR
15TH ST
MAGNOLIA DR
ALUMNI DR
SPECTRUM BLVD
MAPLE DR
BULL RUN
50TH ST
FOWLER AVE
I-75
COUNTRY CLUB DR
HENDERSON RD
ANDERSON RD
NIXON RD
ARMENIA AVE
N BOULEVARD
109TH AVE
BOUGAINVILLEA AVE
MCKINLEY DR
SERENA DR
LINEBAUGH AVE
WILSKY BLVD
NEBRASKA AVE
BUSCH BLVD
TEMPLE TERRACE HWY
MORRIS BRIDGE RD
US HWY 301
YUKON ST
RIVERHILLS DR
40TH ST
56TH ST
78TH ST
HARNEY RD
WATERS AVE
DALE MABRY HWY
FLORIDA AVE
BIRD ST
HIMES AVE
HABANA AVE
ROME AVE
MANHATTAN AVE
HANLEY RD
BARRY RD
BENJAMIN RD
SLIGH AVE

Legend

Recommended Corridor Alternatives

- 2.1: Fletcher Avenue from US 301 to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall
- 2.2: Busch Boulevard from US 301 to Gunn Highway to Citrus Park Mall
- 2.3: Fowler Avenue from US 301 to Florida Avenue to Fletcher Avenue to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall

Transit Orientation*

- Very High
- High
- Medium
- Low

N

Miles

1 0.5 0 1

*Note: The Transit Orientation Index (TOI) identifies market potential through an index that integrates population segments traditionally oriented to transit use. Population segments include elderly, youth, low-income, no vehicle, and higher population density. The index identifies areas of the county with higher concentrations of transit-oriented population relative to other areas in the county.

Metropolitan Planning Organization for Transportation

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map 2-4: Corridor 2 (Fletcher Ave/Fowler Ave/Busch Blvd)

Recommended Alternatives
and Transit Orientation Index

Corridor 3: Dale Mabry Highway/Veterans Expressway/Himes Avenue

Overview of Corridor - Corridor 3 facilitates north/south travel in western Hillsborough County along three major roadways: Dale Mabry Highway, Veterans Expressway, and Himes Avenue. Major service areas include Land O' Lakes and the SR 54 corridor in Pasco County, the Dale Mabry corridor from Pasco County to Gandy Boulevard, Citrus Park, Westshore, and downtown Tampa. Transfer opportunities would exist in the Dale Mabry or Citrus Park areas (Corridor 2) in northwest Hillsborough County and in downtown Tampa or the Dale Mabry Highway/Gandy Boulevard area in south Tampa (Corridor 4).

Four preliminary alternatives were reduced to three recommended alternatives by providing optional segments for one of the final three alternatives. None of the preliminary corridor segments were eliminated. The recommended corridor alternatives were aligned to ensure service to areas that are BRT supportive and/or have very high/high transit orientation.

Preliminary Corridor Alternatives - The preliminary alternatives for Corridor 3 are listed below and illustrated in Appendix A (Maps A-5 and A-6). Map A-5 includes an overlay of the DTA and Map A-6 reflects an overlay of the TOI.

- 3.1 - Dale Mabry Highway from Pasco County to MacDill Air Force Base
- 3.2 - Veterans Expressway from Dale Mabry Highway to Boy Scout Boulevard to Westshore Boulevard to Kennedy Boulevard to Downtown Tampa
- 3.3 - Veterans Expressway from Pasco County to I-275 to Downtown Tampa
- 3.4 - Dale Mabry Highway from Pasco County to Busch Boulevard to Himes Avenue to Columbus Drive to Dale Mabry Highway to MacDill Air Force Base

Recommended Corridor Alternatives - The recommended corridor alternatives are listed below and illustrated in Maps 2-5 (includes overlay of DTA) and 2-6 (includes overlay of TOI).

- 3.1 - Dale Mabry Highway from Pasco County to MacDill Air Force Base
- 3.2 - Dale Mabry Highway from Pasco County to Busch Boulevard to Himes Avenue to Columbus Drive to Dale Mabry Highway to MacDill Air Force Base
- 3.3 - Veterans Expressway from Pasco County to I-275 to Downtown Tampa
    - North Option 1 - Veterans Expressway from Dale Mabry
    - South Option 2 - Boy Scout Boulevard from Memorial Highway to Westshore Boulevard to Kennedy Boulevard to Downtown Tampa

Legend

Recommended Corridor Alternatives

- 3.1: Dale Mabry Highway from Pasco County to MacDill Air Force Base
- 3.2: Dale Mabry Highway from Pasco County to Busch Boulevard to Himes Avenue to Columbus Drive to Dale Mabry Highway to MacDill Air Force Base
- 3.3: Veterans Expressway from Pasco County to I-275 to Downtown Tampa
- 3.3 Option 1: Veterans Expressway from Dale Mabry Highway
- 3.3 Option 2: West Spruce Street from Memorial Highway to Westshore Boulevard to Kennedy Boulevard to Downtown Tampa

2025 Density Threshold Assessment for BRT*

- Residential and Employment
- Residential (6+ dwelling units/acre)
- Employment (5+ employees/acre)

*Note: The Density Threshold Assessment (DTA) evaluates transit feasibility through industry standard relationships between population/employment densities and varying levels of transit investments. BRT supportive areas are characterized by 6+ dwelling units per acre and/or 5+ employees per acre.

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Miles
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Metropolitan Planning Organization for Transportation

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map 2-5: Corridor 3
(Dale Mabry Hwy/Veterans Expressway/Himes Ave)
Recommended Alternatives and
Density Threshold Assessment for BRT

Legend

Recommended Corridor Alternatives

- 3.1: Dale Mabry Highway from Pasco County to MacDill Air Force Base
- 3.2: Dale Mabry Highway from Pasco County to Busch Boulevard to Himes Avenue to Columbus Drive to Dale Mabry Highway to MacDill Air Force Base
- 3.3: Veterans Expressway from Pasco County to I-275 to Downtown Tampa
- 3.3 Option 1: Veterans Expressway from Dale Mabry Highway
- 3.3 Option 2: West Spruce Street from Memorial Highway to Westshore Boulevard to Kennedy Boulevard to Downtown Tampa

Transit Orientation*

- Very High
- High
- Medium
- Low

*Note: The Transit Orientation Index (TOI) identifies market potential through an index that integrates population segments traditionally oriented to transit use. Population segments include elderly, youth, low-income, no vehicle, and higher population density. The index identifies areas of the county with higher concentrations of transit-oriented population relative to other areas in the county.

N

Miles

1 0.5 0 1

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map 2-6: Corridor 3
(Dale Mabry Hwy/Veterans Expressway/Himes Ave)

Recommended Alternatives and Transit Orientation Index

Corridor 4: Selmon Expressway (connecting to South Brandon)

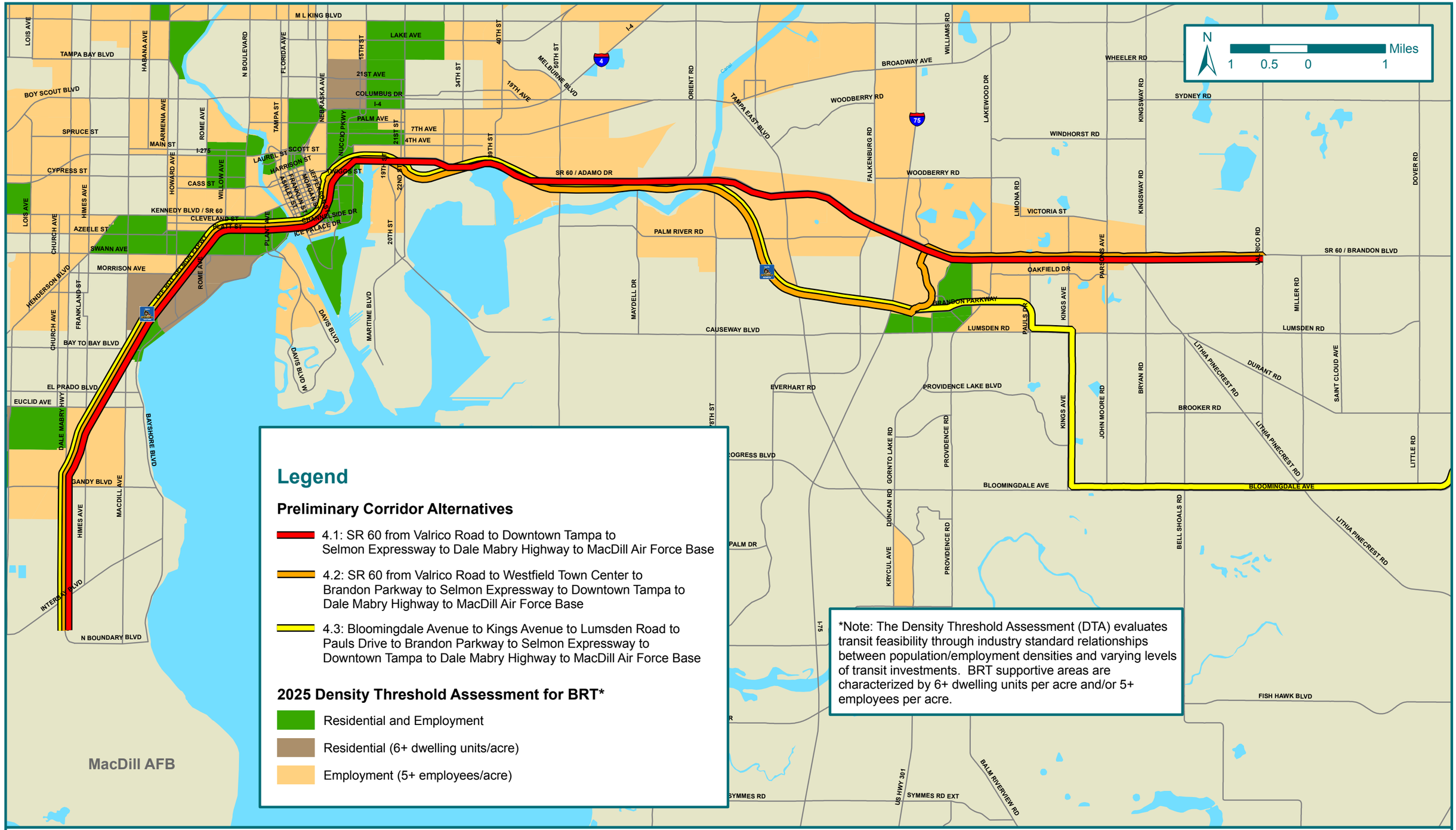
Overview of Corridor - Corridor 4 facilitates east/west travel in Hillsborough County, with connections between Brandon, downtown Tampa, South Tampa, and MacDill Air Force Base. Major roadways within the corridor include Bloomingdale Avenue, Kings Avenue, and Brandon Parkway in the Brandon area, along with SR 60 and the Selmon Expressway providing connections into downtown and South Tampa. Five preliminary alternatives were reduced to three recommended alternatives by reducing the options for serving south Brandon. Similar to the other corridors, areas that are BRT supportive and/or have very high/high transit orientation were reviewed to ensure that service is provided by one or more of the recommended corridor alternatives.

Preliminary Corridor Alternatives - The preliminary alternatives for Corridor 4 are listed below and illustrated in Appendix A (Maps A-7 and A-8. Map A-7 includes an overlay of the DTA and Map A-8 reflects an overlay of the TOI.

- 4.1 - SR 60 from Valrico to Brandon Westfield Town Center to Brandon Parkway to Selmon Expressway to Gandy Boulevard to Dale Mabry to MacDill Air Force Base (requires north/south circulators in Brandon)
- 4.2 - Lithia Pinecrest to SR 60 to mall to Brandon Parkway to Selmon Expressway to Downtown Tampa to Dale Mabry Highway to MacDill Air Force Base
- 4.3 - Bloomingdale to Kings to Lumsden Road to Brandon Parkway to Selmon Expressway to Downtown Tampa to Dale Mabry Highway to MacDill Air Force Base
- 4.4 - Bell Shoals to Lithia Pinecrest to SR 60 to mall to Brandon Parkway to Selmon Expressway to Downtown Tampa to Dale Mabry Highway to MacDill Air Force Base
- 4.5 - SR 60 from Valrico Road to Downtown Tampa to Selmon Expressway to Dale Mabry to MacDill Air Force Base

Recommended Corridor Alternatives **-** The recommended corridor alternatives are listed below and illustrated in Maps 2-7 (includes overlay of DTA) and 2-8 (includes overlay of TOI).

- 4.1 - SR 60 from Valrico Road to Downtown Tampa to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base
- 4.2 - SR 60 from Valrico Road to Brandon Westfield Town Center to Brandon Parkway to Selmon Expressway to Gandy Boulevard to Dale Mabry Highway to MacDill Air Force Base
- 4.3 - Bloomingdale Avenue to Kings Avenue to Lumsden Road to Brandon Parkway to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base



Hillsborough County
Bus Rapid Transit Corridor Assessment

Map 2-7: Corridor 4 (Selmon Expressway/SR 60/South Brandon)

Recommended Alternatives and
Density Threshold Assessment for BRT

Legend

Preliminary Corridor Alternatives

- 4.1: SR 60 from Valrico Road to Downtown Tampa to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base
- 4.2: SR 60 from Valrico Road to Westfield Town Center to Brandon Parkway to Selmon Expressway to Downtown Tampa to Dale Mabry Highway to MacDill Air Force Base
- 4.3: Bloomingdale Avenue to Kings Avenue to Lumsden Road to Pauls Drive to Brandon Parkway to Selmon Expressway to Downtown Tampa to Dale Mabry Highway to MacDill Air Force Base

Transit Orientation*

- Very High
- High
- Medium
- Low

*Note: The Transit Orientation Index (TOI) identifies market potential through an index that integrates population segments traditionally oriented to transit use. Population segments include elderly, youth, low-income, no vehicle, and higher population density. The index identifies areas of the county with higher concentrations of transit-oriented population relative to other areas in the county.

MacDill AFB

N

1 0.5 0 1 Miles

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map 2-8: Corridor 4 (Selmon Expressway/SR 60/South Brandon)

Recommended Alternatives
and Transit Orientation Index

Summary

In summary, Maps 2-9 and 2-10 illustrate the recommended alternatives for all four corridors. Map 2-9 includes an overlay of the DTA and Map 2-10 reflects an overlay of the TOI. This map provides a visual perspective of network connectivity for the corridors selected for this evaluation.

Brainstorming Session

A brainstorming session with the technical team was facilitated on Thursday, May 3, 2007, at the Center for Urban Transportation Research. The technical team included representatives from the following organizations:

Agencies

- Hillsborough County MPO
- Hillsborough Area Regional Transit
- Florida Department of Transportation, District VII
- Hillsborough County City/County Planning Commission
- City of Tampa

Consulting Team

- National Bus Rapid Transit Institute/Center for Urban Transportation Research
- Tindale-Oliver & Associates, Inc.
- Renaissance Planning Group
- Parsons Brinkerhoff

The purpose of this session was to obtain feedback on the recommended corridor alternatives and evaluation methodology prior to moving forward with the evaluation and prioritization of corridor alternatives. Input from this brainstorming session is summarized below.

- The discussion of evaluation criteria resulted in a request to include the following criteria. With the exception of potential future ridership, the requested criteria are included in the evaluation presented in Section 3. Potential future ridership was excluded due to data limitations to support ridership projections on all 12 of the corridor alternatives. The additional criteria include:

    - Potential future ridership (excluded due to data limitations)
    - Order-of-magnitude cost
    - Transit orientation index
    - Regional connectivity
    - Pedestrian access

N

Miles

2 1 0 2

Pasco County

Manatee County

*Note: The Density Threshold Assessment (DTA) evaluates transit feasibility through industry standard relationships between population/employment densities and varying levels of transit investments. BRT supportive areas are characterized by 6+ dwelling units per acre and/or 5+ employees per acre.

Legend

Recommended Corridor Alternatives

- Alternative 1.1
- Alternative 1.2
- Alternative 1.3
- Alternative 2.1
- Alternative 2.2
- Alternative 2.3
- Alternative 3.1
- Alternative 3.2
- Alternative 3.3
- Alternative 4.1
- Alternative 4.2
- Alternative 4.3

2025 Density Threshold Assessment for BRT*

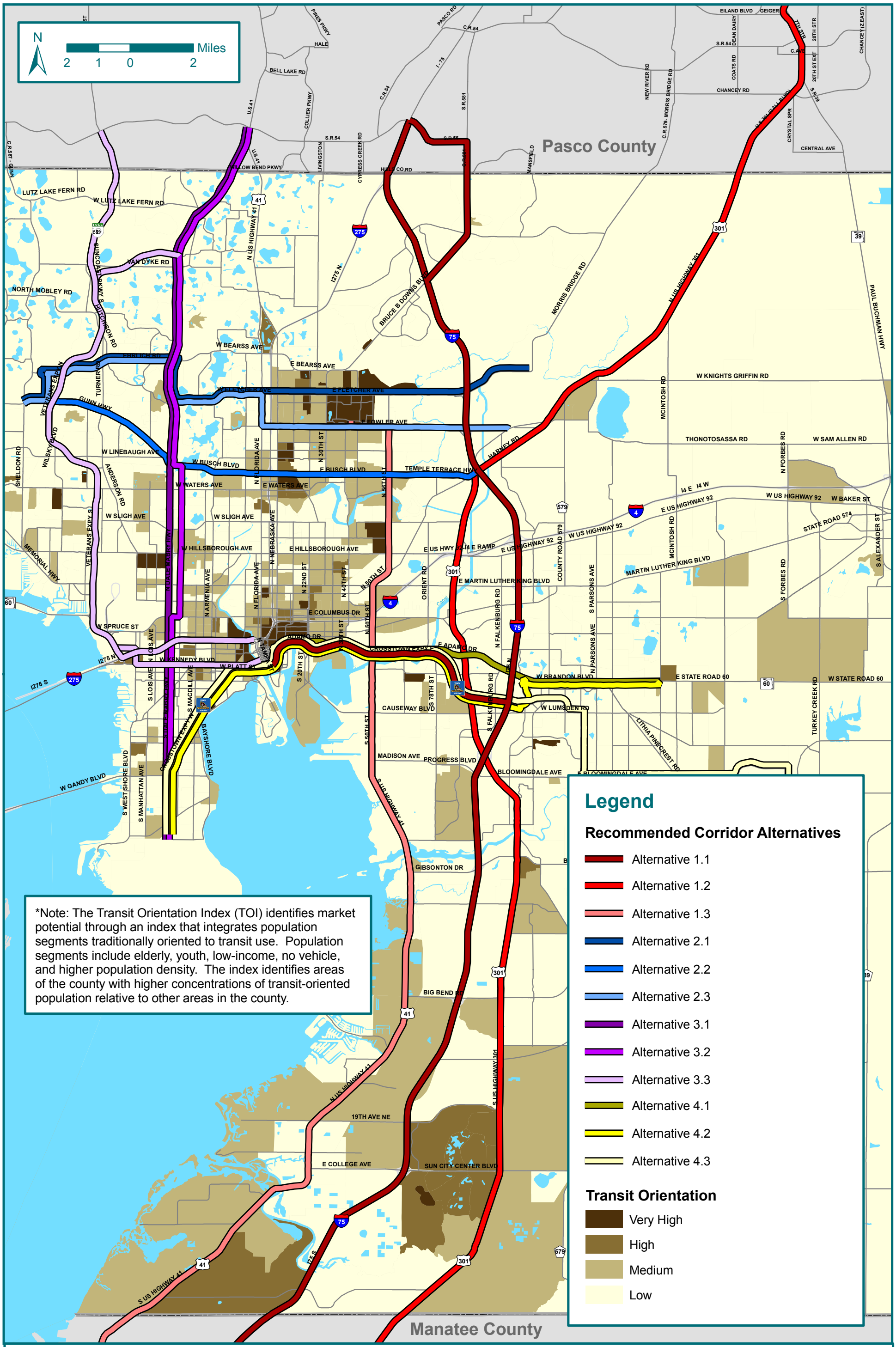
- Residential and Employment
- Residential (6+ dwelling units/acre)
- Employment (5+ employees/acre)

METROPOLITAN PLANNING ORGANIZATION FOR TRANSPORTATION

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map 2-9: All Corridors

Recommended Alternatives and Density Threshold Assessment for BRT



METROPOLITAN PLANNING ORGANIZATION FOR TRANSPORTATION

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map 2-10: All Corridors

Recommended Alternatives
and Transit Orientation Index

- A comment was received regarding the potential consideration of Waters Avenue as an east/west transit corridor with a connection to HART's new Northwest Transit Center. While an evaluation of Waters Avenue is beyond the scope of this BRT corridor assessment, this corridor should receive consideration as part of the broader MPO Transit Study.

Several comments were received about other corridors that are likely to have greater feasibility for future transit investments. All of the corridors that were mentioned are either identified as transit emphasis corridors and/or are being evaluated as part of the broader MPO Transit Study. It will be important to ultimately illustrate the integration of the corridor alternatives evaluated in this BRT study with the broader transit network being developed for Hillsborough County.

Section 3
PRIORITIZATION OF CORRIDOR ALTERNATIVES

This section presents the criteria and methodology utilized to prioritize the corridor alternatives selected for the BRT assessment. The results of this process are also detailed herein through the identification of the best near-term option within each of the four study corridors for potential premium transit service implementation. Finally, an order-of-magnitude cost for capital implementation was estimated for each of the identified alternatives for the four study corridors based on assumed levels of premium transit service investment.

EVALUATION METHODOLOGY

An evaluation methodology was developed to address five major objectives that are generally consistent with Federal Transit Administration (FTA) guidelines for pursuing federal funding for transit capital investments. The five objectives include:

- Ridership
- Capital Cost Effectiveness
- Operating Cost Efficiency
- Rider Potential
- Accessibility

For each objective, two to four criteria were established to facilitate an assessment of the alternatives developed for each corridor. Table 3-1 presents the corridor evaluation methodology. This table includes the following columns:

- Objective (5 objectives)
- Criteria (13 criteria)
- Measure (description of how criteria are measured)
- Weight (6 criteria are weighted double that of the other 7 criteria)
- Thresholds (developed as part of analysis for assigning scores to each alternative)

The evaluation methodology and criteria measurement are reviewed in greater detail in Appendix B. As noted in the table, two of the selected criteria were not analyzed as part of the overall evaluation. In one case, for the potential future ridership criterion, this was due to the unavailability of data necessary to assess this item. In the other case, for the order-of-magnitude cost criterion, it was decided that this item is not necessarily a fair comparative factor since corridor investment costs are primarily a local decision based on a number of considerations and/or desired goals. As a result, later in this section the concept of order-of-magnitude costs is more appropriately utilized to assess the potential costs for implementing varying levels of premium transit service along each of the corridor alternatives, including the four priority ones.

Table 3-1
BRT Corridor Evaluation Methodology

Objectives	Criteria	Measure	Weights [b]	Thresholds [a] 5	3	1	Score [c]
A. Ridership	1. Current ridership	Average weekday ridership per mile	2	High	Medium	Low	
	2. Potential future ridership	Projected weekday ridership per mile (as available from MPO model data)	2	High	Medium	Low	
B. Capital Cost Effectiveness	1. Right-of-way (ROW) availability	General assessment of ROW availability	1	High	Medium	Low	
	2. Potential for coordinated improvements	Review of roadway improvement plans (including ITS improvements)	1	High	Medium	Low	
	3. Order-of-Magnitude Cost	Sketch-level estimated capital cost per mile	2	High	Medium	Low	
C. Operating Cost Efficiency	1. Intersection delay potential	Average number of signalized intersections per mile in corridor	2	High	Medium	Low	
	2. Level of congestion	Average roadway Level of Service in corridor	1	D or better	E	F	
D. Rider Potential	1. Density Threshold Assessment (DTA)	DTA index based on residential and employment densities	2	High	Medium	Low	
	2. Transit Orientation Index (TOI)	TOI index based on Census demographic characteristics	2	High	Medium	Low	
E. Accessibility	1. Access to activity centers	Number of major activity centers per mile	1	High	Medium	Low	
	2. Transit connectivity	Number of transfer opportunities with existing, non-parallel local & planned premium transit services per mile	1	High	Medium	Low	
	3. Regional connectivity	Number of transfer opportunities with inter-county services or connection to adjacent counties	1	≥2	1	0	
	4. Bicycle/pedestrian access	Average bicycle/pedestrian coverage along the length of the corridor	1	High	Medium	Low	
						Total Score (Sum)	

a. Threshold levels are assumed for explanatory purposes and will be calibrated by using available data prior to evaluation.
b. Weights are recommended and will be confirmed with MPO staff and study stakeholders.
c. Score = weight times threshold level.

Note: Shaded criteria are excluded from the analysis due to either insufficient data (A2) or MPO staff direction (B3). It was decided that, since corridor investment costs are a local decision based on a host of factors and not necessarily a fair comparative criterion, the concept of order-of-magnitude costs has been more appropriately utilized in this study to assess the potential costs for implementing varying levels of premium transit service along the corridor alternatives.

PRIORITIZATION OF CORRIDOR ALTERNATIVES

The results of the prioritization process are summarized in Table 3-2. The specific scoring by criteria for each corridor alternative is included in Table B-1 in Appendix B.

Table 3-2
Prioritization of All Corridor Alternatives

Corridor Alternative	General Description	Total Score	Rank
Alternative 1.1	I-75 from SR 54 to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa • Option 1 - SR 56 from SR 54 to BBD to I-75	45	1
Alternative 2.1	Fletcher Avenue from US 301 to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall	43	2
Alternative 4.2	SR 60 from Valrico Road to Brandon Westfield Town Center to Brandon Parkway to Selmon Expressway to Gandy Boulevard to Dale Mabry Highway to MacDill Air Force Base	43	2
Alternative 1.2	US 301 from Zephyrhills to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa	39	4
Alternative 1.3	US 41 from USF to Sarasota/Manatee and Selmon Expressway from US 41 to Downtown Tampa	39	4
Alternative 2.2	Busch Boulevard from US 301 to Gunn Highway to Citrus Park Mall	37	6
Alternative 3.2	Dale Mabry Highway from Pasco County to Busch Boulevard to Himes Avenue to Columbus Drive to Dale Mabry Highway to MacDill Air Force Base	35	7
Alternative 3.3	Veterans Expressway from Pasco County to I-275 to Downtown Tampa • North Option 1 - Veterans Expressway from Dale Mabry • South Option 2 - Boy Scout Boulevard from Memorial Highway to Westshore Boulevard to Kennedy Boulevard to Downtown Tampa	35	7
Alternative 4.1	SR 60 from Valrico Road to Downtown Tampa to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base	33	9
Alternative 3.1	Dale Mabry Highway from Pasco County to MacDill Air Force Base	31	10
Alternative 2.3	Fowler Avenue from US 301 to Florida Avenue to Fletcher Avenue to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall	29	11
Alternative 4.3	Bloomingdale Avenue to Kings Avenue to Lumsden Road to Brandon Parkway to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base	27	12

As indicated previously in Table 3-2, in priority order, the top four corridor alternatives include:

- Alternative 1.1 – I-75/Selmon Expressway
- Alternative 2.1 – Ehrlich Road/Fletcher Avenue
- Alternative 4.2 – SR 60/Westfield Town Center/Selmon Expressway
- Alternative 3.2 – Dale Mabry Highway/Himes Avenue

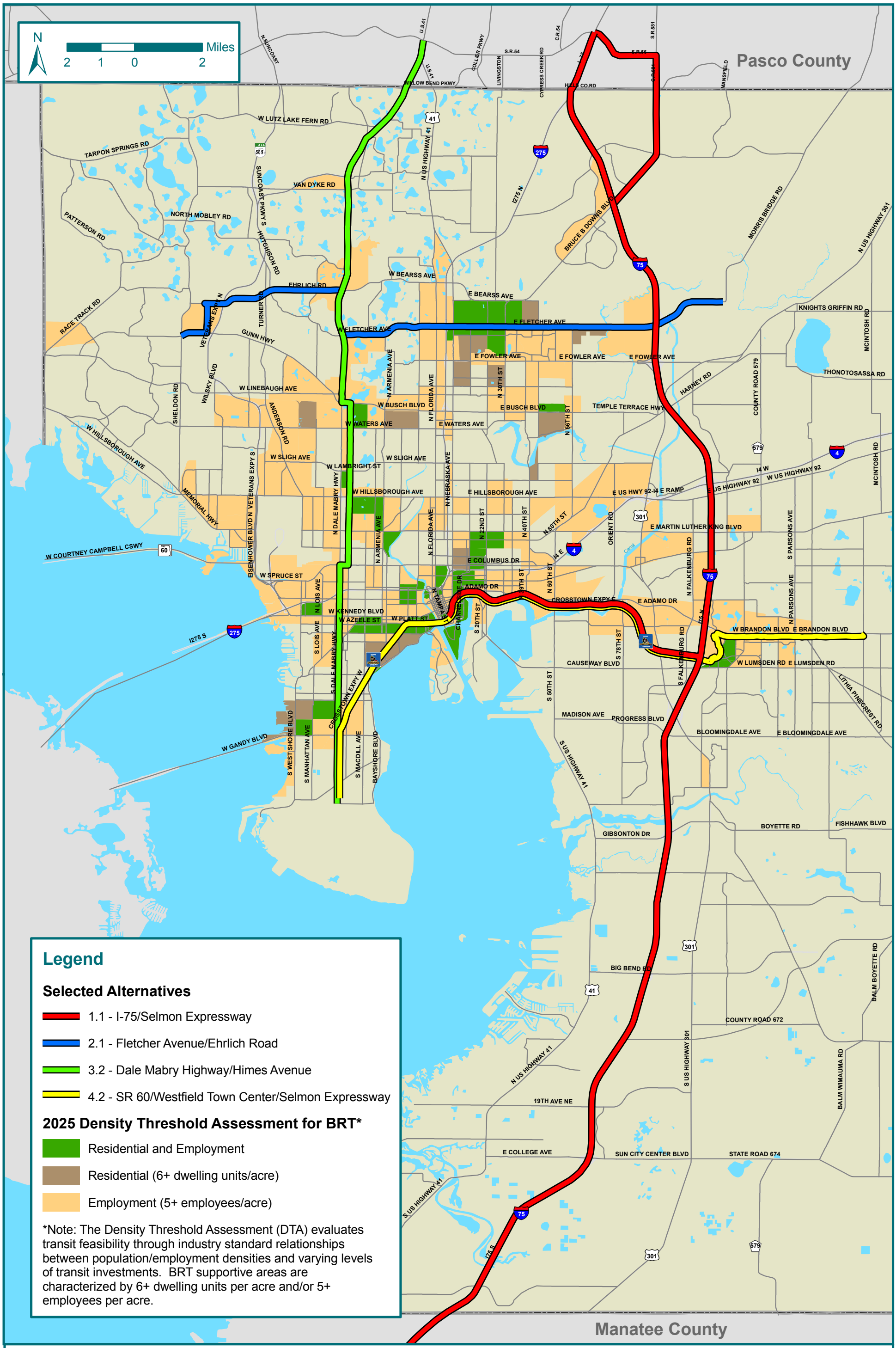
Although Alternatives 3.2 and 3.3 within the Veterans Expressway/Dale Mabry Highway corridor tied in the analysis results with a total score of 35 points each, Alternative 3.2 was prioritized based on the use of a relatively straightforward tie-breaking procedure. The tie-breaking method that was used considered the total score of the "major" criteria for each of the two alternatives to derive a secondary comparative score. The major criteria include those evaluation criteria with a weight of two (indicating a relative higher level of importance in the scoring schema), i.e., current ridership, intersection delay potential, Density Threshold Assessment, and Transit Orientation Index. Using this procedure, Alternative 3.2 received a secondary score of 20 and Alternative 3.3 received a secondary score of 16.

Table 3-3 is similar to Table 3-2, except that instead of indicating the overall priority scoring for all of the alternatives compared to one another, it summarizes the alternative priorities within each corridor.

Map 3-1 illustrates the highest-rated alternative within each corridor. This map is useful in illustrating the potential network connectivity of the four priority corridor alternatives resulting from the evaluation. Furthermore, it again should be noted that it will be important to ultimately illustrate the integration of these corridor alternatives with the broader transit network being developed for Hillsborough County.

Table 3-3
Prioritization of Alternatives within Each Corridor

Corridor Alternative	General Description	Total Score	Rank
Alternative 1.1	I-75 from SR 54 to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa • Option 1 – SR 56 from SR 54 to BBD to I-75	45	1
Alternative 1.2	US 301 from Zephyrhills to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa	39	2
Alternative 1.3	US 41 from USF to Sarasota/Manatee and Selmon Expressway from US 41 to Downtown Tampa	39	3
Alternative 2.1	Fletcher Avenue from US 301 to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall	43	1
Alternative 2.2	Busch Boulevard from US 301 to Gunn Highway to Citrus Park Mall	37	2
Alternative 2.3	Fowler Avenue from US 301 to Florida Avenue to Fletcher Avenue to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall	29	3
Alternative 3.2	Dale Mabry Highway from Pasco County to Busch Boulevard to Himes Avenue to Columbus Drive to Dale Mabry Highway to MacDill Air Force Base	35	1
Alternative 3.3	Veterans Expressway from Pasco County to I-275 to Downtown Tampa • North Option 1 – Veterans Expressway from Dale Mabry • South Option 2 – Boy Scout Boulevard from Memorial Highway to Westshore Boulevard to Kennedy Boulevard to Downtown Tampa	35	2
Alternative 3.1	Dale Mabry Highway from Pasco County to MacDill Air Force Base	31	3
Alternative 4.2	SR 60 from Valrico Road to Brandon Westfield Town Center to Brandon Parkway to Selmon Expressway to Gandy Boulevard to Dale Mabry Highway to MacDill Air Force Base	43	1
Alternative 4.1	SR 60 from Valrico Road to Downtown Tampa to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base	33	2
Alternative 4.3	Bloomingdale Avenue to Kings Avenue to Lumsden Road to Brandon Parkway to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base	27	3


N
Miles
2 1 0 2
Pasco County
Manatee County
U.S.41
N SUNCOAST
GOLLER PKWY
S.R.54
LIVINGSTON
CYPRESS CREEK RD
C.R.54
S.R.581
MANSFIELD
WILLOW BEND PKWY
HILLS CO.RD
W LUTZ LAKE FERN RD
TARPON SPRINGS RD
SUNCOAST PKWY S
VAN DYKE RD
NORTH MOBLEY RD
PATTERSON RD
HUTCHISON RD
N US HIGHWAY 41
I275 N
BRUCE B DOWNS BLVD
MORRIS BRIDGE RD
N US HIGHWAY 301
W BEARSS AVE
EHRLICH RD
E BEARSS AVE
KNIGHTS GRIFFIN RD
RACE TRACK RD
VETERANS EXPY N
TURNER RD
GUNN HWY
W FLETCHER AVE
E FLETCHER AVE
MCINTOSH RD
E FOWLER AVE
THONOTOSASSA RD
HARNEY RD
COUNTY ROAD 579
WILSKY BLVD
SHELDON RD
W LINEBAUGH AVE
N ARMENIA AVE
N FLORIDA AVE
N 30TH ST
W BUSCH BLVD
E BUSCH BLVD
TEMPLE TERRACE HWY
ANDERSON RD
W WATERS AVE
E WATERS AVE
N 56TH ST
W HILLSBOROUGH AVE
W SLIGH AVE
W LAMBRIGHT ST
N NEBRASKA AVE
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E US HWY 92-I4 E RAMP
E HILLSBOROUGH AVE
N DALE MABRY HWY
N 22ND ST
N 40TH ST
N 50TH ST
ORIENT RD
E MARTIN LUTHER KING BLVD
S PARSONS AVE
EISENHOWER BLVD N VETERANS EXPY S
MEMORIAL HWY
W COURTNEY CAMPBELL CSWY
E COLUMBUS DR
W SPRUCE ST
N LOIS AVE
N TAMPA ST
CHANNELSIDE DR
ADAMO DR
39TH ST
I4 E
CROSSTOWN EXPY E
E ADAMO DR
N FALKENBURG RD
I75 N
W KENNEDY BLVD
W AZEELE ST
W PLATT ST
S 20TH ST
W BRANDON BLVD E BRANDON BLVD
I275 S
S LOIS AVE
S DALE MABRY HWY
S 78TH ST
CAUSEWAY BLVD
W LUMSDEN RD E LUMSDEN RD
CROSSTOWN EXPY W
S 50TH ST
S FALKENBURG RD
LITHIA PINECREST RD
MADISON AVE
PROGRESS BLVD
BLOOMINGDALE AVE
E BLOOMINGDALE AVE
W GANDY BLVD
S WEST SHORE BLVD
S MANHATTAN AVE
S MACDILL AVE
BAYSHORE BLVD
S US HIGHWAY 41
BOYETTE RD
FISHHAWK BLVD
GIBSONTON DR
BIG BEND RD
COUNTY ROAD 672
BALM BOYETTE RD
N US HIGHWAY 41
S US HIGHWAY 301
BALM WIMAUMA RD
19TH AVE NE
E COLLEGE AVE
SUN CITY CENTER BLVD
STATE ROAD 674
I75 S
Canal
Legend
Selected Alternatives
1.1 - I-75/Selmon Expressway
2.1 - Fletcher Avenue/Ehrlich Road
3.2 - Dale Mabry Highway/Himes Avenue
4.2 - SR 60/Westfield Town Center/Selmon Expressway
2025 Density Threshold Assessment for BRT*
Residential and Employment
Residential (6+ dwelling units/acre)
Employment (5+ employees/acre)
*Note: The Density Threshold Assessment (DTA) evaluates transit feasibility through industry standard relationships between population/employment densities and varying levels of transit investments. BRT supportive areas are characterized by 6+ dwelling units per acre and/or 5+ employees per acre.
METROPOLITAN PLANNING ORGANIZATION FOR TRANSPORTATION
Hillsborough County
Bus Rapid Transit Corridor Assessment
Map 3-1: Selected Alternatives
Selected Alternatives and
Density Threshold Assessment for BRT

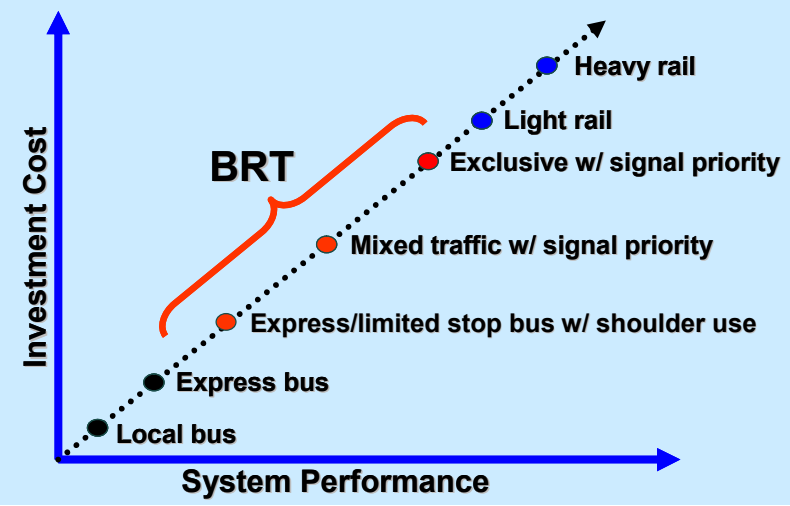
ORDER-OF-MAGNITUDE COSTS

As noted at the outset of this section, an order-of-magnitude cost for capital implementation was estimated for each of the corridor alternatives based on assumed levels of premium transit service investment. The following information presents the order-of-magnitude costs and details how these costs were estimated.

Hierarchy of Transit Investments

In order to estimate order-of-magnitude capital costs, first a hierarchy of transit investments must be assumed for this purpose. Potential components of the hierarchy are illustrated in Figure 3-1. The chart shows that, as transit performance increases, so does the investment cost. The transit investment relationship begins with local bus service (traditional, flex-route, etc.) and then increases gradually to various BRT alternatives and ultimately to rail technologies.

Figure 3-1
Hierarchy of Transit Investments: Relationship of Transit Cost and Performance



Since this study is focused on bus alternatives, the hierarchy of options was limited to the range from local bus alternatives to the highest level of BRT, which is an exclusive running way with signal priority (and/or other bus preferential treatments). A description of this hierarchy was developed and ranges of unit capital cost projections were estimated for each level of transit investment included in this analysis. These levels were then considered and applied to the appropriate segments of each of the corridor alternatives.

Levels of Premium Transit Investment

Six potential investment levels are documented herein to reflect typical low-end to high-end transit investments (2 traditional transit levels and 4 premium transit levels). Order-of-magnitude cost projections were developed for the four highest levels of premium service among the six investment levels, including the implementation of BRT alternatives. Since the cost estimates are intended to be conceptual in this study, the order-of-magnitude cost projections were based on a range of typical capital costs for each of three standard element cost categories, reflecting the implementation experiences of various systems around the U.S. and elsewhere for these types of services. The capital cost projections account for (1) construction of running ways, (2) station costs, and (3) transit signal priority treatments.

A fourth element, vehicle acquisition, was considered for capital costing purposes. However, ultimately it was determined that vehicle costs should not be included in the overall unit costs because of the difficulty in determining the number of vehicles needed for a particular service without specifying its operational characteristics, such as hours and frequency of service. It also is important to recognize that right-of-way acquisition costs were not estimated as part of this project either. In addition, although operating cost efficiency has been considered in this study through the inclusion of several related criteria in the evaluation methodology, operating cost projections were not included due to the significant variability that can occur for this category of costs depending on the level, nature, and operating environment characteristics of the implemented service.

The six levels of transit investment identified for this study include the following:

- Local Bus Service
- Flex Bus Service
- Express/Limited Stop Bus Service (in mixed traffic)
- Express/Limited Stop Bus Service (with conditional shoulder operation as available)
- BRT in Mixed Traffic (with bus preferential treatments)
- BRT on Exclusive Lanes (with bus preferential treatments)

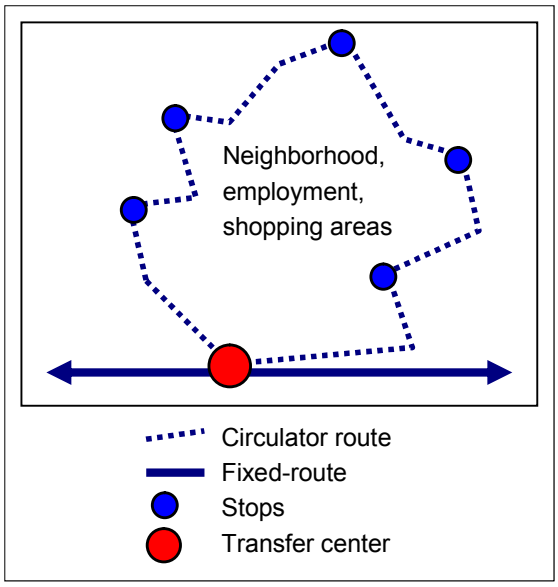
Each level of transit investment is summarized below, including a general description of the service. A summary of the ranges of unit capital costs for the three implementation elements is provided, as well, with the unit capital costs represented on a per-mile basis (vehicle acquisition cost ranges also have been included for informational purposes only). In the case of local and flex bus services, since these lower-level services are part of a more widespread feeder network that would support any implemented express and/or BRT services and are not directly related to the specific implementation of one of the premium investment levels along a given priority corridor alternative, they were not included in this order-of-magnitude cost analysis. Because of the nature of these services and the fact that they would be serving many of the corridor

alternatives simultaneously, it would be impractical to attempt to distribute their implementation costs among the four priority corridor alternatives.

Local Bus Service

Local bus service is the base level of fixed-route public transit service. This type of service operates on a predetermined route with specified transit stops that conform to an established timetable or schedule. For most transit agencies, multiple bus routes are operated concurrently in a network for a fixed period of time each service day to provide access within a specified service area. Local bus service can take a number of different forms, including line-haul service along a major corridor, connector service between major activity centers or corridors, or circulator service within a neighborhood or activity center. Figure 3-2 illustrates some examples of this type of transit service.

Figure 3-2
Conceptual Illustration of Local Bus Service

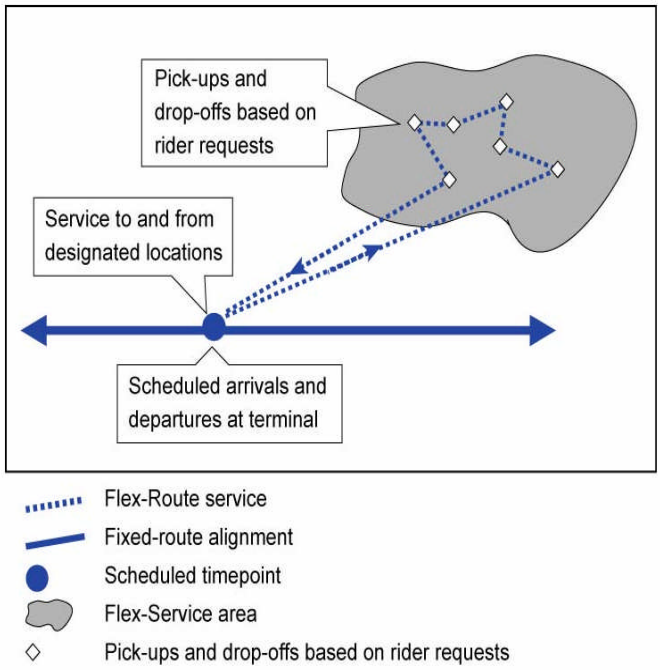


Flex Bus Service

Flex Service is a variant of local bus service that offers transportation anywhere within a defined zone with specific connections to the local bus service for travel outside of the zone. To use this service, passengers call to make an advance reservation to be picked up in their neighborhood and then dropped off at a specific location of the passengers' choosing within the zone or at a designated stop that typically provides connectivity to the rest of the transit system via a local bus route. Passengers also may board without a reservation at an identified flex bus stop and

ask to be brought anywhere within the zone. Figure 3-3 illustrates the basic operational concept behind this service type.

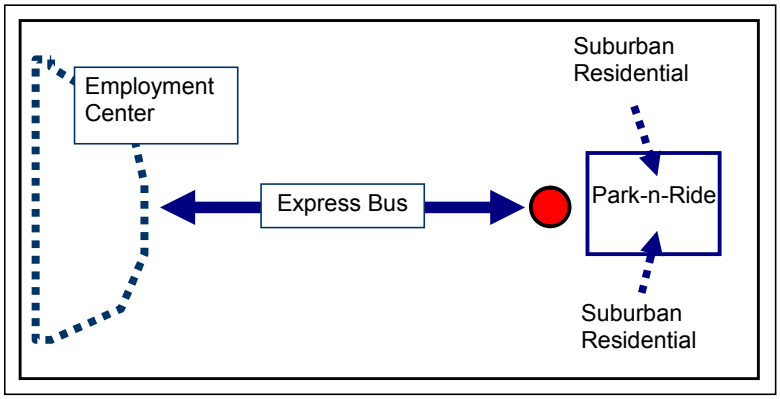
Figure 3-3
Conceptual Illustration of Flex Bus Service



Express/Limited Stop Bus Service

Express bus service, also referred to as limited stop bus service because of its more widely spaced scheduled stops, is a higher level of fixed-route public transit service than local bus service. This type of service is similar to the base local service in that it operates on a predetermined route with specified transit stops that conform to a specific schedule. However, it is different because of its focus on serving work commute trip needs. Because of this focus, express service is faster, typically operates only during peak travel periods in the morning and afternoon, and has fewer designated stops to help maintain its faster travel times. Many transit agencies use this type of service to connect outlying suburban residential areas to downtown cores or other central business districts, or to connect the employment centers themselves. Often, at the suburban residential end of the trip, park-and-ride lots are used to accumulate commuters at a designated stop. In addition, in some applications of express service and depending on the nature of the corridor(s) in which it operates, this type of service can make conditional use of roadway shoulders to bypass congestion and further help maintain its higher average service speeds. Figure 3-4 illustrates some examples of this type of transit service.

Figure 3-4
Conceptual Illustration of Express/Limited Stop Bus Service



BRT in Mixed Traffic (with bus preferential treatments)

Bus Rapid Transit, or BRT, is the highest level of bus-based transit service. As indicated previously in Figure 3-1, BRT encompasses a range of applications between local bus service and rail modes. In fact, in some applications, express bus service can be considered as an entry-level form of BRT. At the higher end of the BRT spectrum, the use of exclusive running ways and various technological and operational elements can elevate BRT to a level that is on par with some light rail and/or streetcar applications. Basically, BRT can be defined as "a high performance transit service that combines high levels and quality of service with a quality image and unique identity."

One of the lower levels of BRT application is BRT operating along a corridor in mixed traffic (i.e., no separate or exclusive running way). Mixed-traffic BRT operations assume that the BRT service will operate along the right lane of the current road right-of-way with other vehicle traffic. This investment level minimizes the capital cost to acquire the additional right-of-way that would be otherwise needed for an exclusive running way, but also reduces travel time savings due to the mixed-traffic operation.

In order to distinguish this level of BRT service from traditional express/limited stop service and to maintain the BRT service's rapid transportation characteristics, it is typical that some level of transit signal priority (TSP) is utilized at all (or most) signalized intersections along the corridor once the BRT service is in operation. This can include mainline TSP, conditional TSP, or combined TSP and queue jump operations.

Additionally, to further emphasize the premium service offered by BRT, enhanced designated stations are the preferred station type at each of the widely-spaced station locations. Enhanced

stations differ from simple or enhanced local bus stops in terms of design, BRT branding, and amenities, such as enhanced weather protection, seating, system information (real-time and/or static displays), and lighting, among others.

BRT on Exclusive Lanes (with bus preferential treatments)

Under this level of investment, the BRT service would operate on a designated running way adjacent to the corridor. Such an operation could function in various forms, including:

- Along an existing shoulder of an arterial roadway;
- Along an existing lane of travel within an arterial roadway that has been dedicated as a BRT travel lane;
- Along available right-of-way within the existing median of an arterial roadway; or
- Along available right-of-way on one or both sides of an arterial roadway.

Similar to the signal priority treatment noted for mixed-traffic BRT operation, depending on the nature of the corridor on which an exclusive-lane BRT would operate, some level of signal priority may be considered at each signalized intersection once the BRT service is in operation. Exclusive travel lanes for the BRT also allow for more effective queue jump operations as the dedicated lane automatically serves as the queue jump lane for the bus service. As such, the implementation of TSP should be pursued at all signalized intersections, if possible.

Summary of Unit Costs

The best current source of information for various BRT-related unit costs is the Federal Transit Administration (FTA) document, *Characteristics of Bus Rapid Transit for Decision-Making* (August 2004), although it is based on limited information from a small number of U.S. and international transit agencies that have implemented BRT. It is important to note that the National Bus Rapid Transit Institute is currently working on a follow-up study that is expected to result in improved, more recent unit costs for various BRT-related operational and capital elements. However, this study is not expected to be completed until late 2007; hence, the information is not available at this time.

Based on this source, Table 3-4 presents estimated unit costs for the three aforementioned standard element capital cost categories (and vehicles) related to the implementation of premium bus services. For each capital cost category, a low and high unit cost is provided. For two of the element-related costs—exclusive busway and shoulder construction/improvement—the source of the indicated data is the Florida Department of Transportation and the data are specifically reflective of current (2006/2007) construction cost experience in District 7.

Table 3-4
Unit Costs by Capital Cost Category

Capital Cost Category	Unit	Unit Capital Cost	
		Low	High
Vehicle			
Conventional Standard	per vehicle	$300,000	$350,000
Stylized Standard		$300,000	$370,000
Conventional Articulated		$500,000	$645,000
Stylized Articulated		$630,000	$950,000
Specialized BRT Vehicles		$950,000	$1,600,000
Station			
Enhanced Stop	per station	$25,000	$35,000
Designated Station		$150,000	$2,500,000
Transit Signal Priority			
TSP without Queue Jump	per intersection	$13,500	$25,000
TSP with Queue Jump		$113,500	$315,000
TSP w/some Queue Jump implemented		$63,500	$170,000
Running Way			
Mixed Flow Lanes	per lane mile	minimal	minimal
At-Grade Exclusive Busway	per centerline mile	$17,760,000	$21,560,000
Shoulder Construction/Improvement		$200,000	$317,000

Sources: *Characteristics of Bus Rapid Transit for Decision-Making* (2004); FDOT Roadway Cost per Centerline Mile table, cost-specific for Hillsborough County (October 2, 2006; used for at-grade exclusive busway element); and FDOT Long Range Estimating System, cost-specific for Hillsborough County (used for shoulder construction/improvement element).

These element-specific unit costs were used to develop the order-of-magnitude unit costs for application to the 12 corridor alternatives. Using general assumptions about which elements apply to a specific level of transit investment, an overall unit cost per mile was estimated for each of four transit implementation scenarios: express/limited stop service in mixed traffic, express/limited stop service using shoulders, BRT in mixed traffic, and BRT on an exclusive running way.

For example, for the express limited stop service modes, it was assumed that these modes would utilize enhanced stops spaced one mile apart, TSP at all signalized intersections, and queue jumps at approximately half of the existing signalized intersections. In the case of the

express/limited stop service using shoulders, an additional cost was assumed for the necessary shoulder improvements to support this type of use. For the BRT service modes, designated stations were assumed (also with a spacing of one mile). The mixed-traffic BRT also assumed costs for implementing TSP at all signalized intersections with queue jumps assumed for only half of these intersections. The exclusive running way BRT service assumed TSP and queue jumps at all signalized intersections, as well as costs associated with the implementation of the exclusive lanes. Table 3-5 specifically details the assumptions used for the application of the capital cost elements to each of the transit investment levels.

Table 3-5
Assumed Application of Capital Cost Elements by Level of Transit Investment

Capital Cost Element	Level of Transit Investment			
	Express/LimStop Mixed Traffic	Express/LimStop Shoulder Use	BRT Mixed Traffic	BRT Exclusive
Enhanced Stop	X	X		
Designated Station			X	X
TSP w/some Queue Jump	X	X	X	
TSP with Queue Jump				X
Mixed Flow Lanes	X		X	
At-Grade Exclusive Busway				X
Shoulder Construction/Improvement		X		

For purposes of estimating the per-mile unit costs for each of the transit investments, the average for each of the constituent element cost ranges was used. A simple way of exemplifying this aspect of the analysis is to consider the cost range for an enhanced stop. Given a range of $25,000 to $35,000 for one stop, an average cost of $30,000 was used in the analysis to price this particular element.

The order-of-magnitude unit capital costs for each of these potential implementation scenarios are summarized in Table 3-6. For each transit investment, a low and high unit cost is provided. Since average constituent element costs were used to develop these estimates, the primary reason for the variability indicated by the low and high unit costs is the application of the corresponding average number of signalized intersections per mile for the various major segments of the corridor alternatives (which ranged from about 0.2 to 2.5 intersections per mile) to the average TSP/queue jump unit cost. Another factor to note regarding these unit costs is that, due to the somewhat dated nature of FTA's 2004 BRT document, the low and high unit

costs utilized from that document have been inflated at a rate of three percent per year to approximate their respective values in current day (i.e., 2007) dollars.

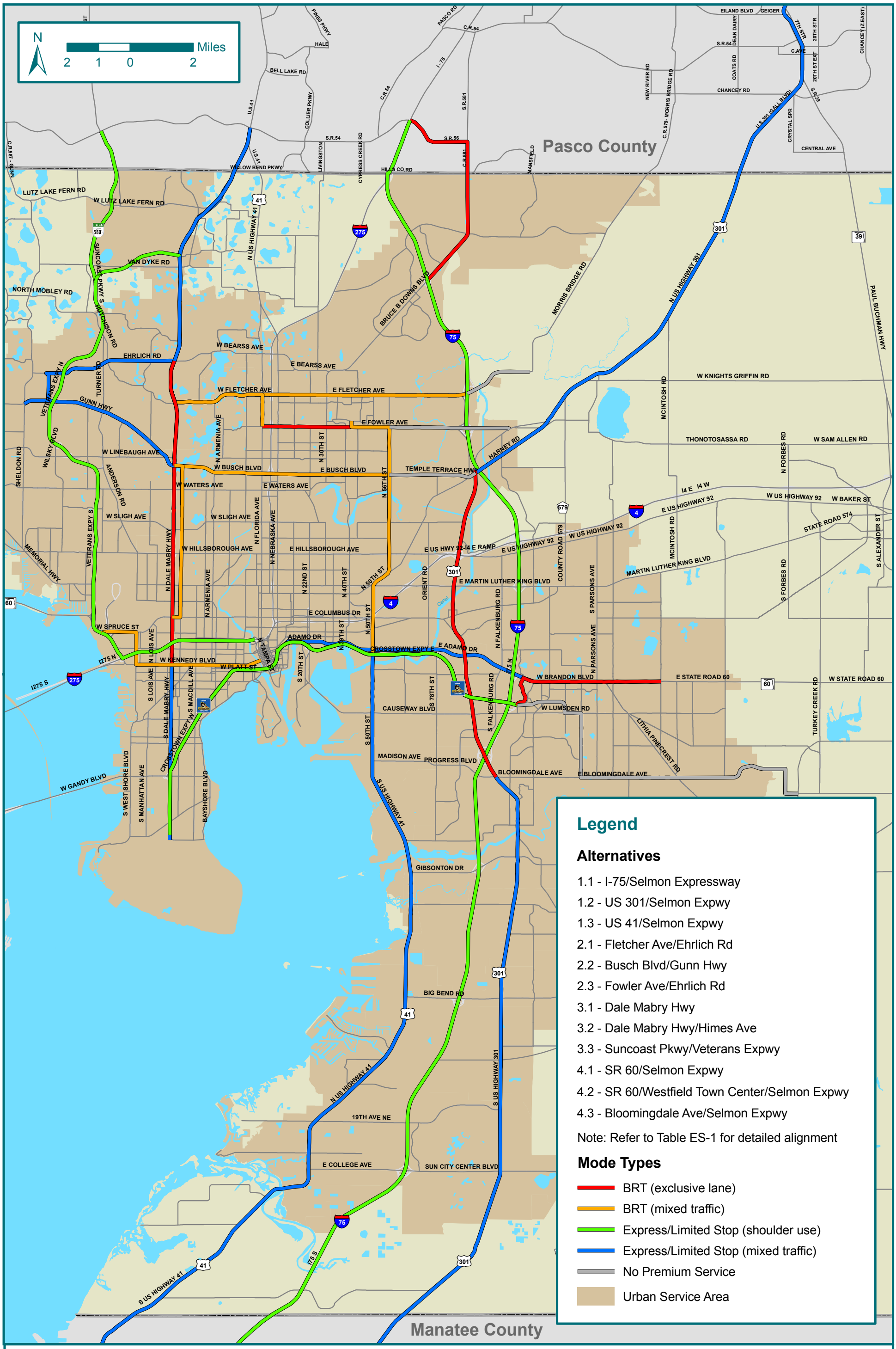
Table 3-6
Order-of-Magnitude Capital Unit Costs by Level of Transit Investment (2007 $)

Transit Investment	Unit Capital Cost per Mile	
	Low	High
Express/Limited Stop (mixed traffic)	$97,000	$352,000
Express/Limited Stop (shoulder use)	$317,000	$495,000
BRT (mixed traffic)	$1,580,000	$1,770,000
BRT (exclusive running way)	$23,050,000	$23,520,000

Note: As noted previously in this section, these unit capital costs do not reflect the acquisition of right-of-way or vehicles. In addition, there are other infrastructure and/or technology costs that are not included, as well, but may be desired for various service implementations. These include such items as specialized farebox equipment, ticket vending machines, real-time passenger information system, automatic passenger counters, automatic vehicle location system, on-board security cameras, and advanced communications system, among others.

In order to apply these unit costs to the 12 corridor alternatives, it was necessary to first assign specific levels of transit investment by segment of roadway for each of the corridors. These recommended modal investment levels were assigned by taking into consideration the DTA and TOI information, specific known characteristics and the nature of the respective roadways (based on the other criteria-based analyses completed for each), and professional judgment regarding the potential future feasibility of the modes under consideration. To exemplify the modal assumptions for the priority corridors, consider the I-75/Selmon Expressway priority alternative (Alternative 1.1) for the I-75 corridor. In this case, the entire lengths of the I-75 and Selmon Expressway components of this alternative were recommended for express/limited stop bus service with conditional shoulder use. However, the optional routing at the northern end of this corridor operating instead on SR 56 and Bruce B. Downs Boulevard was recommended for BRT operating on an exclusive running way. Map 3-2 illustrates the corridor alternatives in terms of their respective assumed levels of transit investment by segment of roadway.

Based on the previous unit costs and the assumed levels of modal investment shown in Map 3-2, an order-of-magnitude total capital cost was developed for each of the corridor alternatives. These costs are presented in Table 3-7 as a total estimate and on a per-mile basis.



Legend

Alternatives

1.1 - I-75/Selmon Expressway
1.2 - US 301/Selmon Expwy
1.3 - US 41/Selmon Expwy
2.1 - Fletcher Ave/Ehrlich Rd
2.2 - Busch Blvd/Gunn Hwy
2.3 - Fowler Ave/Ehrlich Rd
3.1 - Dale Mabry Hwy
3.2 - Dale Mabry Hwy/Himes Ave
3.3 - Suncoast Pkwy/Veterans Expwy
4.1 - SR 60/Selmon Expwy
4.2 - SR 60/Westfield Town Center/Selmon Expwy
4.3 - Bloomingdale Ave/Selmon Expwy

Note: Refer to Table ES-1 for detailed alignment

Mode Types

- BRT (exclusive lane)
- BRT (mixed traffic)
- Express/Limited Stop (shoulder use)
- Express/Limited Stop (mixed traffic)
- No Premium Service
- Urban Service Area

METROPOLITAN PLANNING ORGANIZATION FOR TRANSPORTATION

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map 3-2: All Corridors

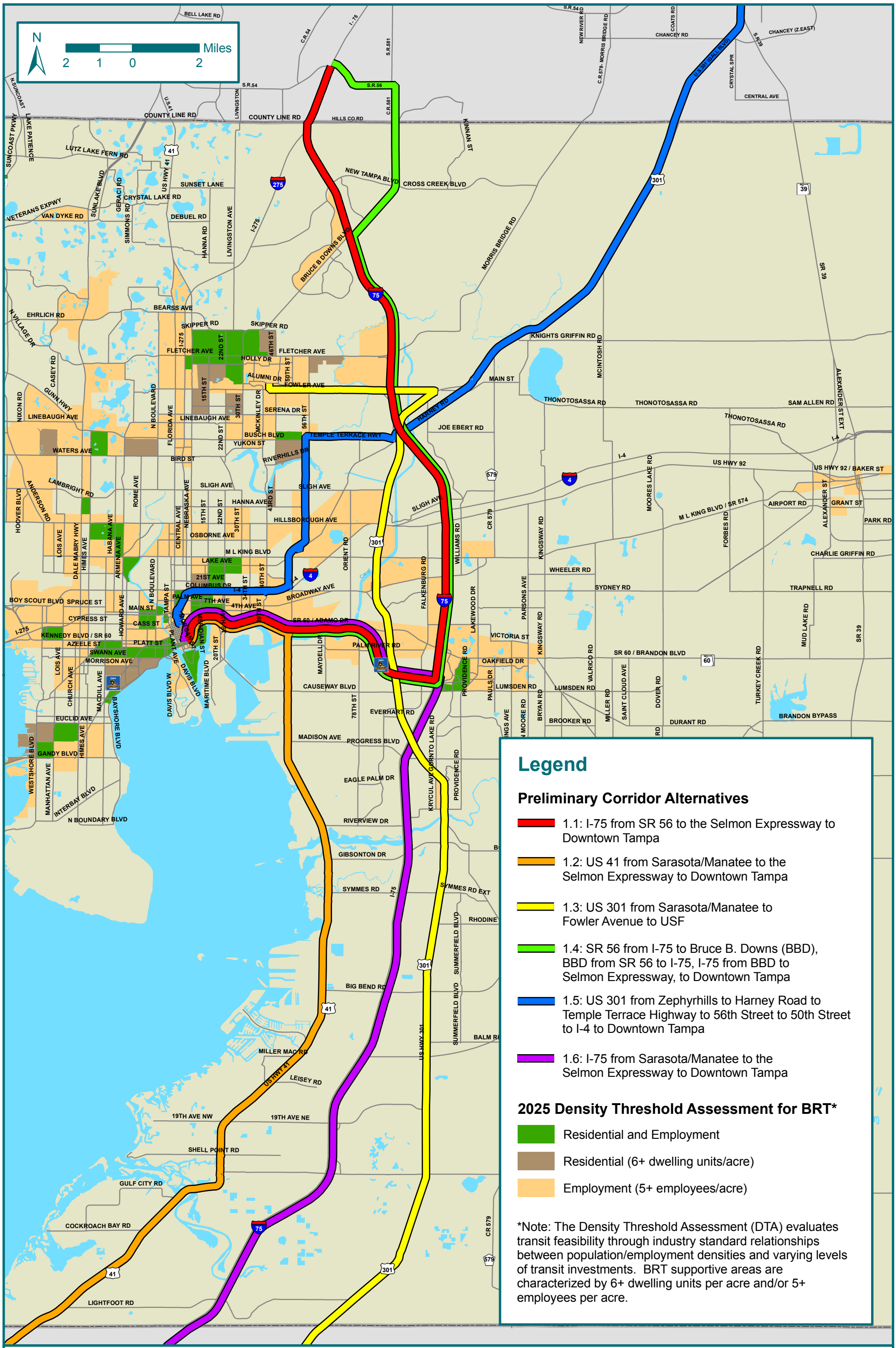
Recommended Alternatives,
Transit Mode Types and Urban Service Area

Table 3-7
Order-of-Magnitude Capital Costs for Corridor Alternatives

Corridor Alternative	General Description	Assumed Levels of Modal Investment	Total Capital Cost	Capital Cost per Mile
Priority Corridors				
1.1	I-75/Selmon Expressway • Bruce B. Downs BRT Option	Exp/Lim Stop – Shoulder BRT – Exclusive Lane	$20,050,000 $180,400,000	$397,000 $3,470,000
2.1	Ehrlich Road/Fletcher Avenue	Exp/Lim Stop – Mixed BRT – Mixed Traffic BRT – Exclusive Lane	$49,680,000	$2,650,000
3.2	Dale Mabry Highway/Himes Avenue	Exp/Lim Stop – Mixed BRT – Mixed Traffic BRT – Exclusive Lane	$128,100,000	$5,380,000
4.2	SR 60/Westfield Town Center/Selmon Expressway	Exp/Lim Stop – Shoulder BRT – Exclusive Lane	$133,830,000	$6,160,000
Other Corridors				
1.2	US 301/Selmon Expressway	Exp/Lim Stop – Mixed Exp/Lim Stop – Shoulder BRT – Exclusive Lane	$238,510,000	$4,400,000
1.3	US 41/Selmon Expressway	Exp/Lim Stop – Mixed Exp/Lim Stop – Shoulder BRT – Mixed Traffic	$19,570,000	$515,000
2.2	Gunn Highway/Busch Boulevard	Exp/Lim Stop – Mixed BRT – Mixed Traffic	$13,690,000	$908,000
2.3	Ehrlich Road/Fowler Avenue	Exp/Lim Stop – Mixed BRT – Mixed Traffic BRT – Exclusive Lane	$135,290,000	$7,170,000
3.1	Dale Mabry Highway	Exp/Lim Stop – Mixed BRT – Exclusive Lane	$231,280,000	$9,920,000
3.3	Suncoast Parkway/Veterans Expressway/I-275 • From Dale Mabry Option • Boy Scout/Westshore/ Kennedy BRT Option	Exp/Lim Stop – Shoulder • Exp/Lim Stop – Shoulder • BRT – Mixed Traffic	$9,780,000 $8,930,000 $17,190,000	$419,000 $419,000 $714,000
4.1	SR 60/Selmon Expressway	Exp/Lim Stop – Mixed BRT – Mixed Traffic BRT – Exclusive Lane	$107,470,000	$5,340,000
4.3	Bloomingdale Avenue/Selmon Expressway	Exp/Lim Stop – Mixed BRT – Mixed Traffic BRT – Exclusive Lane	$6,800,000	$239,000

Note: All costs shown are estimates based on the application of unit costs to assumed levels of transit investment.

Appendix A
Maps of Preliminary Corridor Alternatives



Legend

Preliminary Corridor Alternatives

- 1.1: I-75 from SR 56 to the Selmon Expressway to Downtown Tampa
- 1.2: US 41 from Sarasota/Manatee to the Selmon Expressway to Downtown Tampa
- 1.3: US 301 from Sarasota/Manatee to Fowler Avenue to USF
- 1.4: SR 56 from I-75 to Bruce B. Downs (BBD), BBD from SR 56 to I-75, I-75 from BBD to Selmon Expressway, to Downtown Tampa
- 1.5: US 301 from Zephyrhills to Harney Road to Temple Terrace Highway to 56th Street to 50th Street to I-4 to Downtown Tampa
- 1.6: I-75 from Sarasota/Manatee to the Selmon Expressway to Downtown Tampa

2025 Density Threshold Assessment for BRT*

- Residential and Employment
- Residential (6+ dwelling units/acre)
- Employment (5+ employees/acre)

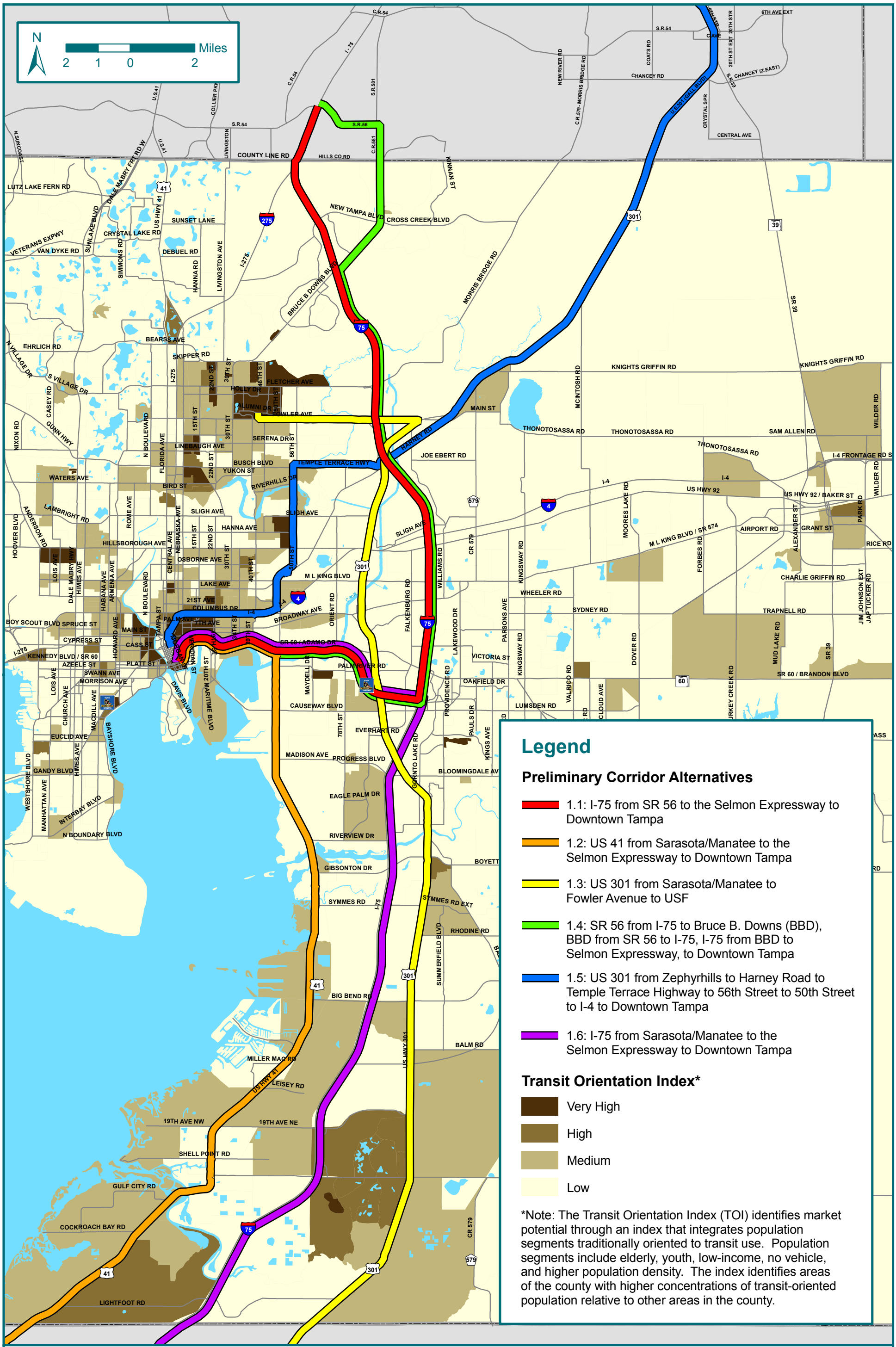
*Note: The Density Threshold Assessment (DTA) evaluates transit feasibility through industry standard relationships between population/employment densities and varying levels of transit investments. BRT supportive areas are characterized by 6+ dwelling units per acre and/or 5+ employees per acre.

METROPOLITAN PLANNING ORGANIZATION FOR TRANSPORTATION

Hillsborough County Bus Rapid Transit Corridor Assessment

Map A-1: Corridor 1 (I-75/US 301/US 41)

Preliminary Alternatives and Density Threshold Assessment for BRT



Legend

Preliminary Corridor Alternatives

- 1.1: I-75 from SR 56 to the Selmon Expressway to Downtown Tampa
- 1.2: US 41 from Sarasota/Manatee to the Selmon Expressway to Downtown Tampa
- 1.3: US 301 from Sarasota/Manatee to Fowler Avenue to USF
- 1.4: SR 56 from I-75 to Bruce B. Downs (BBD), BBD from SR 56 to I-75, I-75 from BBD to Selmon Expressway, to Downtown Tampa
- 1.5: US 301 from Zephyrhills to Harney Road to Temple Terrace Highway to 56th Street to 50th Street to I-4 to Downtown Tampa
- 1.6: I-75 from Sarasota/Manatee to the Selmon Expressway to Downtown Tampa

Transit Orientation Index*

- Very High
- High
- Medium
- Low

*Note: The Transit Orientation Index (TOI) identifies market potential through an index that integrates population segments traditionally oriented to transit use. Population segments include elderly, youth, low-income, no vehicle, and higher population density. The index identifies areas of the county with higher concentrations of transit-oriented population relative to other areas in the county.

METROPOLITAN PLANNING ORGANIZATION FOR TRANSPORTATION

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map A-2: Corridor 1 (I-75/US 301/US 41)

Preliminary Alternatives
and Transit Orientation Index

Legend

Preliminary Corridor Alternatives

- 2.1: Fletcher Avenue from US 301 to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall
- 2.2: Busch Boulevard from US 301 to Gunn Highway to Citrus Park Mall
- 2.3: Fowler Avenue from US 301 to Florida Avenue to Fletcher Avenue to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall

2025 Density Threshold Assessment for BRT*

- Residential and Employment
- Residential (6+ dwelling units/acre)
- Employment (5+ employees/acre)

*Note: The Density Threshold Assessment (DTA) evaluates transit feasibility through industry standard relationships between population/employment densities and varying levels of transit investments. BRT supportive areas are characterized by 6+ dwelling units per acre and/or 5+ employees per acre.

N

1 0.5 0 1 Miles

NEW E/W ROAD (NEW TAMPA)
TAMPA PALMS
COMPTON DR
TAMPA PALMS BLVD
HANNA RD
VANDERVORT RD
I-275
LIVINGSTON AVE
75
VETERANS
LYNN TURNER
CASEY RD
EHRLICH RD
GUNN HWY
S VILLAGE DR
N VILLAGE DR
BEARSS AVE
LAKE MAGDALENE BLVD
SKIPPER RD
30TH ST
46TH ST
FLETCHER AVE
22ND ST
131ST AVE
15TH ST
MAGNOLIA DR
HOLLY DR
ALUMNI DR
SPECTRUM BLVD
MAPLE DR
BULL RUN
50TH ST
FOWLER AVE
I-75
COUNTRY CLUB DR
ARMENIA AVE
N BOULEVARD
109TH AVE
BOUGAINVILLEA AVE
SERENA DR
MCKINLEY DR
VETERANS EXPWY
HENDERSON RD
ANDERSON RD
NIXON RD
LINEBAUGH AVE
WILSKY BLVD
BUSCH BLVD
NEBRASKA AVE
FLORIDA AVE
YUKON ST
RIVERHILLS DR
40TH ST
56TH ST
TEMPLE TERRACE HWY
MORRIS BRIDGE RD
US HWY 301
78TH ST
HARNEY RD
WATERS AVE
DALE MABRY HWY
HIMES AVE
HABANA AVE
ROME AVE
MANHATTAN AVE
BIRD ST
HANLEY RD
BARRY RD
BENJAMIN RD
SLIGH AVE

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map A-3: Corridor 2: (Fletcher Ave/Fowler Ave/Busch Blvd)

Preliminary Alternatives and
Density Threshold Assessment for BRT

Legend

Preliminary Corridor Alternatives

- 2.1: Fletcher Avenue from US 301 to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall
- 2.2: Busch Boulevard from US 301 to Gunn Highway to Citrus Park Mall
- 2.3: Fowler Avenue from US 301 to Florida Avenue to Fletcher Avenue to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall

Transit Orientation Index*

- Very High
- High
- Medium
- Low

N

1 0.5 0 1 Miles

*Note: The Transit Orientation Index (TOI) identifies market potential through an index that integrates population segments traditionally oriented to transit use. Population segments include elderly, youth, low-income, no vehicle, and higher population density. The index identifies areas of the county with higher concentrations of transit-oriented population relative to other areas in the county.

Metropolitan Planning Organization for Transportation

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map A-4: Corridor 2 (Fletcher Ave/Fowler Ave/Busch Blvd)

Preliminary Alternatives
and Transit Orientation Index

Legend

Preliminary Corridor Alternatives

- 3.1: Dale Mabry Highway from Pasco County to MacDill Air Force Base
- 3.2: Veterans Expressway from Dale Mabry Highway to Boy Scout Boulevard to Westshore Boulevard to Kennedy Boulevard to Downtown Tampa
- 3.3: Veterans Expressway from Pasco County to I-275 to Downtown Tampa
- 3.4: Dale Mabry Highway from Pasco County to Busch Boulevard to Himes Avenue to Columbus Drive to Dale Mabry Highway to MacDill Air Force Base

2025 Density Threshold Assessment for BRT*

- Residential and Employment
- Residential (6+ dwelling units/acre)
- Employment (5+ employees/acre)

*Note: The Density Threshold Assessment (DTA) evaluates transit feasibility through industry standard relationships between population/employment densities and varying levels of transit investments. BRT supportive areas are characterized by 6+ dwelling units per acre and/or 5+ employees per acre.

N

Miles
2 1 0 2

Hillsborough County Bus Rapid Transit Corridor Assessment

Map A-5: Corridor 3 (Dale Mabry Hwy/Veterans Expressway/Himes Ave)

Preliminary Alternatives and Density Threshold Assessment for BRT

Legend

Preliminary Corridor Alternatives

- 3.1: Dale Mabry Highway from Pasco County to MacDill Air Force Base
- 3.2: Veterans Expressway from Dale Mabry Highway to Boy Scout Boulevard to Westshore Boulevard to Kennedy Boulevard to Downtown Tampa
- 3.3: Veterans Expressway from Pasco County to I-275 to Downtown Tampa
- 3.4: Dale Mabry Highway from Pasco County to Busch Boulevard to Himes Avenue to Columbus Drive to Dale Mabry Highway to MacDill Air Force Base

Transit Orientation Index*

- Very High
- High
- Medium
- Low

*Note: The Transit Orientation Index (TOI) identifies market potential through an index that integrates population segments traditionally oriented to transit use. Population segments include elderly, youth, low-income, no vehicle, and higher population density. The index identifies areas of the county with higher concentrations of transit-oriented population relative to other areas in the county.

N

2 1 0 2 Miles

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map A-6: Corridor 3 (Dale Mabry Hwy/ Veterans Expressway/Himes Ave)

Preliminary Alternatives and Transit Orientation Index

N

1 0.5 0 1 Miles

Legend

Preliminary Corridor Alternatives

- 4.1: SR 60 from Valrico Road to Westfield Town Center to Brandon Parkway to Selmon Expressway to Gandy Boulevard to Dale Mabry Highway to MacDill Air Force Base
- 4.2: Lithia Pinecrest Road to SR 60 to Westfield Town Center to Brandon Parkway to Selmon Expressway to Downtown Tampa to Dale Mabry Highway to MacDill Air Force Base
- 4.3: Bloomingdale Avenue to Kings Avenue to Lumsden Road to Pauls Drive to Brandon Parkway to Selmon Expressway to Downtown Tampa to Dale Mabry Highway to MacDill Air Force Base
- 4.4: Bell Shoals Road to Lithia Pinecrest Road to SR 60 to Westfield Town Center to Brandon Parkway to Selmon Expressway to Downtown Tampa to Dale Mabry Highway to MacDill Air Force Base
- 4.5: SR 60 from Valrico Road to Downtown Tampa to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base

2025 Density Threshold Assessment for BRT*

- Residential and Employment
- Residential (6+ dwelling units/acre)
- Employment (5+ employees/acre)

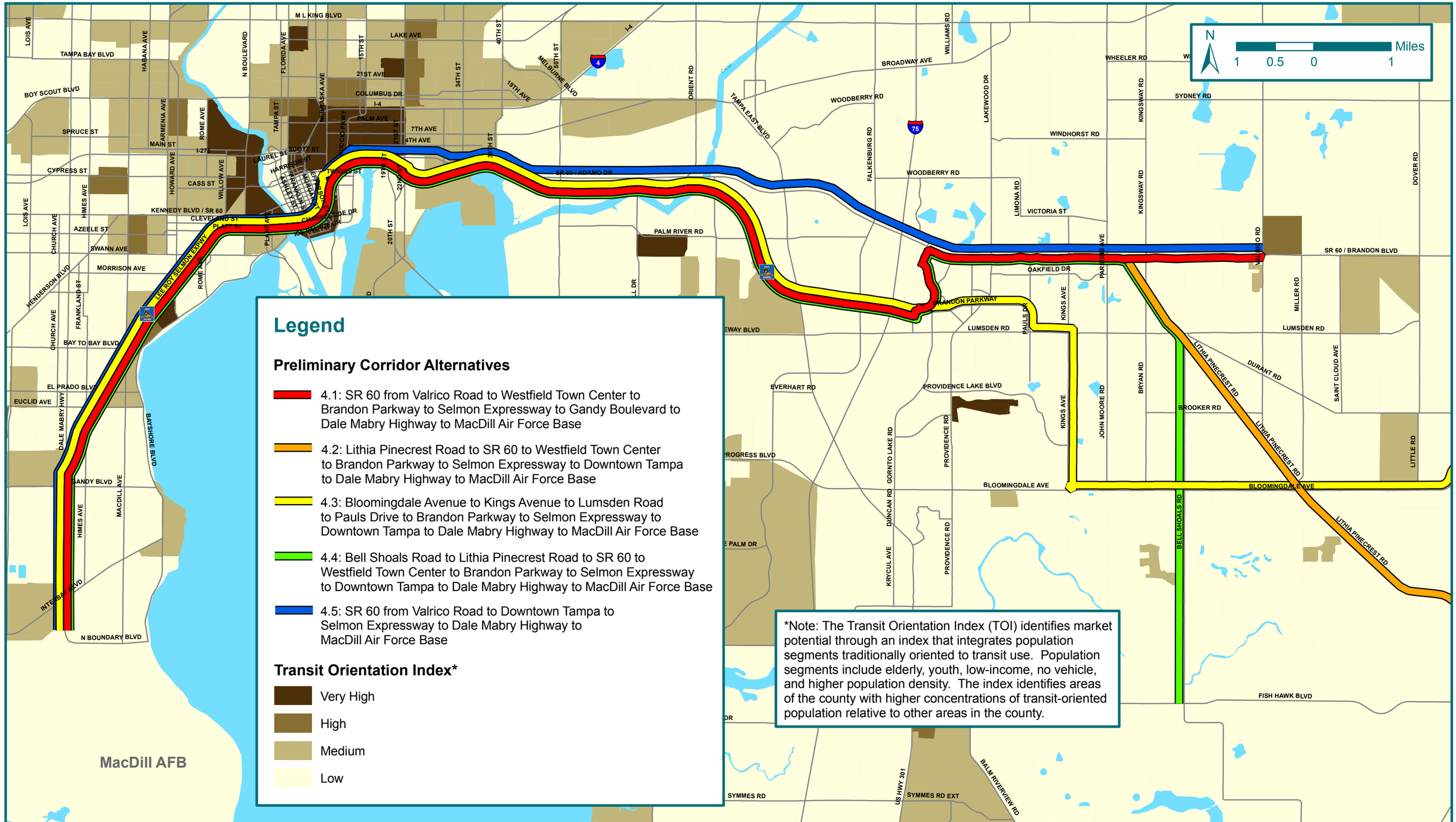
*Note: The Density Threshold Assessment (DTA) evaluates transit feasibility through industry standard relationships between population/employment densities and varying levels of transit investments. BRT supportive areas are characterized by 6+ dwelling units per acre and/or 5+ employees per acre.

MacDill AFB

Hillsborough County
Bus Rapid Transit Corridor Assessment

Map A-7: Corridor 4 (Selmon Expressway/SR 60/South Brandon)

Preliminary Alternatives and Density Threshold Assessment for BRT



Hillsborough County
Bus Rapid Transit Corridor Assessment

Map A-8: Corridor 4 (Selmon Expressway/SR 60/South Brandon)

Preliminary Alternatives
and Transit Orientation Index

Appendix B
BRT Corridor Evaluation Methodology

Appendix B
OVERVIEW OF CORRIDOR EVALUATION METHODOLOGY

The purpose of the evaluation process is to develop and document an evaluation methodology to prioritize 12 alternatives within the four major corridors specified for this project. The methodology identifies the corridor alternatives that maximize the potential for net benefits as measured by multiple criteria.

The chosen methodology for prioritizing the corridors is a multi-criteria analysis, one of the most common methods in the field of decision theory. Ideally, the criteria should be comprehensive, non-redundant, and mutually-exclusive to the extent possible. The criteria must also be quantifiable or classifiable in order to score individual corridors. Each criterion is also given a weight to reflect the priorities set forth by stakeholders participating in the evaluation and review process.

CORRIDOR EVALUATION METHODOLOGY

Table 3-4, presented previously in Section 3 of this report, illustrates the evaluation methodology developed to guide the evaluation of corridor alternatives in Hillsborough County. The methodology includes criteria and specific measures addressing the five basic objectives outlined below. These objectives reflect guidance from major BRT planning documents (e.g., Federal Transit Administration's [FTA's] *Characteristics of BRT for Decision-Making*) and help ensure the viability of the selected corridors in a competitive funding process (i.e., FTA Small Starts and Very Small Starts Process).

Ridership

An important objective of the screening is identifying the corridor alternatives with the greatest potential for ridership gains, both from existing users and new riders to the system. Ridership is one of the best indicators of the incremental user benefits from a BRT project (such as travel time savings).

- **Existing Transit Ridership** – Existing transit ridership is normalized by the length of the corridor to reflect existing ridership per mile.

- **Future Transit Ridership –** Efforts were undertaken to also use future transit ridership as a criterion, but this was excluded from the analysis due to insufficient data.

Capital Cost Effectiveness

Each corridor may present different characteristics in terms of opportunities to contain the capital costs of a BRT line. The criteria used to measure capital cost effectiveness include:

- **Right-of-Way Availability** – This criterion assesses the availability of right-of-way that may be needed for BRT implementation.

- **Potential for Coordinated Improvements** – This criterion reflects the possibility of leveraging BRT investments with future roadway improvements identified in local plans.

- **Order-of-Magnitude Capital Cost** – Sketch planning capital costs are estimated and normalized on a per-mile basis for each corridor alternative to help determine the potential capital cost efficiency of implementing various levels of premium transit services along each of the corridor alternatives.

Operating Cost Efficiency

One of the benefits of BRT is the potential to improve operating efficiencies. Two criteria are used in the evaluation process to assess the potential for operating cost efficiency in each corridor alternative.

- **Intersection Delay Potential** – In the absence of intersection Level of Service (LOS) data, signal density is used as a proxy for intersection delay (signals per mile). This criterion helps identify corridors with few and/or low-to-moderate volume cross-streets, which can impact the operation or implementation of some BRT strategies such as transit signal priority.

- **Level of Congestion** – This criterion is measured with average roadway LOS and assists in identifying corridors with significant congestion since heavily congested corridors may impede the efficient operation or implementation of arterial-type BRT.

Rider Potential

Rider potential is measured through two criteria, one that focuses on transit-supportive densities and one that emphasizes demographic characteristics traditionally conducive to transit use.

- **Density Threshold Assessment** – Projected future corridor residential and employment densities are used to complete a Density Threshold Assessment (DTA) and higher density areas are identified as having greater rider potential.

- **Transit Orientation Index** – Areas of the community, which have a greater concentration of demographic characteristics that are generally more conducive to transit use, are identified as having greater rider potential. Characteristics include elderly, youth, and low-income populations, as well as households with no vehicle.

Accessibility

The evaluation of corridor alternatives considers the accessibility that transit provides to activity centers and other transit services. In addition, this objective includes access to transit facilities by bicycle facilities and sidewalks. The four criteria used to assess this objective are listed below.

- **Access to Activity Centers** – This criterion refers to the number of major activity centers per mile for each of the corridor alternatives.

- **Transit Connectivity** – System-wide transit connectivity for the corridor alternatives is captured by the number of transfer opportunities with existing, non-parallel bus routes (normalized by the length of the corridor).

- **Regional Transit Connectivity** – Region-wide transit connectivity of the proposed BRT corridor is determined by the number of transfer opportunities with inter-county transit services or direct connections to transit service in adjacent counties.

- **Bicycle/Pedestrian Access** – This criterion refers to the average of the percent bicycle coverage and percent sidewalk coverage of a corridor alternative.

CRITERIA WEIGHTS

The importance of the various criteria was discussed with the technical team. The outcome of the discussion was the assignment of weights (1 or 2) according to the priority. The weights presented previously in Table 3-4 are based on the professional judgment of the project team along with input from the technical team. Each corridor is evaluated according to each criterion using the threshold levels and corresponding scores (1, 3, and 5). The composite score or sum is used to rank and prioritize the 12 corridor alternatives.

It is important to note that during the initial application of the evaluation process, it was necessary to calibrate the threshold levels to more appropriately reflect the conditions observed within the corridor alternatives. As a result, the threshold levels for 10 of the 12 criteria used in the analysis were indexed to a “high,” “medium,” or “low” score based on the following scoring scheme:

- Corridor alternatives scoring greater than one standard deviation from the average threshold level received a **High** score.
- Corridor alternatives better than the average but within one standard deviation received a **Medium** score.
- Corridor alternatives scoring below the average threshold level received a **Low** score.

The remaining two criteria were evaluated as follows:

- Level of congestion (roadway level of service)
- Regional transit connectivity (number of connections to inter-county transit services or adjacent counties)

CRITERIA CALCULATIONS

Additional documentation on the criteria calculations is provided below.

Current Ridership

Data

- Hillsborough Area Regional Transit Authority (HART) average weekday ridership for FY 2006
- April 2007 HART route network (from HART)

Methodology

- Used routes from the April 2007 network
- Used FY 2007 averages (October 2006 - March 2007) for routes implemented in 2007
- Ridership for each alternative was calculated by:
    - calculating the percentage of directional route miles for each route along each alternative
    - applying that percentage to the average weekday ridership for each route
    - summing the proportioned average weekday ridership for each route pertaining to each alternative

Future Ridership

This criterion was excluded from the evaluation due to insufficient data.

Right-of-Way (ROW) Availability

Data

- 2005 Hillsborough County parcel shape file
- 2005 City of Tampa parcel shape file
- 2025 Cost Affordable road type from Hillsborough MPO Long Range Transportation Plan (LRTP)
- Average cross-section widths for all road types from Hillsborough MPO LRTP

Methodology

- Assigned ROW of “0” for Selmon Expressway

- Average available ROW for each alternative was calculated by:
    - Measuring the ROW width for each road segment and, if needed, splitting the road segments where the ROW fluctuates within a segment
    - For each segment, subtracting the average roadway cross-section width from the ROW width to determine available ROW
    - Summing the product of the length and the available ROW, then dividing by the total length of the corridor

*Note: Some of the average available ROW widths are negative due to 2025 roadway widths being used in conjunction with a 2005 parcel database.

Potential for Coordinated Improvements

Data

- MPO 2025 Cost Affordable improvements less the MPO 2015 Cost Affordable improvements

Methodology

- Calculate percent of length along each alternative covered by an improvement

Intersection Delay Potential

Data

- MPO 2025 Cost Affordable signalized intersections

Methodology

- Number of signalized intersections along the alternative divided by the length of the alternative

Level of Congestion

Data

- 2025 Level of Service (LOS) from Hillsborough MPO LRTP
- Transportation Research Board criteria for determining LOS by volume-to-capacity (V/C) ratio

Methodology

- Calculate average weighted V/C ratio to determine LOS for each alternative (sum of the product of V/C and length for each segment divided by the total length of the alternative)

Density Threshold Assessment

Data

- 2025 socio-economic data from the Tampa Bay Regional Planning Model 5.2

Methodology

- Determine BRT-supportive areas using Density Threshold Assessment criteria (see Section 2 in the report for further detail)
- Calculate percentage of BRT-supportive area within a ½-mile buffer of each alternative

Transit Orientation Index

Data

- 2000 Census data by block group

Methodology

- Calculate Transit Orientation Index (TOI) for each of the County's Census block groups (see Section 2 in the report for further detail)
- Determine block groups with "High"/"Very High" rankings based on the TOI
- Calculate percentage of High/Very High areas within a ½-mile buffer of each alternative

Access to Activity Centers

Data

- Activity Centers from Hillsborough County Comprehensive Plan (obtained from the Hillsborough County website)
- Major Employers with 2000+ employees - http://www.tampachamber.com/ed_employers.asp

Methodology

- Determine number of activity centers within the ½-mile buffer of each alternative
- Use weights applied to different categories of activity centers to determine a total score for each alternative

Transit Connectivity

Data

- HART April 2007 route network

Methodology

- Count the number of intersecting local bus routes with each alternative and divide by the length

Regional Connectivity

Data

- Most recent route alignments for HART, Pinellas Suncoast Transit Authority, and Pasco County Public Transportation

Methodology

- Count the number of connections each alternative has with adjacent county transit systems, plus the number of physical corridor connections with adjacent counties

Pedestrian Access

Data

- 2004 bike lanes and sidewalks from the Hillsborough County MPO Congestion Management System

Methodology

- Percent coverage for both bike lanes and sidewalks calculated by summing the product of the percent covered and the length of the segment and dividing by the total length of the corridor
- The total percent coverage for each alternative is the average of the bicycle and pedestrian percent coverages

CALCULATION RESULTS

Table B-1, on the following page, details the criteria-specific scoring results for each of the 12 corridor alternatives, as well as the cumulative score for each and their respective overall ranks.

Table B-1
BRT Corridor Evaluation
Scoring Results

Alternative	Current Ridership	Right-of-Way Availability	Potential for Coordinated Improvements	Intersection Delay Potential	Level of Congestion	Density Threshold Assessment	Transit Orientation Index (TOI)	Access to Acitvity Centers	Transit Connectivity	Regional Connectivity	Pedestrian Access	Total Score	Rank
1.1 I-75/Selmon Expwy	2	5	5	10	5	2	6	3	1	5	1	45	1
1.2 US 301/Selmon Expwy	2	5	1	10	5	2	6	1	1	5	1	39	4
1.3 US 41/Selmon Expwy	2	3	1	6	3	2	10	3	1	5	3	39	4
2.1 Ehrlich Rd/Fletcher Ave	10	1	3	2	1	6	10	1	3	1	5	43	2
2.2 Gunn Hwy/Busch Blvd	10	1	5	2	1	6	2	1	5	1	3	37	6
2.3 Ehrlich Rd/Fowler Ave	6	1	1	2	1	6	2	1	3	1	5	29	11
3.1 Dale Mabry Hwy	6	1	3	2	1	6	2	1	3	3	3	31	10
3.2 Dale Mabry Hwy/Himes Ave	10	1	3	2	1	6	2	1	3	3	3	35	7
3.3 Suncoast Pkwy/Veterans Expwy	2	3	3	6	3	6	2	3	1	5	1	35	7
4.1 SR 60/Selmon Expwy	2	3	1	2	1	10	6	3	1	3	1	33	9
4.2 SR 60/Westfield Town Center/Selmon Expwy	2	1	1	6	5	10	6	5	3	3	1	43	2
4.3 Bloomingdale Ave/Selmon Expwy	2	1	1	6	5	2	2	3	1	3	1	27	12

Routing Details for Corridor Alternatives

Alternative 1.1	I-75 from SR 54 to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa • Option 1 – SR 56 from SR 54 to BBD to I-75
Alternative 1.2	US 301 from Zephyrhills to Sarasota/Manatee and Selmon Expressway from I-75 to Downtown Tampa
Alternative 1.3	US 41 from USF to Sarasota/Manatee and Selmon Expressway from US 41 to Downtown Tampa
Alternative 2.1	Fletcher Avenue from US 301 to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall
Alternative 2.2	Busch Boulevard from US 301 to Gunn Highway to Citrus Park Mall
Alternative 2.3	Fowler Avenue from US 301 to Florida Avenue to Fletcher Avenue to Dale Mabry Highway to Ehrlich Road to Gunn Highway to Citrus Park Mall
Alternative 3.1	Dale Mabry Highway from Pasco County to MacDill Air Force Base
Alternative 3.2	Dale Mabry Highway from Pasco County to Busch Boulevard to Himes Avenue to Columbus Drive to Dale Mabry Highway to MacDill Air Force Base
Alternative 3.3	Veterans Expressway from Pasco County to I-275 to Downtown Tampa • North Option 1 – Veterans Expressway from Dale Mabry • South Option 2 – Boy Scout Boulevard from Memorial Highway to Westshore Boulevard to Kennedy Boulevard to Downtown Tampa
Alternative 4.1	SR 60 from Valrico Road to Downtown Tampa to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base
Alternative 4.2	SR 60 from Valrico Road to Brandon Westfield Town Center to Brandon Parkway to Selmon Expressway to Gandy Boulevard to Dale Mabry Highway to MacDill Air Force Base
Alternative 4.3	Bloomingdale Avenue to Kings Avenue to Lumsden Road to Brandon Parkway to Selmon Expressway to Dale Mabry Highway to MacDill Air Force Base