South Miami-Dade Corridor Alternative Analysis Report Executive Summary (South Link Study)

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June 2006

EXECUTIVE SUMMARY

Study Area

The Miami-Dade County Metropolitan Planning Organization (MPO) initiated an alternatives analysis study for the South Link Corridor in February 2005. The study limits consisted of a corridor along U.S. 1 (South Dixie Highway) from the Dadeland South Metrorail station south to its intersection with Florida's Turnpike in Florida City. The corridor was defined to be approximately one-half mile in each direction from the centerline of U.S. 1, a multi-lane highway in Miami-Dade County, Florida. The total length of the corridor is approximately 20 miles. The Miami-Dade Transit (MDT) busway right-of-way parallels U.S. 1 for the entire length of the corridor. Figure S-1 shows the study area.

Planning Context

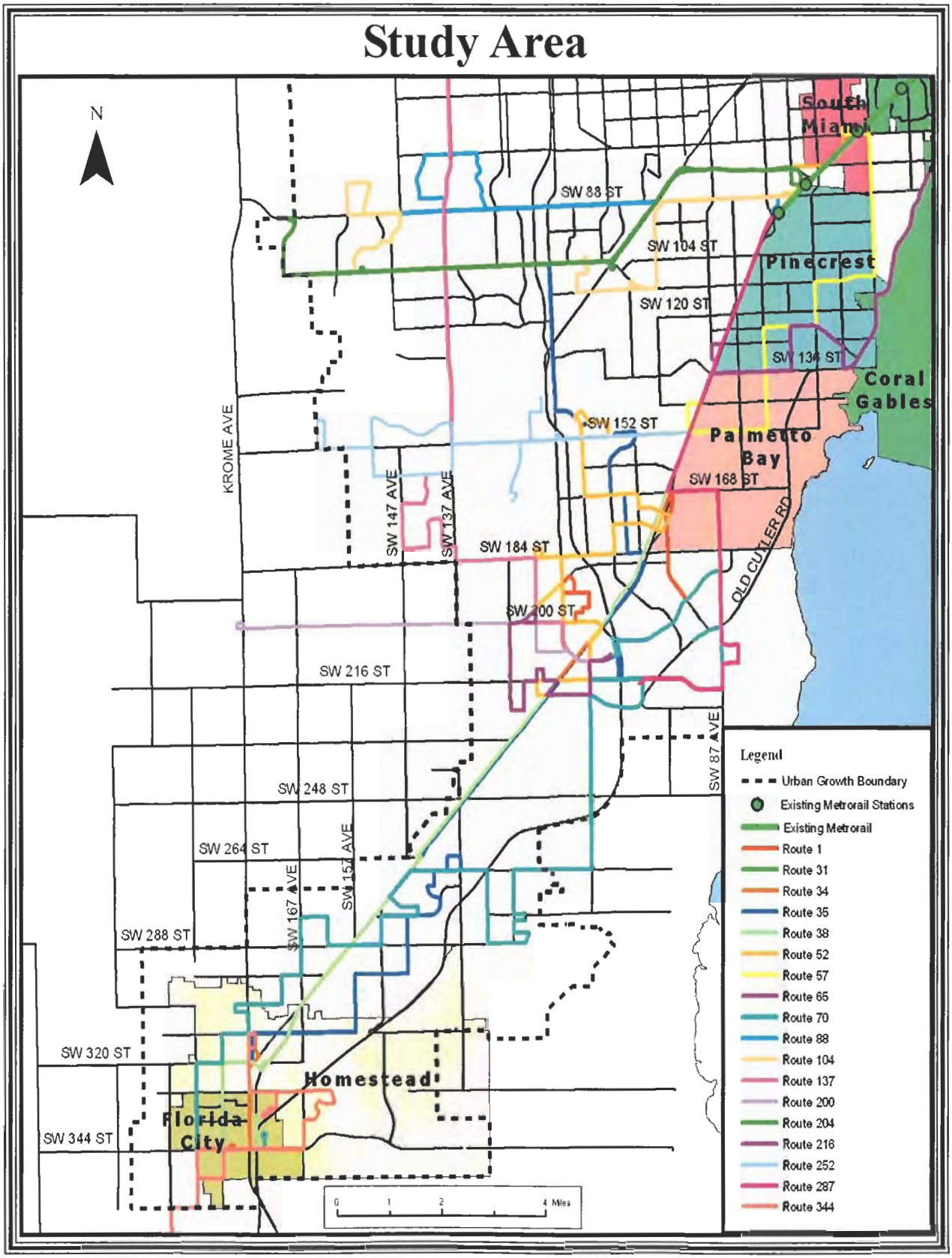
Miami-Dade County's population is projected to grow by 43 percent (from 2,206,500 to 3,149,291) by the year 2030. During this same period the southern portion of the County is projected to grow by 79 percent (from 429,054 to 766,864) and the South Link Corridor, which is already urbanized, is projected to grow by 65 percent by 2030. The South Link Corridor makes up about 27 percent of the residents within South Miami-Dade County and six percent of the entire County total. The 79 percent population growth in South Dade is projected to be accompanied by only a 37 percent increase in employment. Today, South Dade has 28 percent of the County's population and only 20 percent of the jobs. By 2030, South Dade is projected to have 31 percent of the County's population with only 25 percent of the jobs. If the quality of life for the residents of South Dade is to be maintained, a high speed, reliable, transit connection between the residential areas and jobs must be provided. The purpose of this project was to develop a staged program of transit improvements in the corridor that will help to improve mobility between residential areas and employment concentrations.

There are major constraints to physical or spatial growth in South Dade even though South Miami-Dade contains the only reasonably sized parcels of land left for urbanization. The coastal area in South Dade is a saltwater mangrove swamp. The area south of Florida City and Homestead is mangrove swamp that extends to Everglades National Park. The urban development boundary lies only about one mile west of U.S. 1 from SW 232nd Street. There is an agricultural preserve between the urban boundary and the Everglades. The former Homestead Air Force Base is also within the general area of the corridor. The eventual, future of the Base property will have a major impact on the future of the corridor. There are natural wetlands near the busway that could constrain future development in some areas of the corridor.

Land Use and Zoning

The northern portion of the corridor is characterized by predominantly residential land uses. It includes the upper middle-class communities of Pinecrest and Palmetto Bay. The

Figure S-1


Study Area
N
South Miami
Pinecrest
Coral Gables
Palmetto Bay
Homestead
Florida City
SW 88 ST
SW 104 ST
SW 120 ST
SW 134 ST
SW 152 ST
SW 168 ST
SW 184 ST
SW 200 ST
SW 216 ST
SW 248 ST
SW 264 ST
SW 288 ST
SW 320 ST
SW 344 ST
KROME AVE
SW 147 AVE
SW 137 AVE
SW 167 AVE
SW 157 AVE
SW 87 AVE
OLD CUTLER RD
0 1 2 4 Miles
Legend
Urban Growth Boundary
Existing Metrorail Stations
Existing Metrorail
Route 1
Route 31
Route 34
Route 35
Route 38
Route 52
Route 57
Route 65
Route 70
Route 88
Route 104
Route 137
Route 200
Route 204
Route 216
Route 252
Route 287
Route 344

middle portion of the study area is largely agricultural and includes rapidly growing unincorporated villages. The cities of Homestead and Florida City are at the southern end of the corridor. Scattered throughout the neighborhoods are recreational facilities (ball fields, golf courses, etc.) and agricultural areas. Areas zoned for commercial or light industrial use are found only immediately adjacent to U.S. 1. The uses include retail and light industrial facilities, including automotive dealerships, shopping centers, gas stations, restaurants, auto repair centers, marine supplies and maintenance, and building supply facilities.

The South Link Corridor's total area is approximately 29 square miles. The current population of the corridor is about 143,000 people, which equates to 4,900 people per square mile, or only about eight people per acre (Table S-1). By 2030, the corridor is projected to grow to 237,000 people. This equates to 8,200 people per square mile or about 13 people per acre (a density of roughly four dwelling units per acre).

Table S-1 provides information on the corridor based on three segments: North Segment (between Dadeland South and 216th Street), Central Segment (between SW 216th Street and 264th Street), and South Segment (between SW 264th Street and 344th Street).

Table S-1. Growth in South Link Corridor by Segment

	North Segment	Central Segment	South Segment
2000 Population	57,490	38,089	47,830
Population/Sq. Mile	6,114	3,967	4,982
Population /Acre	10	6	8
% Growth	45.5%	78.8%	78.7%
2030 Population	83,613	68,132	85,492
Population/Sq. Mile	8,895	7,097	8,905
Population/Acre	14	11	14

The development pattern described above has already created a strong north-south commuting pattern. Traffic volumes increase steadily from south to north in the South Link corridor. The northern portion of the corridor currently experiences some of the region's worst traffic congestion, constraining economic opportunities and residents' quality of life. The Florida Department of Transportation (FDOT) recorded an average annual daily traffic volume of 94,000 vehicles along U.S. 1 south of Dadeland in 2003. This volume far exceeds the published capacity guidelines for a six-lane urban arterial.

According to FDOT traffic count data along the corridor, U.S. 1 capacity has been saturated for approximately 20 years. Increased travel demand has been met through transportation system management (TSM) improvements such as removing turning movements and signal timing adjustments that heavily favor the flow along U.S. 1 to the detriment of the intersecting roadways. Increases in travel demand strains the capacity of the existing

network, causing delays and increased travel times between activity centers within the corridor and the region. Table S-2 shows the growth in traffic over the last ten years in the corridor.

U.S. 1 has reached its limits for widening. Lack of additional right-of-way, and financial, environmental, social, and political constraints have historically limited both the development of new north-south facilities and the substantial expansion of existing facilities. Currently planned roadway improvements are minor in nature and will only provide localized congestion relief.

Table S-2. Average Annual Daily Traffic (AADT) Growth

US 1 Intersection	1994 AADT	2003 AADT	Percent Growth
State Road 826	90,000	94,000	4.44%
SW 152nd Street	61,000	74,000	21.31%
SW 288th Street	28,000	32,500	16.07%
SW 328th Street	11,800	30,000	154.24%

Existing Transit Facilities and Transit Service

Currently, the South Dade Busway operates along the corridor and interfaces with the Stage I Metrorail at Dadeland South, which is the northern most boundary of the study area. The busway is operational as far south as SW 112th Avenue and is under-construction from there to SW 312th Street in Florida City. Miami-Dade Transit (MDT) operates its fixed bus route service in the southern one-third of the county serving the communities of Pinecrest, Palmetto Bay, Florida City and Homestead and all the unincorporated villages. However, the service area and frequency varies in different communities in South Dade.

In the South Dade region of Miami-Dade County, MDT operates 14 public transit routes. These routes offer 15-30 minute peak-period headways, and 30-60 minute off-peak-period and weekend headways. Services are generally offered between 5:30 a.m. and 11:00 p.m. on weekdays with reduced service on the weekends. Service improvements are planned in the People's Transportation Plan (PTP) through 2007. Out of 14 public transit routes in South Dade only six operate on the busway (or will operate on the busway when it is completed). Three of the routes only operate during peak period. Three of the routes that operate on the busway have a scheduled average speed of 13 MPH or less. Two routes operate between the Southland Mall and 168th Street, four routes operate to 152nd Street and seven routes operate north to the Dadeland South Metrorail station. South of the existing busway to Florida City, three routes currently provide service. When the southern extension of the busway is operational, two enhanced busway routes and two new feeder routes in the PTP would supplement service in this area, and provide better coverage for both Goulds and Florida City. In the southern portion of Miami-Dade County, the greatest coverage of transit services exists in the Kendall, Pinecrest, Cutler Ridge, and Homestead neighborhoods. Areas with less service coverage include Richmond Heights, Goulds,

Naranja, and Florida City, mainly marked by an absence of service on the west side of South Dixie Highway between 200th Street and 280th Street.

Mobility Constraints

The southern third of Miami-Dade County only has three mobility constraints through north-south facilities: Krome Avenue along the far western urban boundary, the Homestead Extension of the Florida's Turnpike and U.S. 1 (South Dixie Highway). It is unlikely that any additional streets will be developed as through facilities within the next 20 years. South Dixie Highway is the only facility that connects to job rich areas of the County and it cannot be expanded because of adjoining development. Given the anticipated population and employment growth that will occur in South Dade and in the Corridor, natural barriers to expansion, the limited number of roadway options that are operating beyond their capacities and relatively low level of transit service available in the Corridor, the adjacent busway represents the only reasonable solution of improving mobility between South Dade and downtown Miami.

Project Purpose, Goals and Objectives

The general public, with the input of the consultant team, identified the following goals and objectives for the South Link Corridor to solve problems and address issues identified above.

Goal 1 - Improve corridor mobility

- Improve north/south mobility
- Improve transportation options within project area

Goal 2 - Improve citizen access to employment

- Improve economic opportunities
- Provide transit connections to downtown employment
- Improve access for transportation disadvantaged
- Use transit accessibility as a key marketing tool for promoting the economic development /redevelopment in the study area by attracting a broader range of employment categories

Goal 3 - Improve corridor safety and Improve operating efficiencies

- Improve intersection safety
- Provide safety and urban design amenities that make cycling and walking more appealing
- Separate pedestrians, autos and transit
- Provide efficient transit services
- Minimize transit delays in corridor
- Reduce transit/auto conflicts at intersections

Goal 4 - Reduce auto dependency

- Increase transit usage
- Provide environmental benefits through reduced mobile source emissions, greenhouse gas emissions and energy consumption

Goal 5 - Accommodate future population growth in south Miami-Dade by providing the citizens of south Miami-Dade with high quality and cost-effective transit service

- Provide cost-effective solutions
- Increase speed of transit service
- Provide reliable service
- Minimize transfers
- Develop a staged program of transit improvements in the corridor
- Match capacity of Dadeland South Terminal to busway
- Improve frequency of transit service

Goal 6 - Modify development patterns in the corridor to support transit

- Support transit supportive land use and future patterns. Reorient corridor design to support pedestrianism
- Encourage transit-oriented development (TOD) around stations
- Create opportunities and mechanisms for public/private development partnerships
- Improve access to stations

Goal 7 - Develop plan for incremental increase of transit infrastructure

- Foster the Greenway development and environment of the corridor
- Promote sustainable development
- Preserve existing communities and neighborhoods

Alternatives Development Approach

The development and evaluation of alternatives for the South Link Corridor followed the general approach described in Federal Transit Administration's (FTA) Procedures and Technical Guidance for major investment planning and project development for fixed-guideway transit systems. The build alternatives were evaluated against the No-Build Alternative for potential environmental affects and against the Transportation System Management (TSM) Alternative for transportation-related user benefits or cost-effectiveness. Alternatives in the South Link Corridor were analyzed using a two-tiered process. The analysis began with a fairly large number of broadly defined alternatives that were reduced to a smaller set of alternatives using primarily qualitative evaluation criteria. In the next phase of the project, alternatives were defined in more detail and evaluated using more quantitative data. The following section summarizes this process.

Tier I Alternatives

Alternative 1: No-Build

This alternative consists of existing plus planned and programmed projects (Figure S-2). The No-Build Alternative includes the South Miami-Dade Busway extended to SW 344th Street in Florida City and the completion of the bus expansion program defined in the People's Transportation Plan.

Alternative 2: Transportation Systems Management (TSM)

This alternative would include modification of the existing bus service in the southern half of Miami-Dade County (Figure S-3). Under the Transportation System Management (TSM) alternative, fixed-route service would continue to feed the existing Dadeland South Metrorail station from Florida City. The TSM alternative would provide substantially more park-and-ride facilities. Signal prioritization would be an essential modification to the busway to improve transit travel time on the busway.

Alternative 3: Light Rail Transit (LRT) to Florida City

This alternative would provide light rail transit (LRT) service from SW 104th Street to Florida City (Figure S-4). It includes a one-mile extension of Metrorail from Dadeland South to the vicinity of 104th Street on the existing busway. This alternative consists of approximately 19.5 miles of a light rail facility powered by a catenary with tracks within the original busway right-of-way. The LRT service would be at-grade and a transfer would still be required at the 104th Street station. Stations spacing would be identical to the stops on the busway, approximately at 1/2 mile intervals with easy access for bus riders, pedestrians, and passengers at stations.

Alternative 4: Metro Rail to Southland Mall/Bus Rapid Transit (BRT) from Dadeland South to Florida City

This heavy rail alternative would provide rapid transit service between the existing Dadeland South Metrorail station and the Southland Mall/South Dade Government Center area. The bus service improvements proposed for the TSM alternative would provide transit service improvements in the remainder of the corridor to Florida City. Figure S-5 illustrates this alternative. This alternative would be an eight-mile extension of Miami-Dade Transit's elevated, heavy rail system. The Metrorail vehicles and guideway would be similar to existing services in Miami and operate on an exclusive, elevated guideway. The Busway portion would extend from the proposed Metrorail station in the vicinity of the Southland Mall to Florida City, approximately 11 miles. The Busway would operate on an exclusive, at-grade guideway.

Alternative 5: Metrorail to Florida City

This alternative would provide heavy rail rapid transit service from the existing Dadeland South Metrorail station to Florida City (Figure S-6). This alternative would extend Miami-Dade County's elevated rapid transit system an additional 19 miles. The Metrorail vehicles and guideway would be similar to existing services in Miami.

Figure S-2

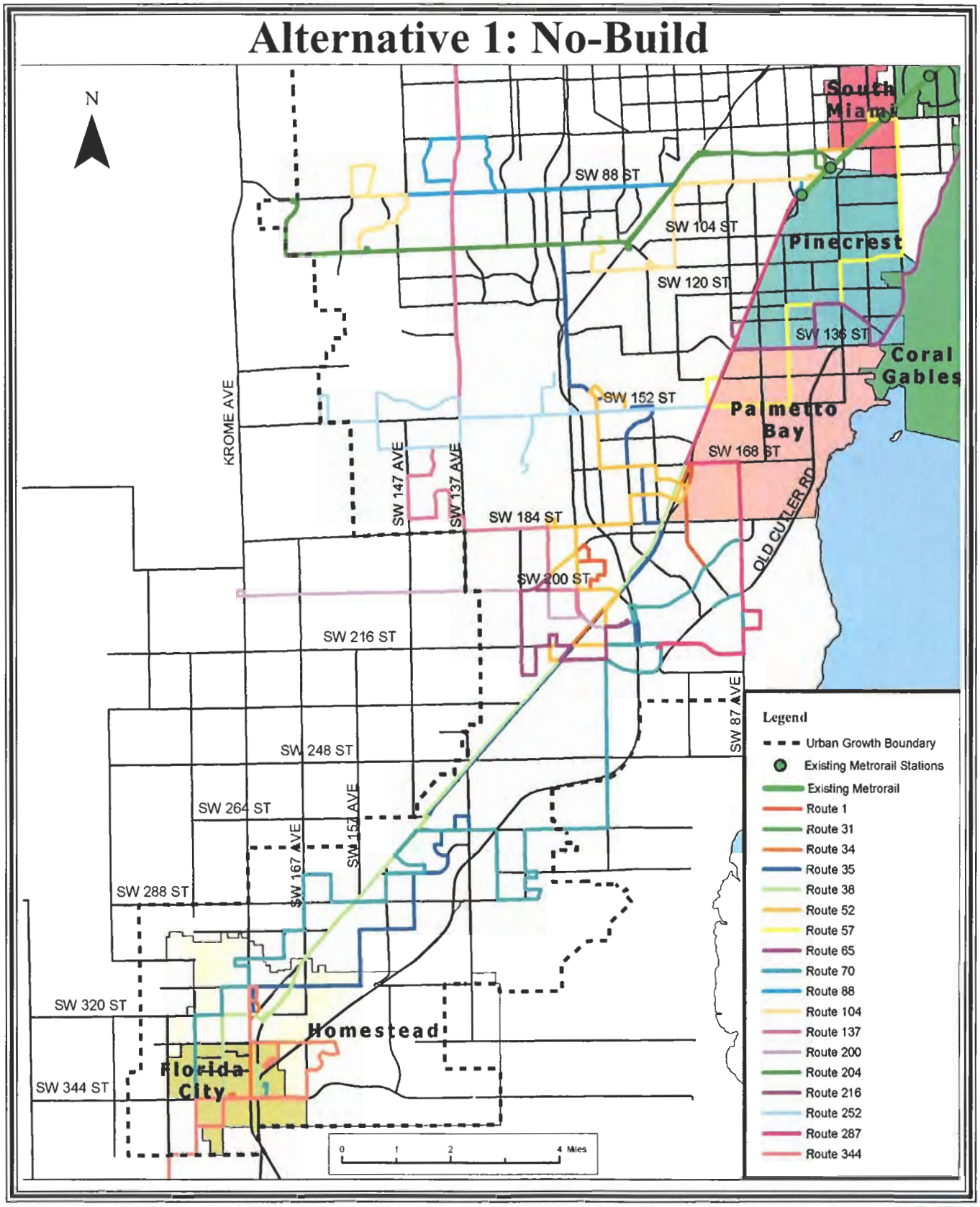

Alternative 1: No-Build
N
South Miami
Pinecrest
Coral Gables
Palmetto Bay
Homestead
Florida City
SW 88 ST
SW 104 ST
SW 120 ST
SW 136 ST
SW 152 ST
SW 168 ST
SW 184 ST
SW 200 ST
SW 216 ST
SW 248 ST
SW 264 ST
SW 288 ST
SW 320 ST
SW 344 ST
KROME AVE
SW 147 AVE
SW 137 AVE
SW 167 AVE
SW 157 AVE
SW 87 AVE
OLD CUTLER RD
0 1 2 4 Miles
Legend
Urban Growth Boundary
Existing Metrorail Stations
Existing Metrorail
Route 1
Route 31
Route 34
Route 35
Route 38
Route 52
Route 57
Route 65
Route 70
Route 88
Route 104
Route 137
Route 200
Route 204
Route 216
Route 252
Route 287
Route 344

Figure S-3

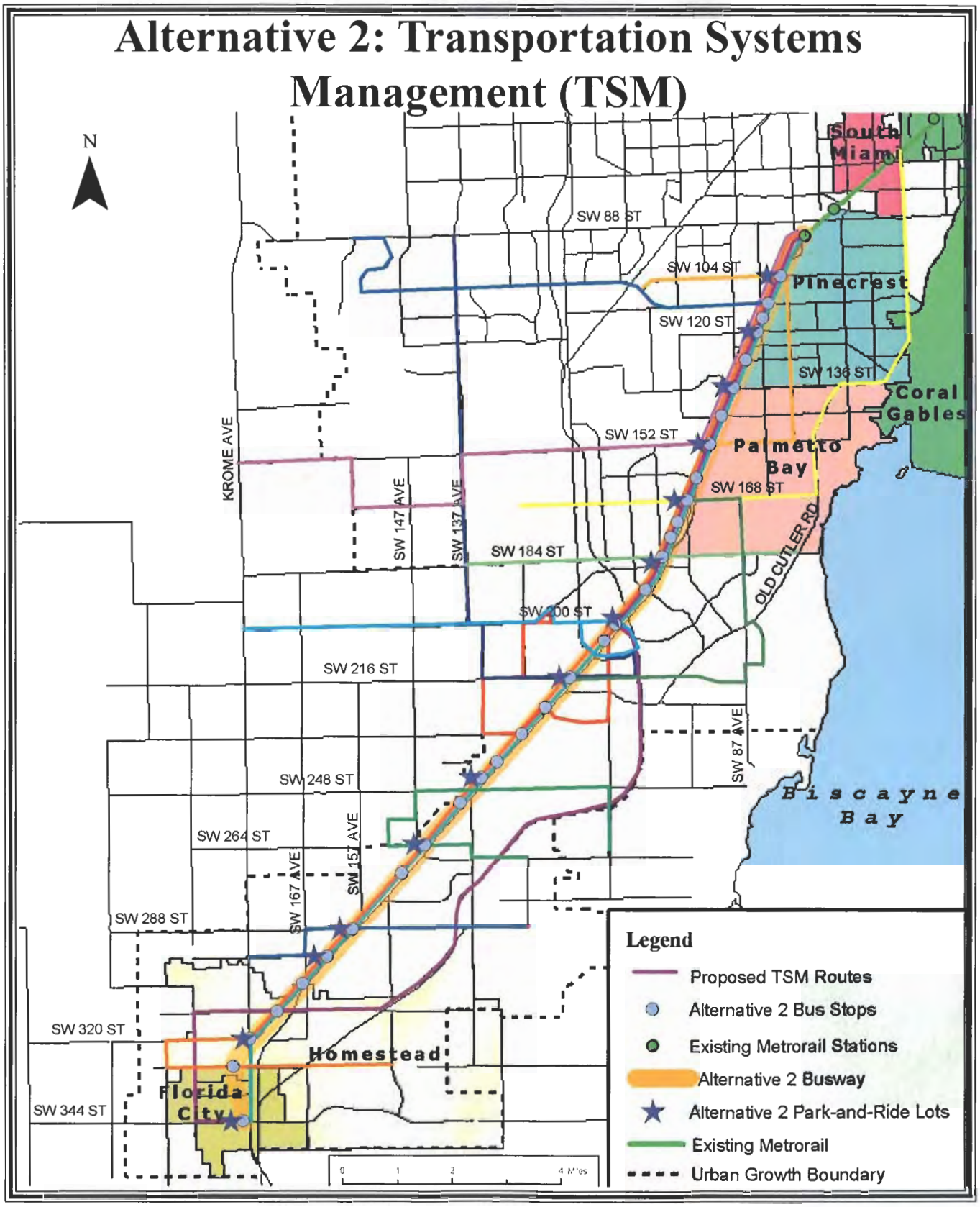

Alternative 2: Transportation Systems Management (TSM)
N
South Miami
Pinecrest
Coral Gables
Palmetto Bay
Biscayne Bay
Homestead
Florida City
SW 88 ST
SW 104 ST
SW 120 ST
SW 136 ST
SW 152 ST
SW 168 ST
SW 184 ST
SW 200 ST
SW 216 ST
SW 248 ST
SW 264 ST
SW 288 ST
SW 320 ST
SW 344 ST
KROME AVE
SW 147 AVE
SW 137 AVE
SW 157 AVE
SW 167 AVE
SW 87 AVE
OLD CUTLER RD
Legend
Proposed TSM Routes
Alternative 2 Bus Stops
Existing Metrorail Stations
Alternative 2 Busway
Alternative 2 Park-and-Ride Lots
Existing Metrorail
Urban Growth Boundary

Figure S-4

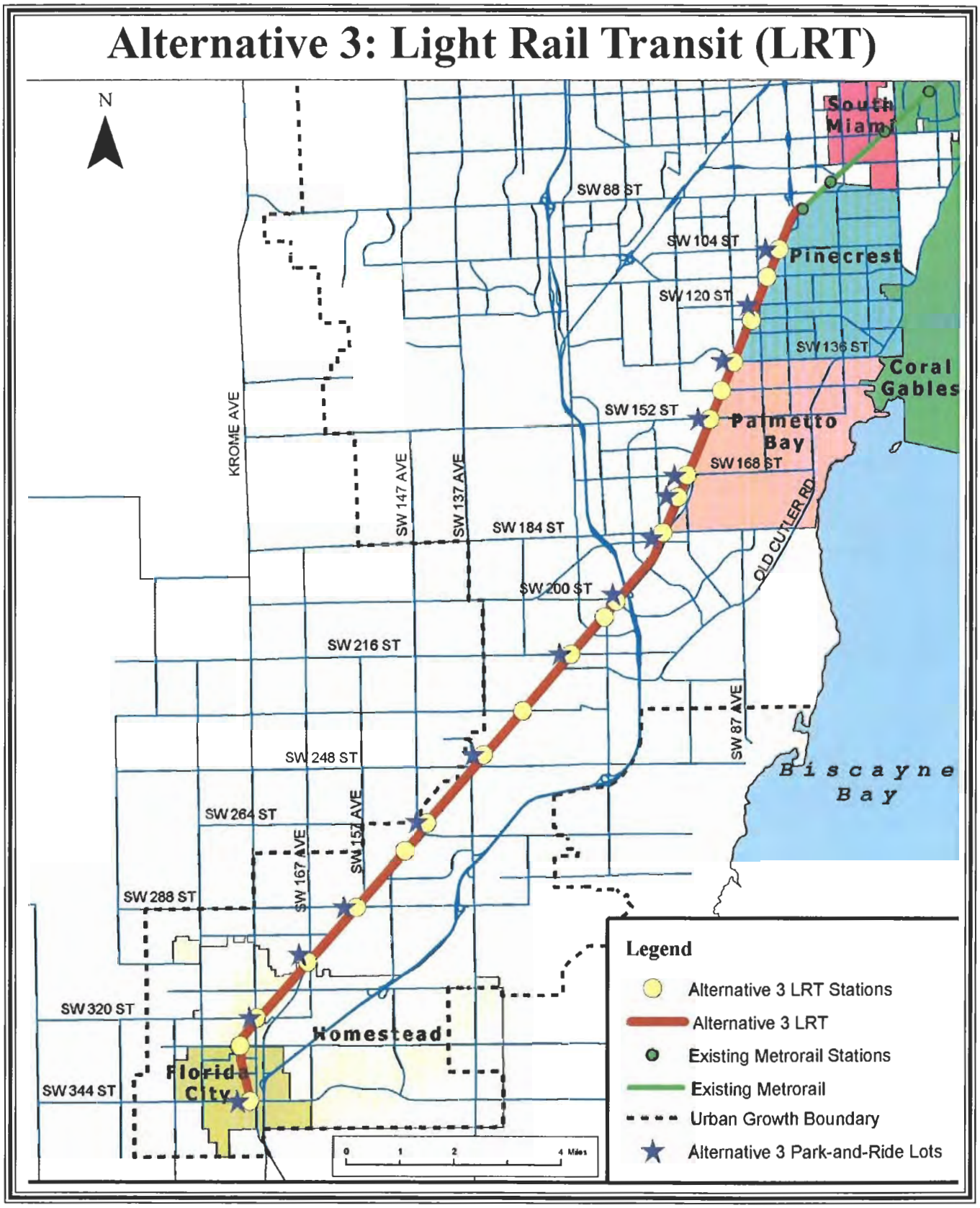

Alternative 3: Light Rail Transit (LRT)
N
South Miami
SW 88 ST
SW 104 ST
Pinecrest
SW 120 ST
SW 136 ST
Coral Gables
SW 152 ST
Palmetto Bay
SW 168 ST
SW 184 ST
SW 200 ST
SW 216 ST
SW 248 ST
SW 264 ST
SW 288 ST
SW 320 ST
SW 344 ST
KROME AVE
SW 147 AVE
SW 137 AVE
SW 157 AVE
SW 167 AVE
SW 87 AVE
OLD CUTLER RD
Biscayne Bay
Homestead
Florida City
0 1 2 4 Miles
Legend
Alternative 3 LRT Stations
Alternative 3 LRT
Existing Metrorail Stations
Existing Metrorail
Urban Growth Boundary
Alternative 3 Park-and-Ride Lots

Figure S-5

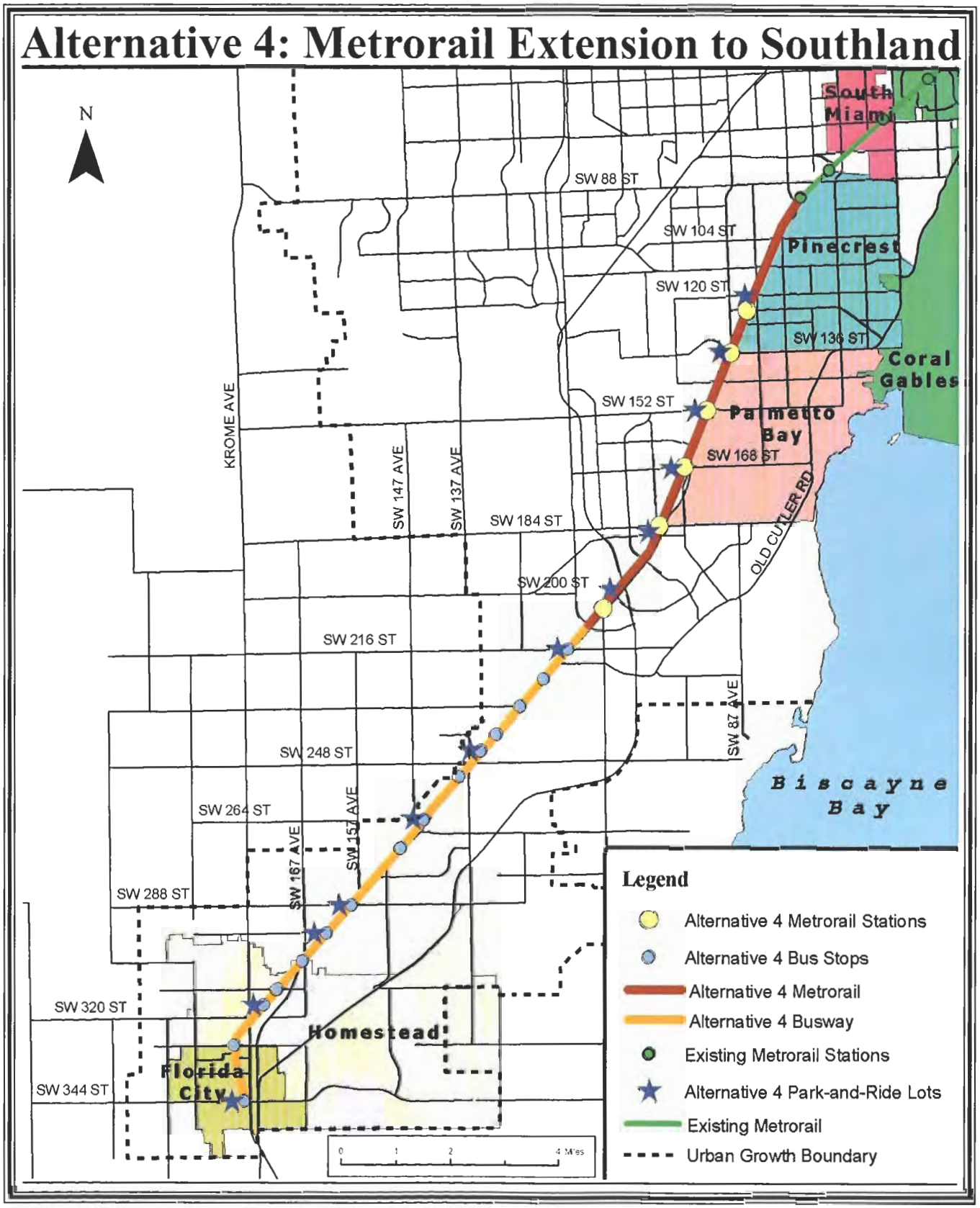
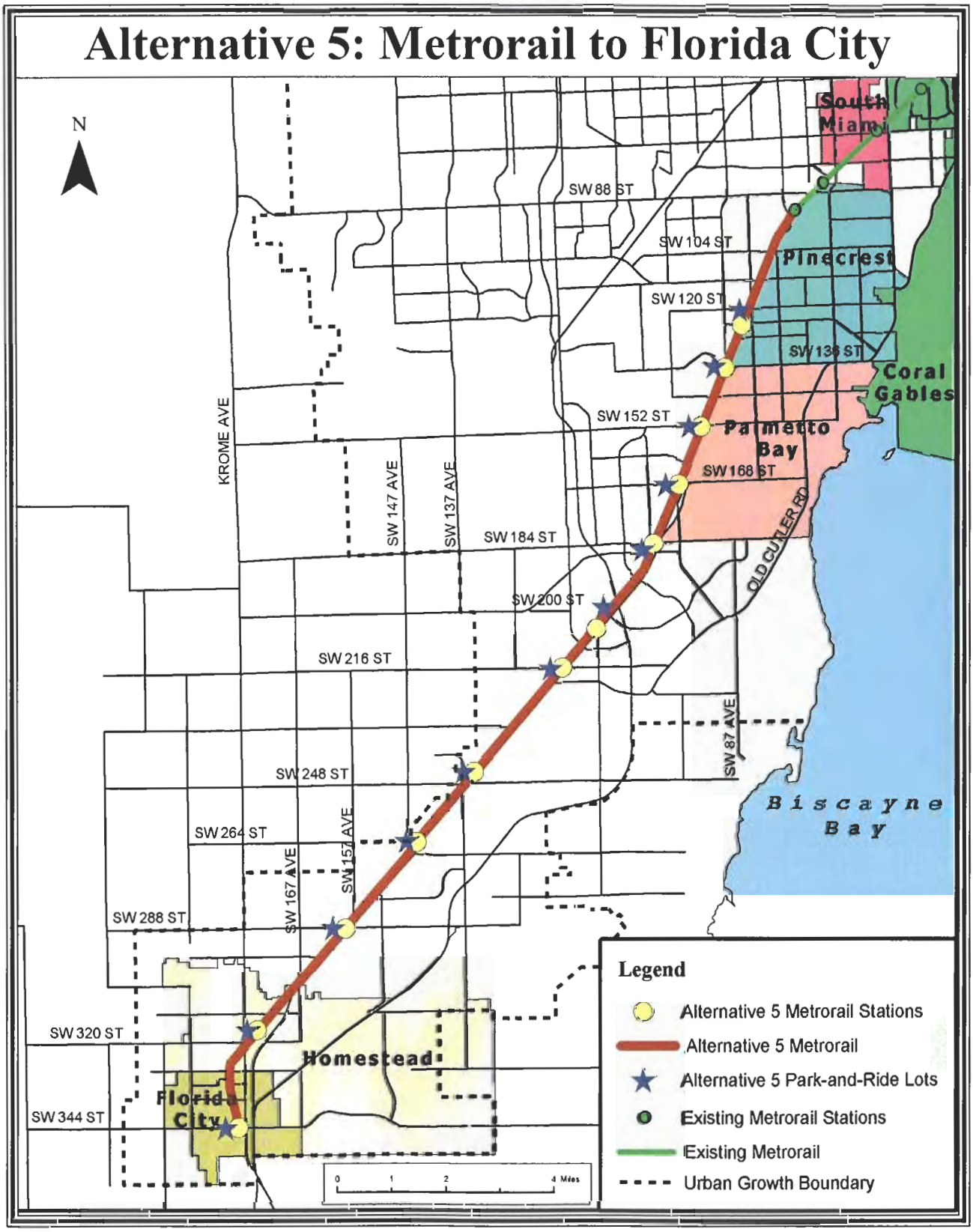

Alternative 4: Metrorail Extension to Southland
N
South Miami
Pinecrest
Coral Gables
Palmetto Bay
Biscayne Bay
Homestead
Florida City
SW 88 ST
SW 104 ST
SW 120 ST
SW 136 ST
SW 152 ST
SW 168 ST
SW 184 ST
SW 200 ST
SW 216 ST
SW 248 ST
SW 264 ST
SW 288 ST
SW 320 ST
SW 344 ST
KROME AVE
SW 147 AVE
SW 137 AVE
SW 157 AVE
SW 167 AVE
SW 87 AVE
OLD CUTLER RD
0 1 2 4 Miles
Legend
Alternative 4 Metrorail Stations
Alternative 4 Bus Stops
Alternative 4 Metrorail
Alternative 4 Busway
Existing Metrorail Stations
Alternative 4 Park-and-Ride Lots
Existing Metrorail
Urban Growth Boundary

Figure S-6


Alternative 5: Metrorail to Florida City
N
South Miami
SW 88 ST
SW 104 ST
Pinecrest
SW 120 ST
SW 136 ST
Coral Gables
SW 152 ST
Palmetto Bay
SW 168 ST
KROME AVE
SW 147 AVE
SW 137 AVE
SW 184 ST
OLD CUTLER RD
SW 200 ST
SW 216 ST
SW 87 AVE
SW 248 ST
Biscayne Bay
SW 264 ST
SW 157 AVE
SW 167 AVE
SW 288 ST
SW 320 ST
Homestead
Florida City
SW 344 ST
0 1 2 4 Miles
Legend
Alternative 5 Metrorail Stations
Alternative 5 Metrorail
Alternative 5 Park-and-Ride Lots
Existing Metrorail Stations
Existing Metrorail
Urban Growth Boundary

Alternative 6: Metrorail to SW 104th Street/BRT from Dadeland South to Florida City

This alternative would include the construction of a new one-mile extension of Metrorail to the vicinity of SW 104th Street on the existing busway (Figure S-7). South of SW 104th Street, Alternative 6 proposes that the existing busway be converted to a bus rapid transit (BRT) corridor. BRT service would run from SW 104th Street in the north to Florida City in the south, and include grade separation for the BRT corridor at several critical roadway crossings to enhance overall system safety, and to achieve greater travel time and trip reliability benefits for BRT users.

Alternative 7: Diesel Multiple Unit (DMU) on CSX/Kendall Drive and Maintain Operation on Existing Busway

The DMU Alternative for the South Link Corridor consists of diesel multiple unit (DMU) commuter rail service in the CSX corridor between Florida City and Dadeland, combined with the TSM alternative on the busway (Figure S-8). The DMU technology is a general term for a diesel-powered train in which the propulsion and control systems are contained within each vehicle. DMUs can have control cabs at both ends of the vehicle, which simplifies out-and-back, point to point operations. DMUs can also pull up to two standard commuter coaches for increased capacity.

Tier I Evaluation & Comparison of Key Criteria

The evaluation process for Tier 1 was based on 16 evaluation criteria that were developed to address the study goals and objectives. These criteria include:

- Number of north/south travel options;
- Travel time;
- Headways;
- Transit routes serving rail;
- Future employment and population near stations;
- Total capital cost;
- System operating cost;
- Auto/transit conflict points;
- System connectivity;
- Transit ridership or trips; and,
- Community impacts and impacts to the existing Busway and Metrorail.

Once the criteria were established, alternatives were analyzed and evaluated based on a scoring system developed for each criterion. These scores were converted to a qualitative rating or ranking of 'low', 'medium' or 'high' to reduce bias between different evaluation criteria. The impacts of Tier I alternatives on mobility, land use, environment, capital cost and operation and maintenance cost of various transit alternatives within the corridor were compared and assessed against the corridor goals and objectives as shown in Table S-3. Following is a summary of the comparison in key areas.

Figure S-7

Alternative 6: Enhanced Bus Rapid Transit (BRT)

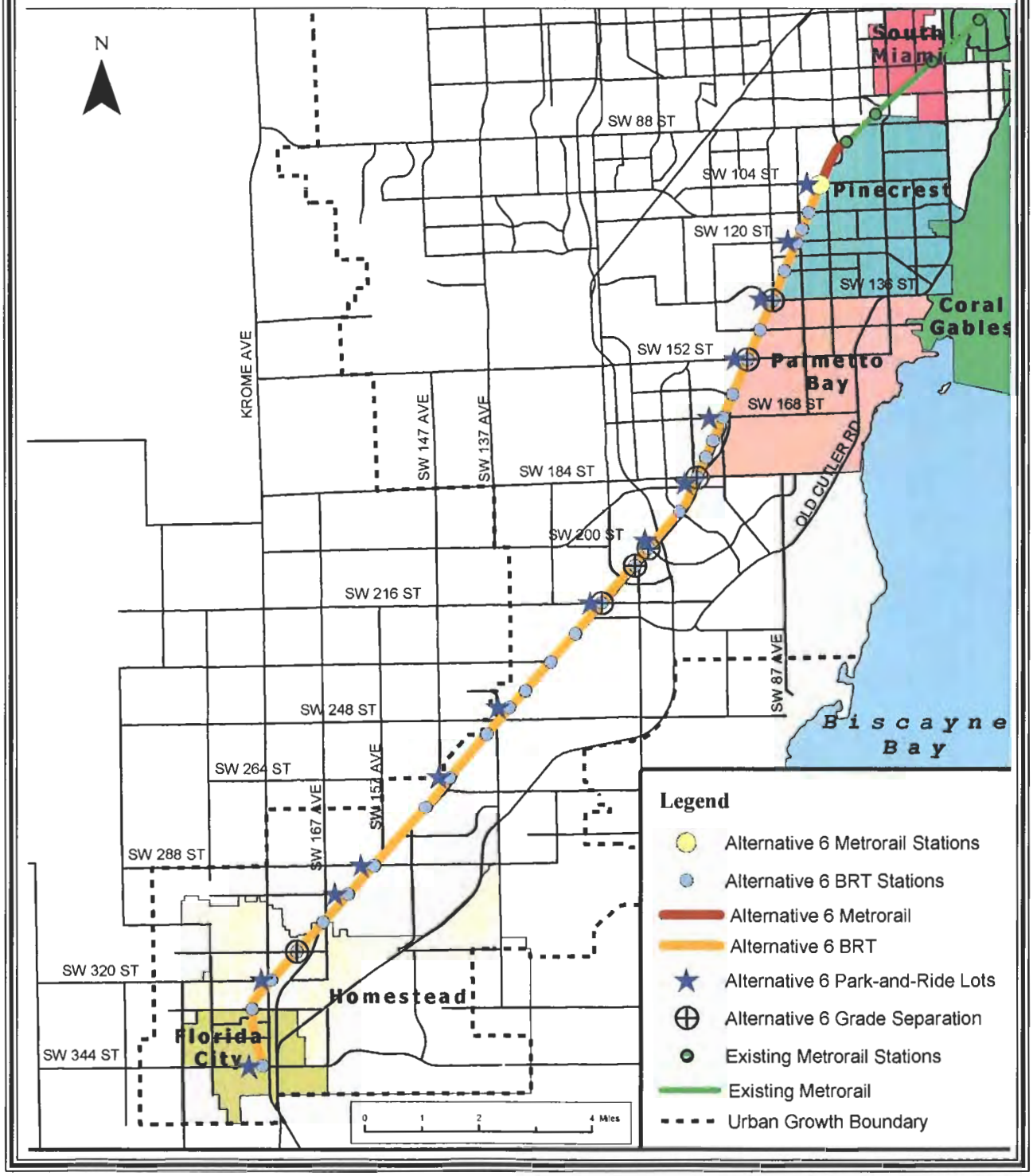


Figure S-8

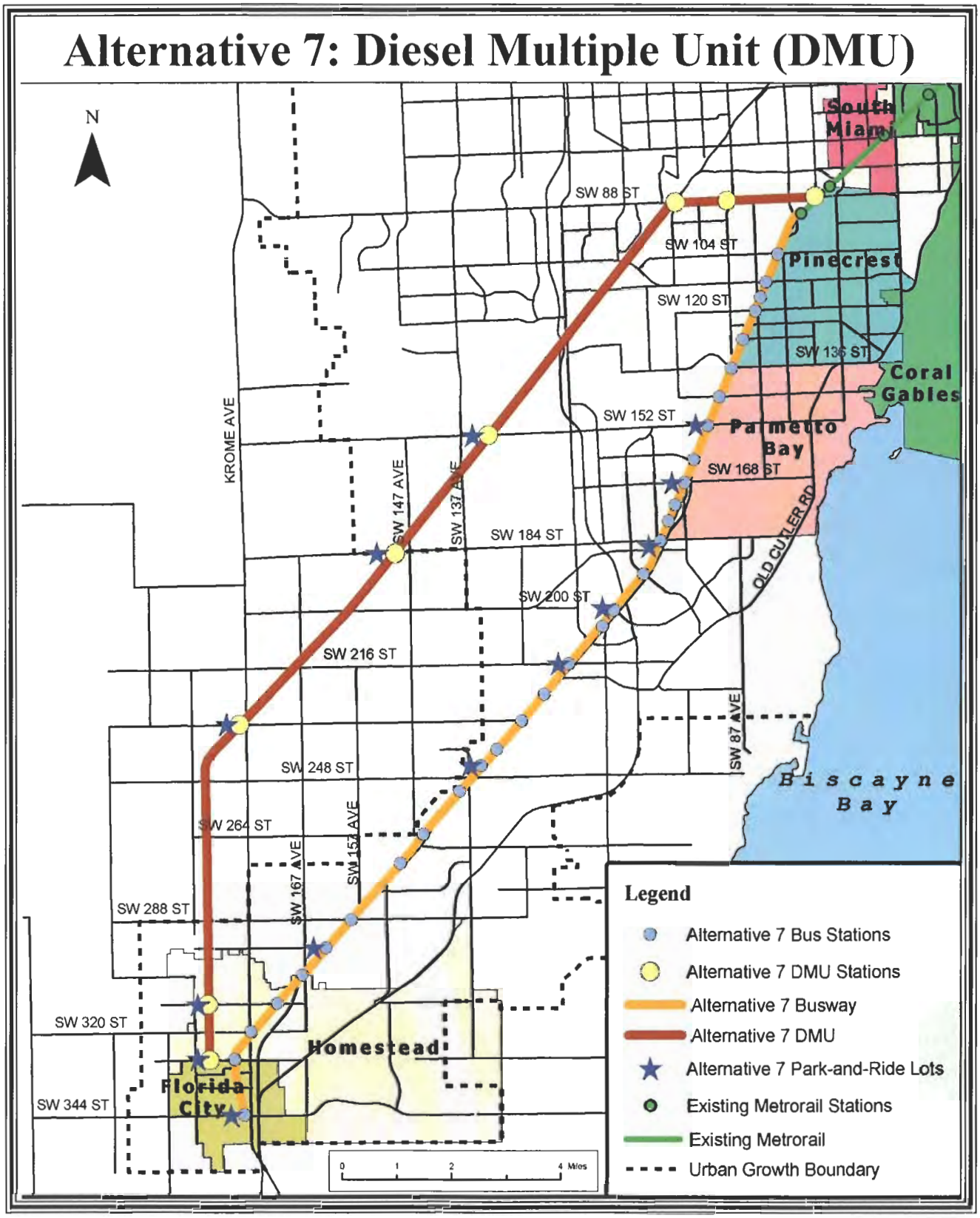

Alternative 7: Diesel Multiple Unit (DMU)
N
South Miami
Pinecrest
Coral Gables
Palmetto Bay
Biscayne Bay
Homestead
Florida City
SW 88 ST
SW 104 ST
SW 120 ST
SW 136 ST
SW 152 ST
SW 168 ST
SW 184 ST
SW 200 ST
SW 216 ST
SW 248 ST
SW 264 ST
SW 288 ST
SW 320 ST
SW 344 ST
KROME AVE
SW 147 AVE
SW 137 AVE
SW 152 AVE
SW 167 AVE
SW 87 AVE
OLD CUTLER RD
0 1 2 4 Miles
Legend
Alternative 7 Bus Stations
Alternative 7 DMU Stations
Alternative 7 Busway
Alternative 7 DMU
Alternative 7 Park-and-Ride Lots
Existing Metrorail Stations
Existing Metrorail
Urban Growth Boundary

Table S-3
South Link
Tier I Evaluation Matrix

	Alt 1 No-Build	Alt 2 TSM	Alt 3 LRT	Alt 4 Metrorail	Alt 5 Metrorail	Alt 6 BRT	Alt 7 DMU
Number of North/South travel options	3 road 1 transit	3 road 1 transit	3 road 1 transit	3 road 1 transit	3 road 1 transit	3 road 1 transit	3 road 2 transit
Travel Time	58 min.	53 min.	45 min.	35 min.	29 min.	48 min	29 min.
Headways from Florida City	6 min	5 min	3.75 min	5 min	5.5 min	5 min	5.5 min
Transit routes serving rail Employment near stations	10 40, 943	7 40,943	13 40,943	13 31,724	11 26,171	13 40,698	12 64,083
Future employment near stations	60,896	60,896	60,896	47,893	38,253	60,593	91,990
Population near stations	59,046	59,046	59,046	47,893	30,732	59,046	86,359
Future population near stations	102,909	102,909	102,909	86,929	52,018	102,909	148,370
Low-income households served	3,710	3,710	3,710	2,966	1,549	3,704	4,973
Persons with disabilities served	10,567	10,567	10,567	8,335	5,004	10,560	14,396
Minority population served	23,216	23,216	23,216	18,889	10,854	23,216	29,170
Capital Cost per mile (millions) Total Capital Cost Range	None	Low	$20.6 Medium	$81.4 High	$81.4 High	$7.2 Medium Low	$15.5 Medium
System operating cost per mile	$6.44	$6.44	$15.94	$6.44/11 mi $8.59/9 mi	$8.59/20 mi	$6.44/19 mi $8.59/1 mi	$6.44/20 mi $11.56/21 m
Auto/transit conflict points	45	45	45	25	0	33	100
Change in VMT Change in VHT	0 0	-245,500 -65,800	-351,400 -72,900		-276,800 -68,800		-298,500 -65,100
Number of transfers needed to downtown	1	1	1	1	0	1	1
Number of unlinked transit trips	581, 746	582, 213	585, 484		581, 615		565, 805
System capacity (Seated/Crush)	1,400/2,065	1,400/2,065	3,215/7,630	3,280/10,000	3,280/10,000	2,165/4,000	1,804/3,000
Improvements negatively impact Metrorail?	No Impact	No Impact	Modify Dadeland S. for LRT interface	Increases fleet size	Increases fleet size	New southern terminus station	New connection t DMU
Existing land use	No Impact	No Significant Impact	Moderate-Densification	Significant Densification	Significant Densification	Significant access issues	Significant outside UDB
Improvements increase the utility of the busway?	No Impact	No Significant impact	Significant Replaces Busway	Significant Replaces 1/2 of busway	Significant Replaces Busway	Significant Improves operations	No Impact
Impact on existing communities? T N V	None None None	Moderate Moderate Moderate	Moderate Moderate Moderate	Significant + Significant Significant	Significant + Significant Significant	Significant + Significant Significant	Significant Significant Significant

Travel Time - Transit travel time from Southland Dade Metrorail Station to Florida City decreases from approximately 53 minutes in the TSM Alternative to between 29 to 48 minutes for the Build Alternatives. Of the Build Alternatives, Metrorail Extension 2 has the shortest travel time of approximately 29 minutes, The BRT and LRT Alternatives save approximately eight minutes of total travel time over the TSM Alternative.

Ridership - The LRT and BRT alternatives have higher transit ridership (linked transit trips) than the TSM Alternative. It is estimated that the LRT and the BRT alternatives would have approximately 8,950 and 8,000 new riders respectively. The Metrorail Extension 2 alternative has fewer new riders (7,930 new riders) than LRT and BRT but significantly higher than Metrorail Extension 1 (3,790 new riders) and DMU (3,350 new riders) alternatives.

Cost - Capital cost and Operation and Maintenance (O&M) cost were compared using secondary data in Tier I. The capital cost for Build Alternatives would range from $7.2 million per mile to $81.4 million per mile. In terms of O&M cost, rail-based systems generally would be more expensive than buses.

Three "build" alternatives were recommended by the CAC from the seven Tier I alternatives for more detailed analysis as part of Tier II. Alternatives 4 and 7 were eliminated while Alternatives 3 (LRT), 5 (Metrorail to Florida City) and Alternative 6 (BRT) were recommended for further analysis.

Tier II Alternatives

In the Tier II process, the three Tier 1 build alternatives were advanced with some refinements to the initial definitions of the alternatives. An additional alternative (5A-Hybrid Metrorail to Florida City) was introduced as a less expensive alternative to the conventional metrorail. The alternatives that were analyzed in the Tier II stage of the alternatives analysis are listed below:

Alternative 1. No-Build
Alternative 2. Transportation System Management
Alternative 3. Light Rail Transit to Florida City
Alternative 5. Metrorail to Florida City
Alternative 5A. Hybrid Metrorail to Florida City
Alternative 6. Enhanced Bus Rapid Transit to Florida City

Tier II Evaluation & Comparison of Key Parameters

Key data used in the Tier II includes ridership, capital cost, operation and maintenance cost, and user benefits. The evaluation also includes comparison of potential environmental effects that could result from the construction and implementation of the Tier II Build Alternatives. Environmental factors were considered as a means to identify a potential "fatal flaws" for an alternative. Environmental factors were also used a means to help to differentiate among the alternatives just as costs and ridership were.

Ridership - Systemwide daily transit ridership forecasted (2030) for different Build Alternatives is summarized in Table S-4. All the Build Alternatives improve transit ridership compared to the TSM Alternative. Rail-based alternatives have higher impact on the overall transit ridership when compared to the bus alternative.

Table S-4: Systemwide Transit Ridership Forecasts

Alternative	Total Transit Trips	Total Transit Boardings	% Change in Transit Trips over TSM	% Change in Transit Boardings over TSM
TSM	304,720	606,413	-	-
LRT	310,592	614,054	1.93%	1.26%
Metrorail	309,187	602,673	1.47%	-0.62%
Metrorail Hybrid (Option 5A)	309,187	602,673	1.47%	-0.62%
BRT	307,879	615,945	1.04%	1.47%

The increase in transit boardings for the LRT and BRT Alternatives is due to riders transferring at the existing Southland Dade Metrorail Station. Since the Metrorail Alternative would require no transfers, transit boardings are lower compared with the TSM or LRT or BRT Alternatives.

Traffic Impacts - The Metrorail alternative, which requires replacing the busway with an elevated (grade-separated) Metrorail line, would provide the highest travel time improvements (-6.97 hours) along the U.S. 1 corridor. The Bus Rapid Transit alternative, which would include a mix of grade separations and signal priority at the intersections, is the second best alternative in terms of intersection travel time savings (-5.56 hours). The dual-mode alternative, which also includes a mix of grade separation and signal preemption, has an overall travel time reduction (-2.16 hours). The Light Rail Transit alternative, which would use signal preemption at all intersections, but would have no grade separations, is expected to increase the intersection travel time (+6.21 hours).

Capital Cost - Table S-5 summarizes the total capital cost for all the Build Alternatives and TSM. The Metrorail Alternative is the most expensive because it is completely elevated and has a larger fleet size and more expensive vehicles.

Table S-5. Capital Cost for Tier II Alternatives

Alternative	Total Capital Cost (2005 dollars)
TSM	$126.5 million
LRT	$853.9 million
Metrorail	$1,649.8 million
Metrorail Hybrid (Option 5A)	$1,208.6 million
BRT	$423.3 million

This alternative would cost almost two times the LRT Alternative and four times the BRT Alternative. Metrorail Hybrid option would cost less than Metrorail Alternative because a significant portion of the guideway would be at-grade. It is, however, significantly more costly than the LRT and BRT Alternatives due to grade-separations, elevated stations, and it would need more expensive transit vehicles. The LRT Alternative would be entirely at-grade which significantly reduces the cost of guideway construction. The LRT alternative is almost twice the cost of the BRT Alternative.

Operation and Maintenance Cost - Table S-6 provides a summary of O&M costs for the Tier II alternatives. The implementation of the bus operating plan specified in the TSM alternative would increase the annual operating cost of MDT by approximately $8.2 million. The total additional O&M cost of the LRT when compared to the No-Build Alternative is $28.4 million for the new LRT service, less the $9.3 million cost savings on bus operations realized from replacing bus service with LRT service in the corridor. The estimated additional annual O&M cost of this alternative is $19.1 million. The BRT bus operating system is very similar to the operating plan of the TSM Alternative. The additional O&M cost of the BRT Alternative includes the additional cost of the bus operations - $8.4 million and the additional Metrorail service of $2.4 million dollars for a total increase in O&M costs of $10.8 million.

Table S-6. O&M Cost for Tier II Alternatives

Alternative	Background Bus O&M Cost (2005 dollars)	Build Alternative O&M Cost (2005 dollars)
No-Build	$227.9 million	-
TSM	$236.1 million	-
LRT	$218.6 million	$28.4 million
Metrorail	$218.6 million	$46.7 million
Metrorail Hybrid (Option 5A)	$218.6 million	$46.7 million
BRT	$236.3 million	$2.4 million

Transit User Benefits & Cost-Effectiveness - Table S-7 indicates that the Metrorail Alternative and Metrorail Alternative Hybrid (Option 5A) would provide the highest overall user benefits followed by LRT and BRT Alternatives.

Cost-effectiveness assesses the incremental costs and benefits of Build Alternatives. The costs include both the annualized capital costs and annual operation and maintenance costs. The Metrorail Alternative and the Hybrid option do not offer the most cost-effective solutions for the South Link Corridor.

Table S-7. Cost-Effectiveness of Tier II Alternatives

Alternative	LRT	Metrorail	Metrorail Hybrid (Option)	BRT
Annualized Capital Cost	$66,843,000	$124,570,000	$94,370,000	$33,927,000
Annual O&M Cost	$10,922,910	$29,236,136	$29,236,136	$2,584,102
Total Annualized Cost	$77,765,910	$153,806,136	$123,606,136	$36,511,102
User Benefits Hours (annual)	$1,337,485	$1,399,748	$1,399,748	$1,147,010
Cost-Effectiveness (cost/hour of user benefit)	$58.14	$109.88	$88.31	$31.83

Public Involvement

The involvement of stakeholders in The Public Involvement Participation Program is an integral part of the process and mandated by state and federal laws. The public involvement efforts for the South Link Study provided an open, proactive, participatory process for the public, affected agencies and others to become partners with the Citizens Advisory Committee (CAC). Public and agency involvement activities were an integral component of all tasks and continuous throughout the project. Public involvement activities included the development of public awareness (via newsletters, website, corridor meetings, scoping meetings and public meetings) and coordination of public meetings to identify and rank transportation modes and alternative alignments.

Scoping Meetings - Three scoping meetings were conducted along the corridor at West Perrine Community House-Chamber South, Miami-Dade Community College-Homestead Campus and Coral Reef Senior High School during March and April 2005. The meetings were advertised in two newspapers of general distribution. Postcards were mailed to the initial mailing lists that exist from previous work in the corridor.

CAC Meetings - The CAC was formally appointed and organized and was subject to the Florida Sunshine Law. The CAC consisted of 19 members. The CAC met a total of nine times between March 2005 and March 2006. Meetings will were held to obtain input and concurrence on project issues and update the members on the status of the project.

MPO Committee Meetings - The Project Team met with the various MPO Committees (CTAC, TPTAC, TPC and MPO) at significant milestones of the project. Several meetings were held with the various MPO committees or other agencies. These meetings were initiated on Tuesday, January 25, 2005, at the Stephen Clark Center. A meeting was held to provide coordination between Project Team and the Miami-Dade MPO and Miami Dade Transit.

Corridor Meetings - The Project Team planned for and attended many meetings, including: agency briefings, City Commission meetings, elected official meetings, and group meetings and/or open houses.

Public Meetings - Two sets of public meetings were held. The first set of meetings was held on February 24, 2006. Informal meetings were held in the parking lot of Wal-Mart in Florida City in the morning, in the food court at the Southland Mall during lunch and finally at the Dadeland South Metrorail station during the evening commute period. The project team maintained and used the record of citizens' preferences and comment summary about the alternatives from these meetings. Two advertised public meetings were held along the corridor to obtain recommendations for a selected alternative. These hearings were advertised in the newspaper at least two weeks in advance. These meetings were held on March 22, at the Perinne Cutler building, and the South Dade Government Center. Their purpose was to solicit input on all of the alternatives. Support was expressed for all of the alternatives but the general consensus was that Alternative 5, Metrorail, from Dadeland South to Florida City was preferred.

Newsletters - The Project Team prepared three newsletters about the project. For each, about 2,000 copies were made and distributed throughout the community as project updates and summaries. These newsletters detailed the happenings of the project, from its introduction, selection of a CAC, initial evaluation of Tier 1 alternatives to the evaluation of Tier 2 alternatives.

Project Website Updates - A link was maintained on the MPO Website for the project. It explained the project details, had a variety of downloads, encompassing maps, the purpose and need report, the newsletters and press releases. A history of meeting dates was also kept.

LOCALLY PREFERRED ALTERNATIVE (LPA)

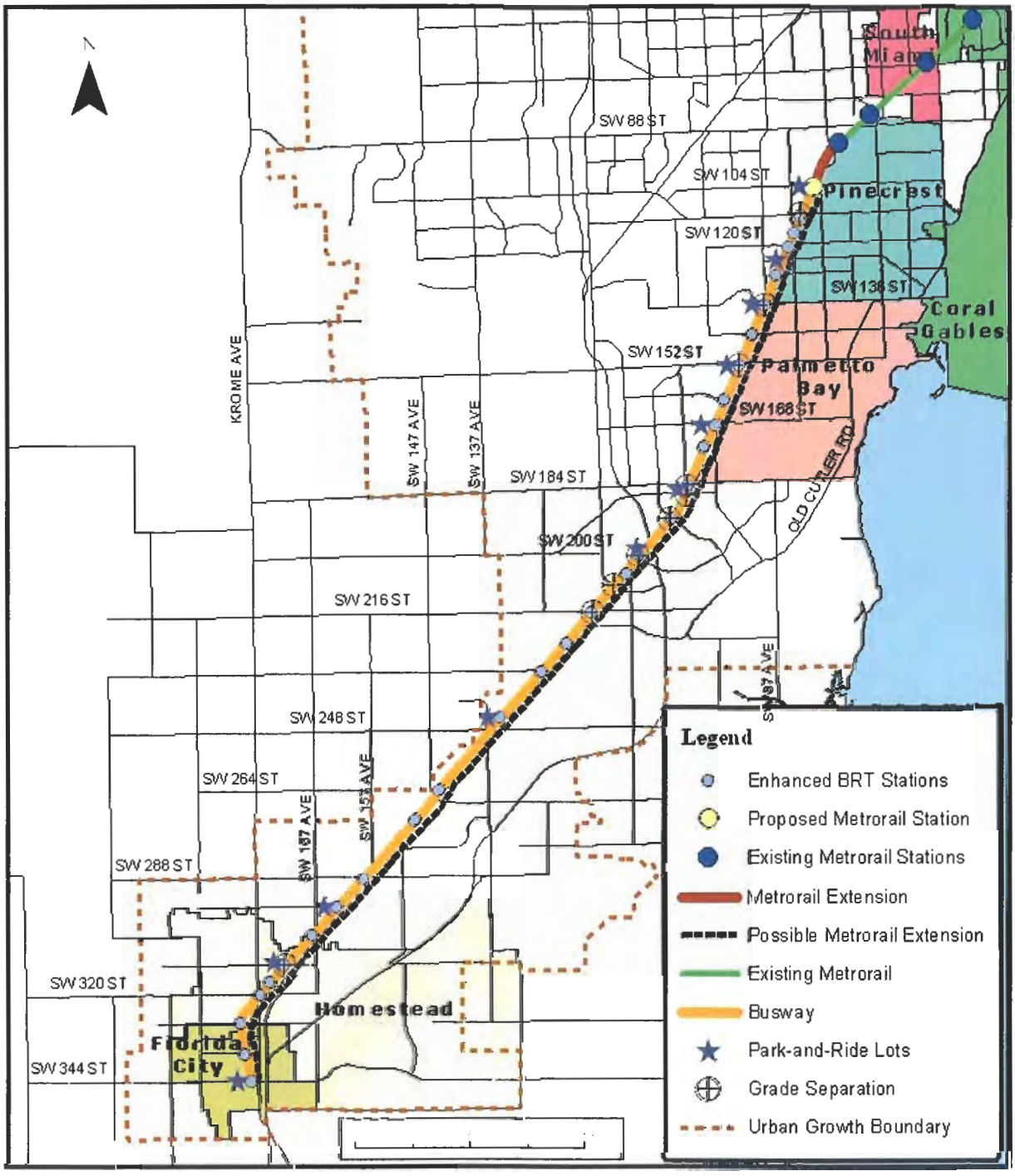
On June 22, 2006, the Miami-Dade Metropolitan Planning Organization voted by simple majority to support the Modified Enhanced Bus Rapid Transit Alternative 6 with a provision of supporting a long-range Metrorail extension south of SW 104th Street as demand warrants, as the Locally Preferred Alternative for the South Link Corridor.

The Modified Enhanced Bus Rapid Transit Alternative for the South Link Corridor, as illustrated in Figure S-9, consists of the two primary components listed below.

- An Enhanced Bus Rapid Transit system from Dadeland South to Florida City within the existing and future South Miami-Dade Busway right-of-way that would include:
    - Enhanced fare collection system;
    - Transit signal priority;
    - Real-time passenger information;

Figure S-9

Locally Preferred Alternative Modified Enhanced BRT



- Grade separation at selected intersections;
- Feeder buses on surface streets;
- Increased park-and-ride facilities; and
- Low floor stylized buses with a specific branding theme.

- A Metrorail extension (approximately 4,500 feet) from the Dadeland South Metrorail Station to SW 104th Street with a possible future extension as demand warrants.

Bus rapid transit can take many forms, but the common element is a rubber-tired bus operating on a seperated or defined pathway. Essentially the concept is having a bus function and look like a train. BRT vehicles typically include a variety of enhancements over traditional buses that allow faster operating speed, enhance passenger convenience and comfort, and portray a sleek, modern perception of efficiency and distinction from traditional buses.

Advanced technologies are implemented on the BRT vehicle to provide additional travel efficiency. BRT vehicles are often equipped with vehicle tracking systems that allow dispatchers to monitor travel time and schedules for better trip reliability. Information can be relayed to display boards both on-board and at stations that provide travel time information to major destinations and can inform passengers when the next bus is arriving. Perhaps the most recognizable feature of BRT vehicles to the average patron is the distinctive design characteristics that are often employed. The aesthetics of the BRT vehicle, including design, color, and graphics, helps to portray a positive sense with "choice riders" who may be willing to ride BRT vehicles over traditional buses.

The LPA includes the construction of one new Metrorail station in the vicinity of SW 104th Street near the existing busway to relieve congestion in the Dadeland area and to serve

latent parking demand experienced in the corridor. It is expected that park-and-ride demand will be significant at the proposed SW 104th Street station due to passenger demand from south of the existing Metrorail line wishing to access popular destinations such as downtown Miami and the Civic Center area. In the absence of adequate park-and-ride facilities, some transit patrons currently use shopping center parking lots near SW 104th Street as de-facto park-and-ride facilities. As the new southern terminus for Metrorail, the SW 104th Street intersection should include approximately 1,500 parking spaces dedicated for Metrorail park-and-ride patrons. An opportunity for a joint development project exists at this station that would ideally include mixed-use retail and office space attached to the Metrorail station.

The Metrorail extension to SW 104th Street should help alleviate congestion and parking deficiencies at the two Dadeland Metrorail stations, thereby increasing efficiency for passengers feeding into the Metrorail system from the proposed BRT system operating within the busway. Currently, the two Dadeland stations are ranked second and third in passenger boarding activity within the Metrorail system, their parking garages are 95 to 100 percent full, and surface streets are severely congested in the Dadeland area.

The northern terminus of the Enhanced BRT system is proposed to be at the Dadeland South Station. Therefore, the Enhanced BRT line would share the 100-foot right-of-way with the proposed Metrorail extension between SW 104th Street and Dadeland South. The purpose of continuing Enhanced BRT service north of the proposed southern terminus of Metrorail is to allow Enhanced BRT passengers to access the Dadeland South employment center without transferring.

The southern terminus of the Enhanced BRT system is proposed to be at SW 344th Street (Palm Avenue). A bus station would be provided within the busway right-of-way north of SW 344th Street. Due to potential high passenger demand within Florida City, some southbound buses may exit the busway at SW 328th Street or SW 336th Street, circulate through Florida City, and re-enter the busway at SW 344th Street for the northbound trip back to Dadeland South. This type of operational arrangement would serve passenger demand and provide a convenient way for buses to turn around at the southern BRT terminus.

Interface with Metrorail

The Metrorail vehicles and guideway would be consistent with the existing Miami-Dade Metrorail service and operate on an exclusive, elevated guideway. Metrorail service would seamlessly extend to the proposed SW 104th Street station. No transfer would be required to travel from the existing Metrorail line to SW 104th Street. The Modified Enhanced BRT Alternative supports a long-range Metrorail extension south of SW 104th Street as future demand warrants.

Feeder bus routes will be designed to circulate through residential neighborhoods, activity centers, and employment areas and connect to the BRT line. Some feeder bus routes will provide limited stop or express service within the BRT corridor and provide direct connec-

tions to Metrorail. Feeder buses are proposed to operate on 15-minute headways. The proposed feeder bus routes are presented in Figure S-10.

Bus station spacing along the proposed Enhanced BRT line is recommended to be approximately one-half mile. Station spacing would be similar to the existing busway. A few closely spaced stations may be consolidated to reduce travel time. In addition, stations at intersections that are recommended for grade separation would be located on the elevated section above the cross-street to eliminate the need for pedestrians to walk more than 1,000 feet from the intersection to access the Enhanced BRT station. Table S-8 provides recommended station locations for the Modified Enhanced BRT Alternative along with recommended park-and-ride locations and other enhanced BRT amenities.

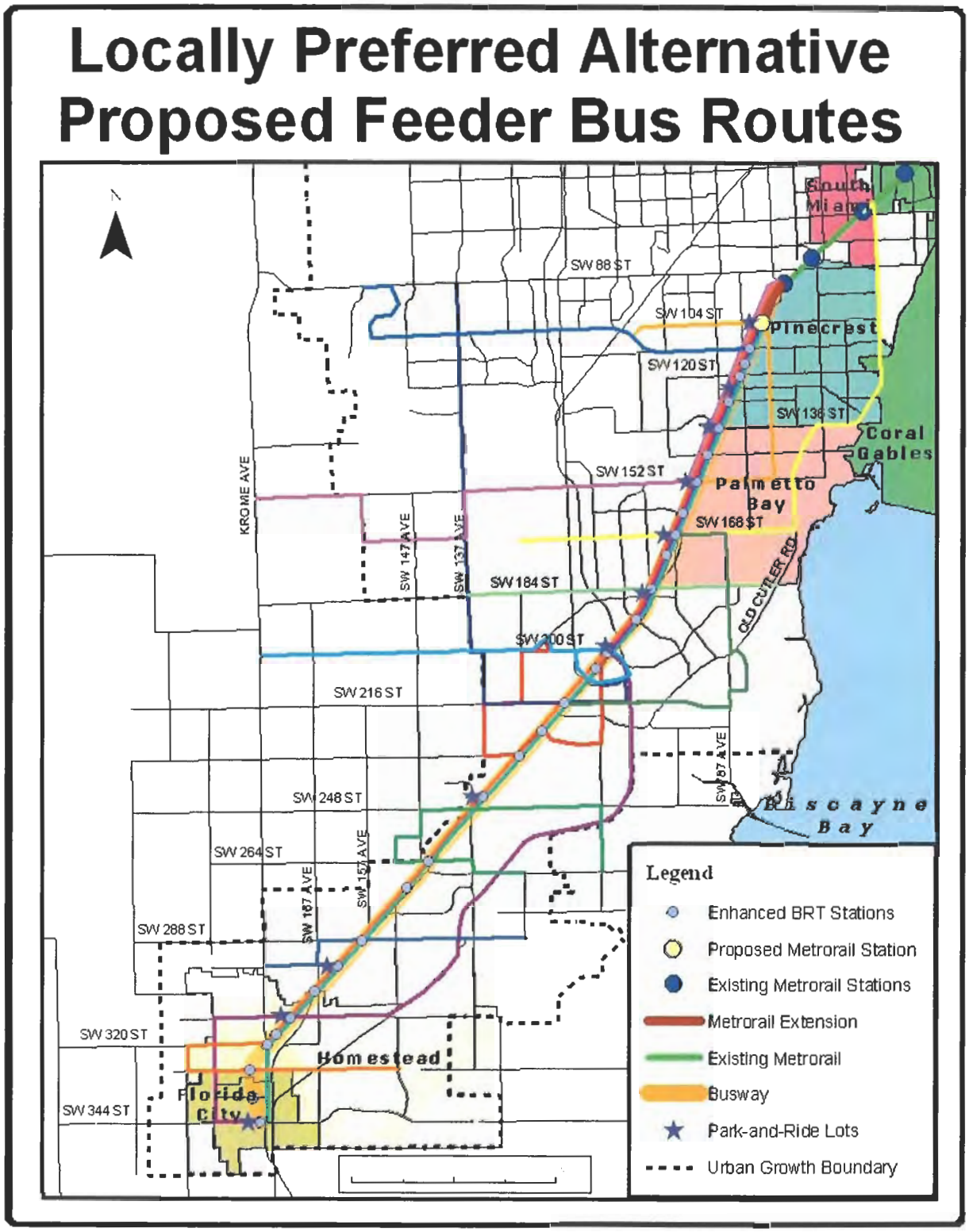
Table S-8. Enhanced BRT Station Locations and Characteristics

Cross-Street	Metrorail Transfer	Intersection Treatment(1)	Park and Ride Facilities	Off-Vehicle Fare Collection	Real-Time Passenger Info
Dadeland South	Yes	Terminus	Existing	Yes	Yes
SW 104th Street	Yes	TSP	Proposed	Yes	Yes
SW 112th Street	No	Elevated	No	Yes	Yes
SW 117th Street	No	TSP	No	Yes	Yes
SW 124th Street	No	TSP	Proposed	Yes	Yes
SW 128th Street	No	TSP	No	Yes	Yes
SW 136th Street	No	Elevated	Proposed	Yes	Yes
SW 144th Street	No	TSP	No	Yes	Yes
SW 152nd Street	No	Elevated	Existing	Yes	Yes
SW 160th Street	No	TSP	No	Yes	Yes
SW 168th Street	No	TSP	Existing	Yes	Yes
Banyan Street	No	TSP	No	Yes	Yes
SW 184th Street	No	Elevated	Proposed	Yes	Yes
Marlin Road	No	Elevated	No	Yes	Yes
SW 200th Street	No	Elevated	Proposed	Yes	Yes
SW 112th Avenue	No	TSP	No	Yes	Yes
SW 216th Street	No	Elevated	No	Yes	Yes
SW 224th Street	No	TSP	No	Yes	Yes
SW 232nd Street	No	TSP	No	Yes	Yes
SW 244th Street	No	TSP	Existing	Yes	Yes
SW 264th Street	No	TSP	No	Yes	Yes
SW 272nd Street	No	TSP	No	Yes	Yes
SW 288th Street	No	TSP	No	Yes	Yes
SW 296th Street	No	TSP	Existing	Yes	Yes
SW 304th Street	No	TSP	No	Yes	Yes
SW 312th Street	No	Elevated	Proposed	Yes	Yes
MDC Homestead	No	N/A	No	Yes	Yes
SW 320th Street	No	TSP	No	Yes	Yes
SW 328th Street	No	TSP	No	Yes	Yes
SW 336th Street	No	TSP	No	Yes	Yes
SW 344th Street	No	Terminus	Proposed	Yes	Yes

(1) TSP – Transit Signal Priority

The LPA requires purchasing thirty-three 45-foot Stylized BRT-type buses and eight buses similar to where MDT currently operates. It was assumed that Miami-Dade Transit's existing storage and maintenance facilities will support the maintenance of these 41 vehicles

Figure S-10. Feeder Bus Routes



as part of typical fleet expansion. Therefore, the LPA does not require a new maintenance or storage facility.

IMPACTS AND BENEFITS OF THE LPA

The implementation of the LPA will include grade separation of the busway at priority east-west streets and transit signal priority (TSP) for the busway at other intersections. Overall, the LPA is expected to decrease the average delay per intersection by approximately 5.6 vehicle hours during the PM peak hour.

Travel demand modeling performed for this study calculates a total of 2,062 hours of travel time savings daily due to faster travel times resulting from grade separation, transit signal priority (TSP), and more efficient passenger boarding. In addition, the Enhanced BRT Alternative is expected to attract 3,200 new riders daily above the Transportation System Management (TSM) Alternative.

The Comprehensive Development Master Plan (CDMP) developed by Miami-Dade County identifies existing and future rapid transit stations as locations to encourage land uses including housing, shopping, and offices paired with compatible entertainment, cultural, and human service uses. Within the South Link Corridor, seven urban centers are identified in the CDMP; five of which coincide with stations on the Enhanced BRT Alternative. Based on CDMP designations, the Modified Enhanced BRT Alternative has high potential for developing stations under the community urban center designation.

The Federal Transit Administration (FTA) requires examination of three different user benefit categories: annual cost per new rider, system operating cost per passenger mile, and cost per hour of user benefit. Annual cost per new rider uses the difference in the annualized cost of the alternative above the annualized cost of the TSM Alternative. System operating cost per passenger mile is calculated by using the increase in annual operating and maintenance cost between the TSM Alternative and the Build Alternative, and dividing it by the increase in passenger miles traveled. Cost per hour of user benefit uses the total of annualized capital cost plus the annual operating cost divided by the hours of user benefit. Table S-9 presents the user benefit results for the Enhanced BRT Alternative.

Table S-9. User Benefits Estimation

Cost per New Rider	Cost per Passenger Mile	Cost per Hour of User Benefit
$25.94	$0.41	$31.83

COSTS

The capital cost of the LPA was estimated at a conceptual level, compatible with the Alternatives Analysis level of planning, and includes required planning and design improvements. As shown in Table S-10, the total cost of the Modified Enhanced BRT Alternative is approximately $398 million.

Table S-10. Capital Cost for Modified Enhanced BRT Alternatives

Components	Cost (2005)
Enhanced BRT	$210,000,000
Metrorail Extension	$101,600,000
Grade Separation	86,000,000
TOTAL	$397,600,000

The Operating and Maintenance (O&M) costs are a recurrent annual cost for transit and for the most part must be budgeted locally. Preventive maintenance is an allowable expenditure of formula funds that transit agencies receive from the federal government. The state also assists with payment for the first three years of up to 50 percent of the costs of new service under their Service Department Block Grants.

O&M costs were developed for the Modified Enhanced BRT Alternative using FTA methodology. The incremental cost of the Modified Enhanced BRT Alternative that would need to be budgeted annually, compared to the No Build Alternative, is $10.8 million as presented in Table S-11.

Table S-11. O&M Costs for Enhanced BRT Alternative (2005 Dollars)

	Background Bus O&M Cost	Build Alternative O&M Cost	Total O&M Cost Above No Build Cost
No Build Alternative	$227.9 million	N/A	N/A
Enhanced BRT Alternative	$236.3 million	$2.4 million	$10.8 million
Additional O&M Costs (Enhanced BRT minus No Build)	$8.4 million	$2.4 million	$10.8 million

IMPLEMENTATION

The following funding strategy and phasing plan were developed for the LPA.

Identified potential funding sources include the Federal Transit Administration's Small Starts program, Miami-Dade County's People's Transportation Plan, and the Federal Highway Administration's Surface Transportation Plan.

The Modified Enhanced BRT Alternative was split into three components as described below.

- A project that meets the Federal Transit Administration's "Small Starts" criteria was identified. In order to meet Small Starts criteria, the total funding requirement for the project should be less than $250 million. The identified Small Starts component entails the BRT component without grade separation. The estimated cost of this component is approximately $210 million.
- The proposed extension of Metrorail from the Dadeland South Station to SW 104th Street and construction of the park-and-ride garage at SW 104th Street were identified for potential funding through FTA and/or the People's Transportation Plan. The estimated cost of this component is approximately $102 million.

- Grade separation of the busway at identified locations was identified for potential funding through the Federal Highway Administration's Surface Transportation Plan (STP). The estimated cost of the FHWA component is approximately $86 million.

It should be noted that the funding plan presented in this section considers fewer park-and-ride facilities than the original Enhanced BRT Alternative. Still, the LPA would provide a total of 11 park-and-ride locations, which is an increase of seven park-and-ride locations in comparison to the No Build Alternative.

An implementation plan was developed for the Modified Enhanced BRT Alternative to determine a timeline for implementation. The three subcomponents of the Modified Enhanced BRT Alternative are expected to be implemented over a 10-year timeframe. The costs presented in Table S-12 are planning level estimates based on 2005 dollar values.

Table S-12. Phasing Plan of Modified Enhanced BRT Alternative

Time Frame	Components	Activities	Cost (2005)
1 – 5 Years	Enhanced BRT	Environmental documentation for BRT component	$3,000,000
		New P&R at SW 124th Street; SW 136th Street	$24,800,000
		Expand P&R at SW 152nd Street, SW 168th Street	$24,800,000
		Order vehicles, spare parts, and reorient feeder bus routes	$44,400,000
		Design BRT elements(A)	$19,300,000
	Metrorail Extension	Environmental documentation for Metrorail extension	$2,000,000
		Design Metrorail Extension/Busway to SW 104th Street	$24,300,000
		Design Metrorail/BRT station at SW 104th Street	$5,900,000
	Grade Separation	Environmental documentation for grade separation	$2,000,000
		Design & construct grade separations at SW 136th Street; SW 152nd Street	$17,700,000
6 – 10 Years	Enhanced BRT	Install TSP for busway	$2,400,000
		Install off-vehicle fare collection system	$6,200,000
		Install communication system	$12,900,000
		Modifications to stations and platforms	$10,200,000
		New P&R at SW 184th Street; SW 344th Street	$24,800,000
		Expand P&R at SW 200th Street	$12,400,000
	Metrorail Extension	Construct Metrorail Extension to SW 104th Street (includes busway modifications)	$39,900,000
		Construct Metrorail/BRT station at SW 104th Street	$9,700,000
		New P&R at SW 104th Street	$19,800,000
	Grade Separation	Design & construct grade separations at SW 112th Street, SW 184th/SW 186th/Marlin Rd; SW 200th Street	$48,600,000
11 – 15 Years	Enhanced BRT	New P&R at SW 312th Street	$12,400,000
		Expand P&R at SW 244th Street	$12,400,000
	Grade Separation	Design & construct grade separations at SW 211th/SW 216th Street; SW 312th Street	$17,700,000
Total Cost			**$398,000,000**

(A) Includes transit signal priority, off-vehicle fare collection, communication system, and modifications to stations and platforms.

CONCLUSION

The objective of the South Link Alternatives Analysis study was to identify transit improvements in the South Link Corridor with the intent to broaden the range of transit options. The need for transit improvements in South Miami-Dade is demonstrated by the lack of adequate north-south mobility corridors, failing levels of service on existing roadways, highest projected population growth in the County (81 percent by 2030), and imbalance between jobs available and housing units in the area.

The recommended Locally Preferred Alternative for the South Link Corridor is the Modified Enhanced Bus Rapid Transit Alternative 6 with a provision of supporting a long-range Metrorail extension south of SW 104th Street as demand warrants. The LPA is expected to attract approximately 3,200 new riders daily more than the Transportation System Management Alternative. The travel time from Florida City to SW 104th Street is expected to be approximately 40 minutes. The total cost of the Modified Enhanced BRT Alternative is approximately $398 million. The additional annual Operations and Maintenance costs of the Modified Enhanced BRT Alternative above programmed service levels is $10.8 million.

The LPA will help alleviate mobility deficiencies by reducing the travel time between South Miami- Dade and major employment centers; increasing park-and-ride capacity; and, increasing transit passenger carrying capacity, service frequency, and system reliability.

THE CORRADINO GROUP