DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS

CORRIDORS EVALUATION REPORT

March 17, 1993

Submitted to:

Metropolitan Dade County
Metropolitan Planning Organization Secretariat

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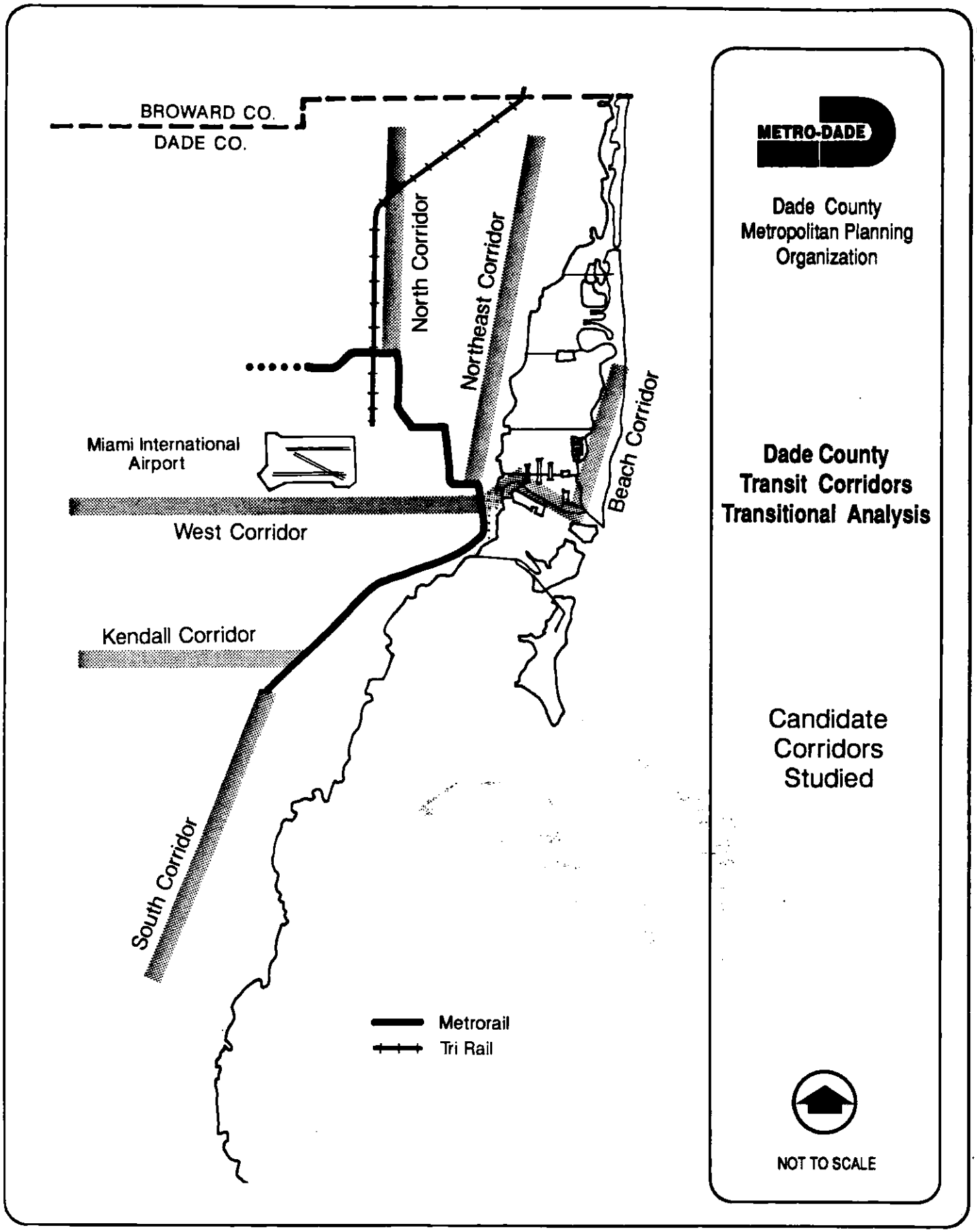
BROWARD CO.
DADE CO.
North Corridor
Northeast Corridor
Beach Corridor
Miami International Airport
West Corridor
Kendall Corridor
South Corridor
Metrorail
Tri Rail
METRO-DADE
Dade County Metropolitan Planning Organization
Dade County Transit Corridors Transitional Analysis
Candidate Corridors Studied
NOT TO SCALE

Figure E.1

EXECUTIVE SUMMARY

Study Purpose

The Transit Corridors Transitional Analysis is being conducted by the Dade County Metropolitan Planning Organization to identify and evaluate transit alternatives in six corridors within the County. These six corridors were recommended for further study in the Metro Dade Year 2010 Transportation Plan prepared in 1990 by the County. This plan identifies that the future travel needs of these six corridors are beyond most roadway-oriented solutions. The transit improvement alternatives identified for each corridor are described, analyzed, and evaluated and a set of the most promising alternatives presented for possible further consideration and development.

Corridors Considered

The six corridors under study (see Figure E.1) are:

South: Dadeland South Metrorail Station to Homestead/Florida City (19.2 miles -- includes the programmed 9-mile South Dixie Busway between Dadeland South and Cutler Ridge)

Kendall: Dadeland North Metrorail Station to SW 137th Avenue (7.5 miles)

North: Dr. M.L. King Jr. Metrorail Station to NW 215th Street (8.5 miles)

Northeast: Downtown Miami to NE 199th Street (13.6 miles)

Beach: Downtown Miami to 71st Street on Miami Beach (10.9 miles)

West: Downtown Miami to Florida International University at the Homestead Extension of the Florida Turnpike (HEFT) (12.1 miles) with direct connection or branch service to Miami International Airport.

A seventh element which combines aspects of both the West and Beach Corridors, including a connection between Miami International Airport and the Seaport via downtown Miami, is also analyzed and evaluated:

West-Beach: Florida International University to the Miami Beach Convention Center via downtown Miami with a direct connection or branch service to both the airport and the Seaport (22.0 miles)

Study Scope and Process

The Dade County Transit Corridors Transitional Analysis began in July 1991. The work includes a sequence of analytical tasks regarding:

- review and revision of a travel demand forecasting model including the incorporation of jitney service;
- development of an evaluation methodology and criteria, as well as other study methodologies;

- development and analysis of transit improvement alternatives for each corridor, including ridership and travel benefits projections, capital and operating and maintenance cost estimates, and environmental assessments, and;

- evaluation of the alternatives within each corridor and comparison of the corridor results.

The study was directed by the Metropolitan Dade County Metropolitan Planning Organization Secretariat, with guidance and review provide by technical and policy committees from Metro Dade Transit and Aviation agencies, and Florida Department of Transportation (District 6.)

******IMPLICATIONS OF HURRICANE ANDREW ON STUDY RESULTS******

The Transit Corridors Transitional Analysis looks at transportation needs and improvements based on the year 2010 projected land use, population and employment patterns for Dade County. These projections are based on current patterns, however, Hurricane Andrew has drastically altered these patterns in the near term. Concerns were raised as to how the aftermath of the hurricane may affect the outcome of the study. Based on an assessment of the near (next five years) and long (five to 20 years) term implications of the hurricane, the effects of the storm on the year 2010 horizon of the study will be negligible.

When Hurricane Andrew struck South Florida on August 24, 1992, it wrought extensive damage to homes and businesses in southern Dade County, particularly south of Kendall Drive. This resulted in two major temporary shifts in travel in Dade County. First, many residents of the affected areas relocated temporarily to northern Dade County and Broward County. These people were added to those already commuting south to jobs in downtown and other employment areas in Dade County and reduced travel from the south to central Dade County. Second, southern Dade County, which had been primarily residential, became a major employment center as repair crews, insurance agents, and others began commuting from residences and hotels in northern Dade County to effect repairs in the damaged areas.

However, these effects are primarily temporary. Although some people have permanently relocated from southern Dade County, most residents are expected to return as their homes again become habitable. Other homes and lots are expected to be sold and new residents will move into the area as conditions return to normal. As repairs progress the volume of southbound traffic by repair crews and workers will also subside. The distribution of population is expected to be nearly restored within the next several years and business is expected to be restored to its former level within approximately the same time.

Some reports suggested that it would be many years before the affected areas return to normal. In some respect there will be lasting remnants of the storm for many years as some buildings or other elements such as fences will not quickly be rebuilt and damage to trees and vegetation will be visible for many years. However, these impacts of the storm will not greatly affect travel patterns in the longer term.

The future of the Homestead area is more affected by the future use of Homestead Air Force Base. The status of the base has not been determined at this time and plans for alternate uses for the airfield and associated land are under consideration. However, since the transit improvements under study in the South Corridor do not serve the air base market, the status of the air base is only peripherally tied to the transit improvements. Thus, Hurricane Andrew will not have a significant long term effect on the transit corridors under study.

Transit Proposals in Response to Hurricane Andrew

In the aftermath of Hurricane Andrew which extensively damaged south Dade County, several proposals have been, or are being, considered as means to extend fixed guideway transit service as soon as possible into devastated areas. The purpose of

these immediate-response proposals is to provide additional transportation service, demonstrate a commitment to rebuilding south Dade County, and act as a stimulus and focus for redevelopment.

The **South Dade Transit Linkage** is a proposal to extend Tri-Rail from the Miami International Airport to the Metrorail Dadeland North Station via existing FEC and former CSX railroad right of way. The South Dixie Busway, whose northern terminus is at the Dadeland South Metrorail Station, is extended northward to the Dadeland North Station. These extensions combine to form a transit hub at Dadeland North combining Metrorail, bus, and Tri-Rail services. The transit linkages provided by this program serve additional markets to those served by the Transitional Study South Corridor alternatives and will complement rather than compete with or preclude each other.

Transit Modes Considered

Eight public transit modes may be applied to meet transit needs in Dade County. The key features and operating characteristics of each mode are outlined below. Within these general outlines, variations in specific details are possible. Table E.1 indicates the various modes considered in each corridor.

TABLE E.1
POTENTIAL APPLICATION OF MODE TECHNOLOGIES

	Priority Bus Lanes	Express Busway	Light Rail Transit*	Metrorail		Local Bus/ Jitney**	Notes
SOUTH		•		H	S	O	
KENDALL	•	•		H	S	O	Busway and bus lanes combined in one alternative
NORTH	•				S	O	
NORTHEAST		•	S	H	S	O	
BEACH			S			O	
WEST			S	H	S	O	Various alignments
WEST-BEACH			H			O	Dedicated bus/van service
• Line-Haul Service Mode Alternative S Standard LRT or Metrorail H "Hybrid" LRT or Metrorail				OBackground Service Mode OSpecial Service			

*"Hybrid" rail transit vehicles can operate both on Metrorail lines and in mixed traffic or with at-grade crossings.

**Local bus service may include regular buses, minibuses, and/or jitneys. Special airport-seaport bus service represents existing cruise company bus services.

Local On-Street Minibus/Jitney

This mode represents minibus and jitney services presently operating in Dade County. Minibus service operates in mixed traffic making frequent stops and may provide feeder service to another mode such as Metrorail. Significant features include:

- Serves light passenger volumes
- Slow speed
- Dense localized network useful for short trips
- Extremely flexible routing and scheduling

Local On-Street Bus

This mode represents the majority of Metrobus routes operating in Dade County. Local bus service operates in mixed traffic making frequent stops and may provide feeder service to another mode such as heavy rail. Significant features include:

- Serves light to heavy passenger volumes
- Slow speed
- Dense areawide network useful for short to medium length trips
- Flexible routing and scheduling

Priority Bus Lanes

Priority bus lanes or transitways are characterized by buses operating on exclusive bus lanes along a street and making periodic stops. A busway may be located in the median of a roadway or may consist of restricted lanes available full time or only during peak flow periods along the sides of the roadway. The speed of service depends on the spacing of stops and degree of separation from other traffic. Significant features include:

- Serves medium to high passenger volumes
- Slow to medium speed
- May serve short to long trips (depending on operating speed and bus stop spacing)
- May be intermixed with on-street bus operation

Express Busway

This mode is represented by express buses operating on a busway or separate bus lane along a roadway or segregated right-of-way. In such service, buses normally collect passengers on local streets or at park-and-ride facilities at one end of the busway, then operate with few or no stops until reaching the other end of the busway. Express buses may serve the CBD directly or they may feed a rail transit station. Significant features include:

- Serves medium to high passenger volumes
- Primarily serves long distance commuter trips
- Buses may continue on a local collector route to provide a one-seat ride without transfers
- May operate in HOV lanes with other traffic or on exclusive lanes
- High speed -- buses avoid roadway congestion by use of exclusive lanes

Automated Guideway Transit (AGT)

This mode is represented in Dade County by Metromover. AGT usually operates as a local distribution system. Because it is automated (driverless), AGT systems operate on an exclusive right-of-way. Significant features include:

- Serves low to medium passenger volume
- Medium speed
- Serves short to medium length trips
- Automated, control by computer with supervision from central control center
- Must be grade separated throughout
- Stations spaced 1/4 to 1/2 mile apart
- Cars may operate alone or in pairs

Light Rail Transit (LRT)

Light rail transit is a flexible mode which can operate in a variety of settings. Key distinctions between light and heavy rail are light rail's use of overhead power collection as opposed to the track-level third rail used by heavy rail and light rail's shorter trains of articulated vehicles. With overhead power collection, light rail trains can operate in mixed traffic like streetcars, on an at-grade right-of-way with street and pedestrian crossings, or on a fully segregated right-of-way. Since passengers can walk across tracks, stations can be simple with low platforms or use high platforms for faster loading and unloading.

Significant LRT features include:

- Serves medium to high passenger volume
- Low to high speed (depending on degree of separation of right-of-way and distance between stops)
- May serve short to long distance trips
- Normally uses overhead power collection, but may also use third rail
- May operate in mixed traffic, with cross-traffic, or on exclusive right-of-way
- Stations may be elaborate or simple. May use low platforms, high platforms, or both
- Stations spaced 1/2 to 1 mile apart
- Vehicles may operate along or in trains of up to four vehicles
- Lower capital cost than heavy rail
- Lower environmental and neighborhood impacts than heavy rail
- May be automated where exclusive right-of-way is used
- Fare collection may be performed in stations, on board vehicles, or both

Hybrid Light Rail Transit ("Hybrid" LRT)

A light rail transit option which may be of particular interest in Dade County is a "hybrid" vehicle which can operate both on Metrorail tracks and on tracks with street crossings or in mixed traffic. Such a vehicle would be equipped to collect power both from a third rail (for operation along existing Metrorail lines) and from overhead catenary wires (where street crossings or mixed traffic is present), would have both high and low platform access, and would be compatible with both automatic operation on Metrorail and manual operation where grade crossings are present. In this study, this configuration is referred to as "hybrid" LRT while the typical configuration (no third rail power collection) is referred to as standard LRT.

In addition to its ability to operate on Metrorail guideways, significant "hybrid" LRT features are the same as those listed above for standard LRT.

Heavy Rail

This mode is represented in Dade County by Metrorail. Heavy rail, which collects power from a "third rail", must be on an exclusive guideway throughout – vehicle or pedestrian crossing of tracks is not possible. Heavy rail provides the highest passenger capacity and fastest service possible but at the highest capital cost. Significant features include:

- Serves high passenger volume
- Medium to high speed
- Serves medium to long trips
- Must be an exclusive right-of-way throughout (no crossings)
- Highest per-unit capital cost
- Must use high platforms
- Power collection from "third rail"
- Medium to long trains (usually 4 to 10 cars)
- Stations spaced 3/4 to 1-1/2 miles apart

"Hybrid" Metrorail

In several of alternatives, Metrorail vehicles, which pick up their propulsion power by means of a third rail, would be equipped with a roof-top pantograph to pick up power from an overhead wire, and be able to operate like a light rail transit line. In this study, this configuration is referred to as "hybrid" Metrorail.

Significant features of "hybrid" Metrorail for this study include:

- Operates on existing or future Metrorail guideways.
- Reduces cost of Metrorail extensions by allowing at-grade construction with street-level crossings.
- Can use existing Metrorail vehicle fleet and maintenance and storage facilities.

Commuter Rail

This mode is represented in South Florida by Tri-Rail. Commuter rail service uses typical railroad technology to provide long distance, high speed commuter service. Commuter rail service typically consists of unpowered passenger cars pulled by a locomotive. In the case of Tri-Rail, diesel locomotives pull bi-level coaches. Significant features include:

- Serves medium to high passenger volume
- Medium to high speed
- Serves long trips
- Normally on railroad right-of-way, may have street crossings
- High or low platforms (Tri-Rail uses low platforms only)
- Diesel locomotive power (as with Tri-Rail) or electric locomotive power from overhead catenary wire
- Medium to long trains (usually 4 to 10 cars)
- Stations spaced 2 to 6 miles apart

Commuter rail was not considered for the corridors under study due to its wide station spacing, orientation to longer distance travel and general operating characteristics.

SUMMARY OF CORRIDORS

Ridership and Travel Benefits

The West-Beach Options by far, generates the most riders and travel benefits of all the corridors. As separate corridors, the West Corridor and Beach Corridor rank next highest in terms of new transit riders and line passenger boardings, followed closely by the Northeast Corridor. The South Corridor has a fairly high number of boarding passengers but most are existing riders diverted from existing transit services. Both the Kendall and North corridors have modest ridership volumes, although the North Corridor rail options attract a much higher number of new transit riders.

Capital Costs

As a group, the West-Beach Options are the most costly because they are relatively long (with the exception of the South Corridor) and involve several expensive crossings of rivers and other obstacles. The South Corridor, being the longest, is the next most costly group, followed by the West Corridor. The North and Kendall Corridors are lower in cost than the above corridors because of their shorter length. The Beach Corridor is the least costly as a corridor by virtue of the relatively inexpensive at-grade light rail transit mode considered.

The busway alternatives are the least costly modal option. The at-grade light rail transit and "hybrid" rail transit are less costly on a per mile basis than the Metrorail options because they can have at-grade crossing of roadways and relatively simpler stations. The fully exclusive guideway and stations required under the Metrorail alternatives, make them the most expensive group of options.

Operating and Maintenance Costs

In general, the longer the corridor, the higher the O&M cost. The West-Beach Options as a group are the most costly to operate because they involve the longest route lengths and represent, for the most part, a separate line from the existing Metrorail system. For similar reasons, the West Corridor alternatives are the second costliest group. The rail alternatives for the South, North, Northeast, Beach, and Kendall Corridors have a similar order of magnitude costs. The busway options have small cost increases given that they represent TSM bus service plans operating over new guideways.

Many of the alternatives, particularly the rail options, free up bus vehicles which can be used for service in other areas of Dade County.

Environmental Assessment

The alternatives considered in this study were developed to avoid or minimize impacts to existing communities and the man-made and natural environments. Alignments or transit modes that would have major community/environmental impacts were screened out from consideration early in the study process. The alternatives considered in this study do have some impacts; however, most can be mitigated. Nevertheless, there are some impacts associated with the construction and/or the operation of an alternative which vary among the different alternatives and particularly among the different corridors. These are highlighted in the Summary Evaluation below.

Air quality is an important environmental concern, particularly given the requirements of the federal Clean Air Act of 1990. Transit improvements are generally regarded as having a beneficial effect on air quality and part of an overall regional air quality improvement program. Key indicators of the degree to which the various alternatives improve air quality are the number of auto trips diverted to transit and the diverted number of auto vehicle miles travelled (VMT), as these are measures of the reduction in auto emissions. Diverted auto trips and VMT are presented in the evaluation matrix for each corridor. Generally those alternatives that attract the most new riders, such as the West-Beach options, have the greatest reductions in auto trips and VMT, and therefore auto emissions. While the amount of reductions in any one corridor may not be large on a regional basis, they nevertheless contribute to an overall program to improve air quality.

Summary Evaluation

This study examined and evaluated sets of transportation improvement alternatives for seven corridors in Dade County. The results of the technical analyses are presented and various indicators of performance, benefits, costs and impacts are listed and used to identify those alternatives and corridors, of those considered, that represent the best opportunities for transportation investment. To the extent possible within the scope of this systems level of technical analysis, consideration of community and environmental impacts and sensitivities have been incorporated into the development and evaluation of the alternatives. An ongoing financial analysis is examining the resources and opportunities to fund the construction and operations of potential improvements.

The following findings can be drawn from the results of the technical analysis presented above:

- The **South Corridor** busway alternative, which is an extension to the programmed South Dixie Busway to Cutler Ridge, represents a relatively low cost, and cost effective option for the South Corridor. Although it does not attract as many new riders as the rail options, it does carry nearly the same number of total riders. This option provides improved access for bus riders and improved operating reliability to the Metrorail from south Dade County. The rail extension alternatives attract more new ridership but at a higher cost.

- The alternatives in **Kendall Corridor** improve access and travel times for existing riders but only attract relatively modest new ridership compared to the investment required. Therefore, the transit service improvements included in the TSM alternative for this corridor, enhanced with some modest capital projects such as traffic queue by-pass lanes and other transit priority treatments at selected locations, represent an inexpensive, non-disruptive, and effective means of addressing the transportation needs in the Kendall Corridor.

- Improvements in the **North Corridor** attract many new riders as well as serve existing users. The rail extension straight up NW 27th Avenue is the most attractive investment for the corridor. The bus lane is a cost effective, lower cost investment, although its transportation benefits are modest as it carries only about a third of the riders as the rail options and only attracts about a third as many new transit trips. The required street widening under the bus lane alternative raises serious community impact questions because of the loss of parking and associated business and property impacts.

- The **Northeast Corridor** busway is a very cost effective and relatively low cost option. It gains more new riderships than any of the rail options examined in the corridor and costs substantially less to build and operate. Of the Northeast Corridor rail alternatives, Standard Light Rail Transit is the most cost-effective. It generates comparable ridership benefits to the other rail alternatives, but at a lower capital cost and operating and maintenance cost. Because these alternatives run along the existing FEC railroad right of way, the community and environmental impacts are minimal. The Northeast Corridor Busway has the best FTA C/E index of all the alternatives considered in this study.

- The **West-Beach Options** represent an opportunity to provide a major transportation improvement to better serve existing riders, attract a large number of new riders to transit, and provide a economically-valuable direct connection between the Miami International Airport and the Seaport as well as to Florida International University. While the benefits are great, so is the investment. The two components that comprise this corridor -- **West Corridor and Beach Corridor** -- each are viable, beneficial, and reasonably cost-effective investments by themselves, especially the Beach LRT. This opens up the opportunity for staged implementation of an overall program for the corridors based on availability of funding. The alignment in the West Corridor and the connection the Beach across Biscayne Bay require more detailed analysis to determine the preferred configuration.

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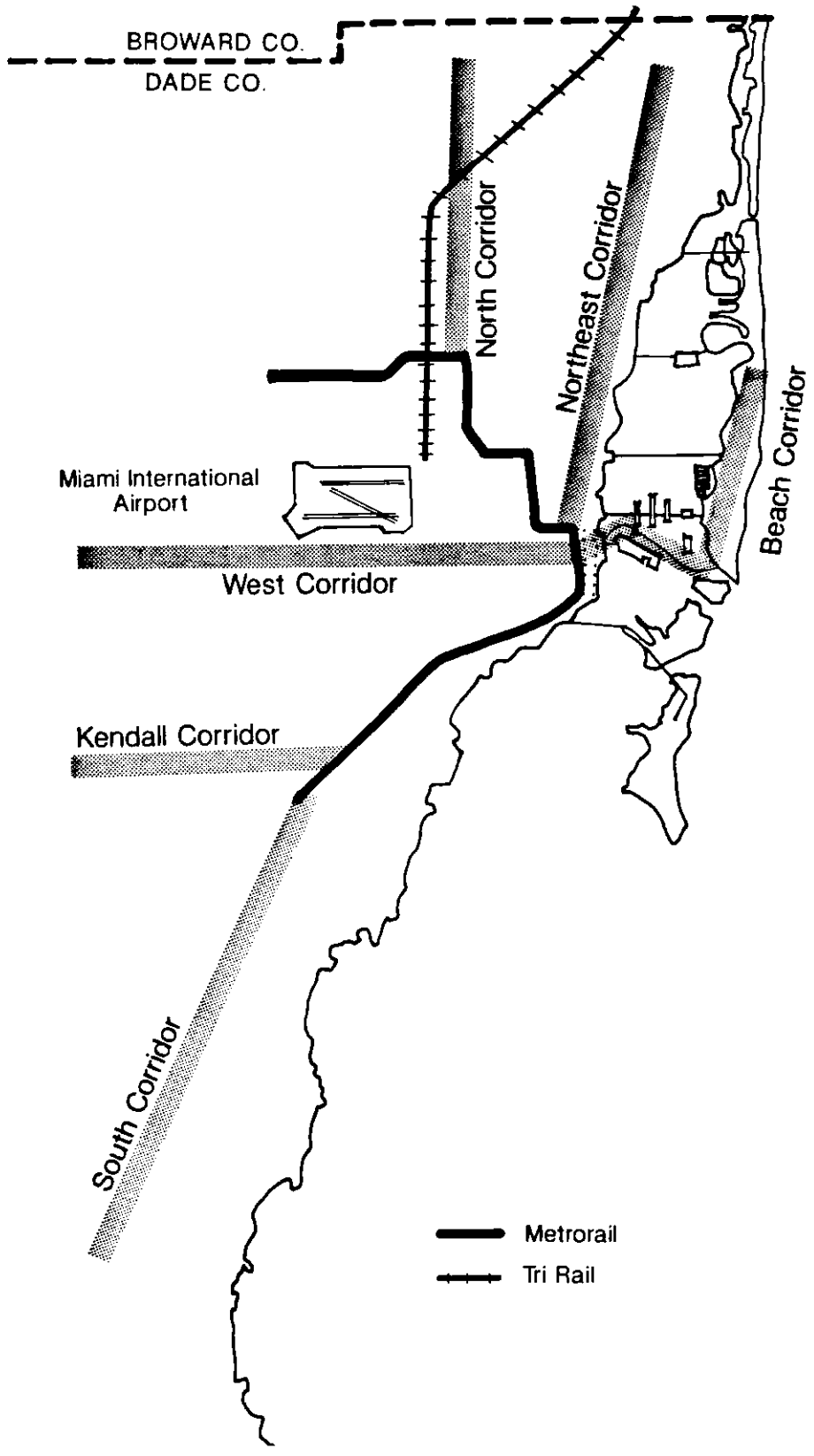

METRO-DADE

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Figure 1

OVERVIEW

Study Purpose

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- evaluation of the alternatives within each corridor and comparison of the corridor results.

More specific discussions on the methodologies and assumptions used in the technical analyses are provided later in this section.

In addition to this work related to the development, analysis, and evaluation of transit improvements within each corridor, other study activities include: inventory and review of previous and ongoing studies (documented in the Task 2 Technical Memorandum, "Identification, Collection, and Review of Previous Work"); development of and support to the citizen participation and official review processes, including production of a study introductory video and development of a speakers bureau; and a financial analysis of a potential transit improvement program.

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Thus, Hurricane Andrew will not have a significant long-term effect on the transit corridors under study. The transit improvement considered in the South Corridor, on the other hand, could have a long-term effect on South Dade County by serving as a stimulus and focus for redevelopment.

Alternatives Definition/Service Planning

A set of transit improvement alternatives is identified for each of the six corridors as well as the combination of the West and Beach corridors. Based on a review of the present and expected transportation needs and travel patterns in each corridor and the physical opportunities and constraints, a set of transit improvement alternatives were developed representing a range of transit technologies, service characteristics, and cost. An initial listing and definition of the alternatives for each corridor are provided in the study's Task 5 Technical Memorandum, "Identification of Preliminary Alternatives," dated January 21, 1992. These alternatives were further refined and developed in physical and operational terms for the purposes of the travel demand forecasting, operating and maintenance cost estimating, capital cost estimating, and environmental assessment.

The definition of the alternatives for each corridor are provided in the individual corridor sections.

The alternatives described in this report are generally considered the long-term transit improvement for the corridors. Shorter initial implementation segments could be considered as need requires and funding permits.

Transit Modes Considered

Eight public transit modes may be applied to meet transit needs in Dade County. The key features and operating characteristics of each mode are outlined below. Within these general outlines, variations in specific details are possible. Table 1 indicates the various modes considered in each corridor.

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Light Rail Transit (LRT)

Light rail transit is a flexible mode which can operate in a variety of settings. Key distinctions between light and heavy rail are light rail's use of overhead power collection as opposed to the track-level third rail used by heavy rail and light rail's shorter trains of articulated vehicles. With overhead power collection, light rail trains can operate in mixed traffic like streetcars, on an at-grade right-of-way with street and

pedestrian crossings, or on a fully segregated right-of-way. Since passengers can walk across tracks, stations can be simple with low platforms or use high platforms for faster loading and unloading.

Significant LRT features include:

- Serves medium to high passenger volume
- Low to high speed (depending on degree of separation of right-of-way and distance between stops)
- May serve short to long distance trips
- Normally uses overhead power collection, but may also use third rail
- May operate in mixed traffic, with cross-traffic, or on exclusive right-of-way
- Stations may be elaborate or simple. May use low platforms, high platforms, or both
- Stations spaced 1/2 to 1 mile apart
- Vehicles may operate along or in trains of up to four vehicles
- Lower capital cost than heavy rail
- Lower environmental and neighborhood impacts than heavy rail
- May be automated where exclusive right-of-way is used
- Fare collection may be performed in stations, on board vehicles, or both

Hybrid Light Rail Transit ("Hybrid" LRT)

A light rail transit option which may be of particular interest in Dade County is a "hybrid" vehicle which can operate both on Metrorail tracks and on tracks with street crossings or in mixed traffic. Such a vehicle would be equipped to collect power both from a third rail (for operation along existing Metrorail lines) and from overhead catenary wires (where street crossings or mixed traffic is present), would have both high and low platform access, and would be compatible with both automatic operation on Metrorail and manual operation where grade crossings are present. In this study, this configuration is referred to as "hybrid" LRT while the typical configuration (no third rail power collection) is referred to as standard LRT.

In addition to its ability to operate on Metrorail guideways, significant "hybrid" LRT features are the same as those listed above for standard LRT.

Heavy Rail

This mode is represented in Dade County by Metrorail. Heavy rail, which collects power from a "third rail", must be on an exclusive guideway throughout -- vehicle or pedestrian crossing of tracks is not possible. Heavy rail provides the highest passenger capacity and fastest service possible but at the highest capital cost. Significant features include:

- Serves high passenger volume
- Medium to high speed
- Serves medium to long trips
- Must be an exclusive right-of-way throughout (no crossings)
- Highest per-unit capital cost
- Must use high platforms
- Power collection from "third rail"
- Medium to long trains (usually 4 to 10 cars)
- Stations spaced 3/4 to 1-1/2 miles apart

"Hybrid" Metrorail

In several of alternatives, Metrorail vehicles, which pick up their propulsion power by means of a third rail, would be equipped with a roof-top pantograph to pick up power from an overhead wire, and be able to operate like a light rail transit line. In this study, this configuration is referred to as "hybrid" Metrorail.

Significant features of "hybrid" Metrorail for this study include:

- Operates on existing or future Metrorail guideways.
- Reduces cost of Metrorail extensions by allowing at-grade construction with street-level crossings.
- Can use existing Metrorail vehicle fleet and maintenance and storage facilities.

Commuter Rail

This mode is represented in South Florida by Tri-Rail. Commuter rail service uses typical railroad technology to provide long distance, high speed commuter service. Commuter rail service typically consists of unpowered passenger cars pulled by a locomotive. In the case of Tri-Rail, diesel locomotives pull bi-level coaches. Significant features include:

- Serves medium to high passenger volume
- Medium to high speed
- Serves long trips
- Normally on railroad right-of-way, may have street crossings
- High or low platforms (Tri-Rail uses low platforms only)
- Diesel locomotive power (as with Tri-Rail) or electric locomotive power from overhead catenary wire
- Medium to long trains (usually 4 to 10 cars)
- Stations spaced 2 to 6 miles apart

Commuter rail was not considered for the corridors under study due to its wide station spacing, orientation to longer distance travel and general operating characteristics.

Travel Demand

Travel demand forecasts were prepared for each of the transit alternatives in each corridor. The estimates were prepared using the travel forecasting models and input data developed by Metro Dade and the Florida Department of Transportation (FDOT), based on the Florida Standard Urban Transportation Model Structure (FSUTMS). A revised transit forecasting module, known as a modal split model, was developed for use in this project. The revised model is consistent with the state of the practice in transit demand estimation and meets the unique needs of transit travel forecasting in the Miami area, especially the treatment of jitneys as a viable transit mode in several corridors.

The travel models were run for a 2010 time horizon, based on projected land use data and other inputs provided by Metro Dade. The highway system assumed to be in place by 2010 includes:

- Numerous arterial street improvements, particularly in the rapidly growing western parts of the county.

- Extension of the Dolphin Expressway (SR 836) to NW 137th Avenue.
- Extension of SR 874 to SW 137th Avenue.
- Construction of a new expressway along the northern edge of the airport from the Palmetto to LeJeune, connecting with SR 112 to the east.
- Construction of Gratigny Parkway in the Opa Locka area from the Palmetto to the vicinity of NW 27th Avenue.

It is possible that some of the projects may not be implemented within the year 2010 time horizon used in this study. As all these highway projects are included in the travel demand model used for the study, any highway project not implemented would have a positive (higher) effect on the forecasted transit ridership for any transit alternative in the same or adjacent corridor.

A 2010 transit network was created to serve as a base line for comparing each of the corridor alternatives. This network was prepared following the guidelines specified by the Federal Transit Administration (FTA) which calls for the creation of a "Transportation Systems Management" (TSM) alternative to serve as the basis for calculating various impacts and evaluation measures. The TSM alternative was developed on a regional basis so that a single, common network could be used as a base line for all of the corridor alternatives. The network also includes transit improvements in other parts of the region and is designed to represent a reasonable representation of future transit services in Dade County if no major investments are made in additional fixed-rail facilities.

The TSM network is based on current Dade County transit services and reflects those improvements, such as the Metromover extensions, which are well underway or which could be considered part of the future transportation network for the purposes of this study. The key features of the network are discussed in the description of the TSM Alternative but does include the following:

- Extension of the Metromover system to the Brickell and Omni areas and re-orientation of bus service to reduce bus demands on congested downtown streets.
- Addition of a "short-turn" Metrorail line from Dadeland South to Earlington Heights, providing a base line service to tie into several of the corridor extension alternatives considered in this study. The crossover needed for this exists at Earlington Heights.
- Construction of a South Corridor busway along South Dixie from Cutler Ridge to Dadeland South, including the construction of several park-and-ride lots and the addition of express and park-and-ride bus service to Dadeland South from the Homestead/Florida City area and along the corridor.
- Extension of the north end of the Stage I Metrorail system to a new station just west of the Palmetto expressway.
- Planned of a Multimodal terminal near Miami International Airport, and on-airport people mover system served by a Tri-Rail extension and various Metrobus routes.

Jitney service was added to the travel demand model system based on observations of the current system and estimation of usage. Because of the uncertainties associated with future jitney service, the current level of service is assumed to continue for the future system, thus the current jitney network was

incorporated in the 2010 TSM base line. Changes in jitney ridership levels often have a direct effect on transit ridership levels.

The fare policy assumed for the travel demand analysis is based on the tariff in place at the start of the study. Under this policy, a single Metrobus or Metrorail trip can be made for a full fare of $1.25. Trips on express buses cost $1.50 and transfers between bus and bus or bus and rail cost $0.25. Currently, the 95X express routes, the Killian KAT services and a few other routes are subject to the $1.50 bus fare. The MAX services were implemented recently without a surcharge. However, the study assumes that the premium fare ($1.50) would be charged for all "premium" bus services. Thus, the existing and new MAX services, the extensive South Corridor express services, and the various new express services in the western part of the county are all assumed to be priced as premium services.

The impact of this tariff on fare revenue potential can be substantial. In some corridors, the bulk of the riders on the proposed rail alternatives shift from premium bus services to rail, at a net reduction in fare for park-and-ride users and those who can walk to a station. Although in a number of other cases, fares would remain the same, in only rare instances would fares in a rail alternative be higher than in the TSM baseline.

Operating & Maintenance Cost Estimating

Operating and maintenance costs are those recurring costs associated with providing the transit service and the upkeep of the vehicles and facilities. These costs were estimated using procedures prescribed by the Federal Transit Administration for this type of study. The service plan assumptions for the alternatives, such as frequencies, route length, and hours of operations, were translated into measures of travel service such as vehicle miles traveled and peak vehicle fleet requirements. The physical characteristics of the alternatives, such as the length of the alignment and the number of stations, were used as measures of maintenance needs. Cost models that translate these measures into annual incremental costs to operate and maintain the alternatives were developed from the actual Metro Dade Transit bus and rail operating experience. For the light rail transit mode included in some of the corridors, cost data from comparable light rail transit systems (especially the recently opened Baltimore Central Light Rail Line) were used in combination with Dade County rail operating cost data (FTA Section 15 Report) to estimate the costs.

The operating and maintenance cost estimates presented are incremental costs for each alternative over the costs of the 2010 TSM baseline condition.

Conceptual Engineering/Capital Cost Estimating

Capital cost are one time expenditures to design, construct, and equip the transit improvement alternatives under consideration. The procedures followed were consistent with the level of detail at which the alternatives were defined and are appropriate for the purposes of this study. Each of the alternatives was sketched onto aerial mapping of the various corridors, showing the alignment, stations, and related facilities locations. These locations are representative of where these facilities could be

placed for the purposes of developing capital cost estimates, but actual locations would be based on detailed planning and engineering and community consultation in any subsequent phases of a selected project.

Based on these preliminary concept plans, estimates of length of guideway by type (two-track, at-grade or aerial rail, for example,) number of stations by type (busway, light rail at-grade, aerial rail, for example) and amount of parking, real estate and related facilities are estimated. Systems costs (propulsion power, signals, and communications) are based on the type and length of guideway, and costs for new, modified, or additional vehicles are based on the results of the operations analysis described above. To these costs are added costs for real estate (for right-of-way, stations and other facilities) design, construction management, insurance, and agency costs. On top of all these costs was added a contingency cost of twenty percent to cover unanticipated conditions and costs

Environmental Assessment

The alternatives considered in this study were developed to avoid or minimize impacts to existing communities and the man-made and natural environments. Alignments or transit modes that would have major community/environmental impacts were screened out from consideration early in the study process. The alternatives considered in this study do have some impacts, however, most of which can be mitigated. Nevertheless, there are some impacts associated with the construction and/or the operation of an alternative which vary among the different alternatives and particularly among the different corridors. The environmental assessment conducted in this study focused on those environmental impacts that are distinguishing characteristics among the alternatives and may factor into the evaluation of the alternatives. These factors include such issues as property displacement and traffic and parking disruptions. Many issues such as noise and vibration are generally mitigatible and the cost estimates include allowances for these types of mitigation measures. Formal environmental impact assessment documents would be prepared on any project selected for implementation.

Air quality is an important environmental concern, particularly given the requirements of the federal Clear Air Act of 1990. Transit improvements are generally regarded as having a beneficial effect on air quality and part of an overall regional air quality improvement program. Key indicators of the degree to which the various alternatives improve air quality are the number of auto trips diverted to transit and the diverted number of auto vehicle miles travelled (VMT), as these are measures of the reduction in auto emissions. Diverted auto trips and VMT are presented in the evaluation matrix for each corridor. While the amount of reductions in any one corridor may not be large on a regional basis, they nevertheless contribute to an overall program to improve air quality.

Evaluation

A Task 4 technical memorandum entitled "Evaluation Methodology," dated February 28, 1992, establishes a set of criteria to be used to evaluate the alternatives. These criteria are as follows:

Ridership

Total Daily Regional Transit Trips
New Daily Transit Trips (Metro Dade and Jitney Services)
New Daily Metro Dade Transit Trips
Daily Boardings on New Alignment
Reverse Commuter Trips (Percent)
Farebox Revenue

New daily transit trips indicate the number of trips attracted to transit (to both Metro Dade and jitney services) as a result of the alternative. New daily Metro Dade transit trips criteria enumerate the number of trips attracted to Metro Dade services only, which may include trips diverted from jitney operations to Metro Dade transit as a result of improved transit service. Daily boardings criteria show how many trips will board the proposed alternative which may include trips formerly made on other transit services. A reverse commuter trip is one that goes the opposite direction of the traditional peak or rush hour direction, such as a trip outbound from downtown in the morning.

Time Savings

Total Daily Time Savings Value
Selected Travel Times between Key Locations

The first line converts the total daily travel time savings in hours into a monetary equivalent reflecting different values of time, for time saved riding in a vehicle versus time spent waiting.

Traffic Operations

Daily Diverted Auto Vehicle Trips
Daily Diverted Auto Vehicle Miles Traveled

These measures convert the number of trips attracted to transit that were formerly made by auto into reduced auto trips and miles traveled by auto, recognizing the number of passengers typically occupying an auto.

Capital Cost

This represents the total cost in 1992 dollars of building and equipping the alternative.

Operating and Maintenance Cost

This is the incremental cost of operating and maintaining an alternative as part of the Metro Dade transit system.

FTA Cost Effectiveness

The cost-effectiveness analysis is a mechanism comparing the total costs of each alternative to its benefits -- measured here by the additional annual transit patronage attracted and the annual value of

travel time savings for existing transit patrons. The method for determining the cost-effectiveness measure is a formula described in "Procedures and Technical Methods for Transit Project Planning" (September 1986), published by FTA and updated by current FTA practice. The output of the formula is an alternative's cost per new passenger attracted relative to the TSM baseline alternative. The option of primary interest is the TSM alternative, since it is designed to represent the most effective solution to transportation problems short of new facility construction. The TSM alternative provides a baseline against which it is possible to isolate the added costs and benefits of a capital intensive alternative. The cost index is also used by FTA to rate proposed major capital transportation projects which are being considered for Federal funding.

The second purpose of the evaluation is to rank the alternatives against each other. This task requires only the ordering of projects according to their relative merits rather than the calculation of absolute merits. Since the transportation benefits of an alternative (new riders) are usually the largest component of overall benefits, the ranking of alternatives based on transportation benefits alone is the same ordering that would result if the secondary benefits such as air pollution reduction and energy savings were also measured. Therefore, the indirect measurement of secondary benefits is quite adequate for this evaluation.

The general methodology of this cost-effectiveness analysis translates the capital costs of the alternatives into equivalent uniform annual costs. These uniform annual capital costs reflect assumptions about the economic life of the capital components in each alternative (based on federal guidelines) and the cost of capital (i.e., the discount rate). Uniform annual capital costs are combined with annual operating and maintenance expenses and then compared to the benefits of each alternative -- measured by additional transit patronage and the value of travel time savings for existing transit patrons -- to arrive at a cost-effectiveness index for each alternative.

Placing the capital costs of the alternatives into a common framework involves calculating a stream of annual costs that are equivalent to their initial investment. These annual costs are referred to as an equivalent annual cost (EAC). The method of computing the EAC is straightforward: an annualization formula, which takes into account the discount rate and the useful economic life of major costs components, is applied directly to the initial year capital cost of each major component. For cost components with relatively long useful lives (over 25 years), this formula is approximately equal to the discount rate. In effect, the EAC represents the amount that would have to be invested each year to maintain the capital stock of each alternative at its initial level. The reason for converting the capital costs of each alternative to equivalent annual costs is that EAC can be compared with annual operating statistics and annual passengers, allowing a reasonably uniform analysis of cost-effectiveness.

Because all costs used in the analysis are in constant dollars, the effects of inflation are already taken into account; the discount rate used in the analysis is a "real" discount rate that reflects prevailing interest rates net of the effect of inflation.

As noted above, key assumptions required for the derivation of equivalent annual cost include the choice of discount rates and the effective useful lives of all major cost components. Following standard practice (outlined in the Office of Management and Budget Circular A-94), a real discount rate of 10 percent was used. Assumptions about the effective useful lives of major cost components correspond to

the economic lives of the major categories of capital cost. The economic life of heavy construction items, for instance, is assumed to be 50 years, while buses and rail vehicles are assumed to have a useful economic life of 12 years and 25 years, respectively, before needing replacement.

The index utilized in this study measures the additional cost of proposed transit investments, using the cost per additional rider expected under the TSM alternative as the measure against which the build alternatives are compared. In order to reflect the benefits of reduced travel time resulting from fixed-guideway projects, the value of travel savings for existing riders is also included in the formula. Specifically, the cost effectiveness index is computed as follows:

$$\text{C.E. Index} = \frac{\Delta \$CAP + \Delta \$O\&M - \Delta \$TT}{\Delta \text{RIDERS}}$$

where the Δ's represent changes in costs and benefits compared to the TSM alternative, and

$CAP	=	equivalent annual capital costs;
$O&M	=	annual operating and maintenance costs;
$TT	=	monetary value of travel time savings for existing riders; and
RIDERS	=	annual transit ridership, measured in "linked" trips.

"Existing" riders are defined in this equation as transit patrons carried by the TSM alternative. Values necessary to convert travel time into its monetary equivalent in 1986 dollars have been determined by FTA to equal $4.00 per hour for work trips and $2.00 for non-work trips. These values are unchanged since 1984 and were based on current average wage rates nationwide and a survey of research on the responsiveness of transit riders to variations in travel times at that time.

By this measure, the lower the index value, the better an alternative is, from a cost-travel benefit point of view. This measure does not take into account community and many environmental concerns which are addressed elsewhere.

The cost-effectiveness index is computed twice for each alternative: first, using the new trips on both the Metro Dade and jitney services and second, using new trips to the Metro Dade system only (some of which come from jitney services.) The latter produces a higher ridership value resulting in a lower (better) cost effectiveness index. For each corridor, the results of the cost-effectiveness calculations are also displayed graphically in order to further demonstrate their relative ranking based on the FTA cost-effectiveness measure. The net annual cost increase (annualized capital costs plus O&M costs minus the monetary value of annual travel time benefits) of each alternative relative to the TSM baseline alternative is plotted against the net increase in new transit patrons relative to the TSM baseline. The slope of the line (passengers/costs) connecting an alternative with the origin is an indicator of the alternative's cost effectiveness. The steeper the slope, the more cost effective the alternative may be considered. In fact, the slope of the line is the inverse of the alternative's index.

To identify the most cost-effective alternative based solely on the calculated FTA indices, the alternatives that lie highest and furthest to the left on the graph are connected. The resulting boundary, or "frontier," indicates the best that can be achieved with increasing levels of investment; those alternatives that are lower and to the right indicate less cost-effective investment opportunities.

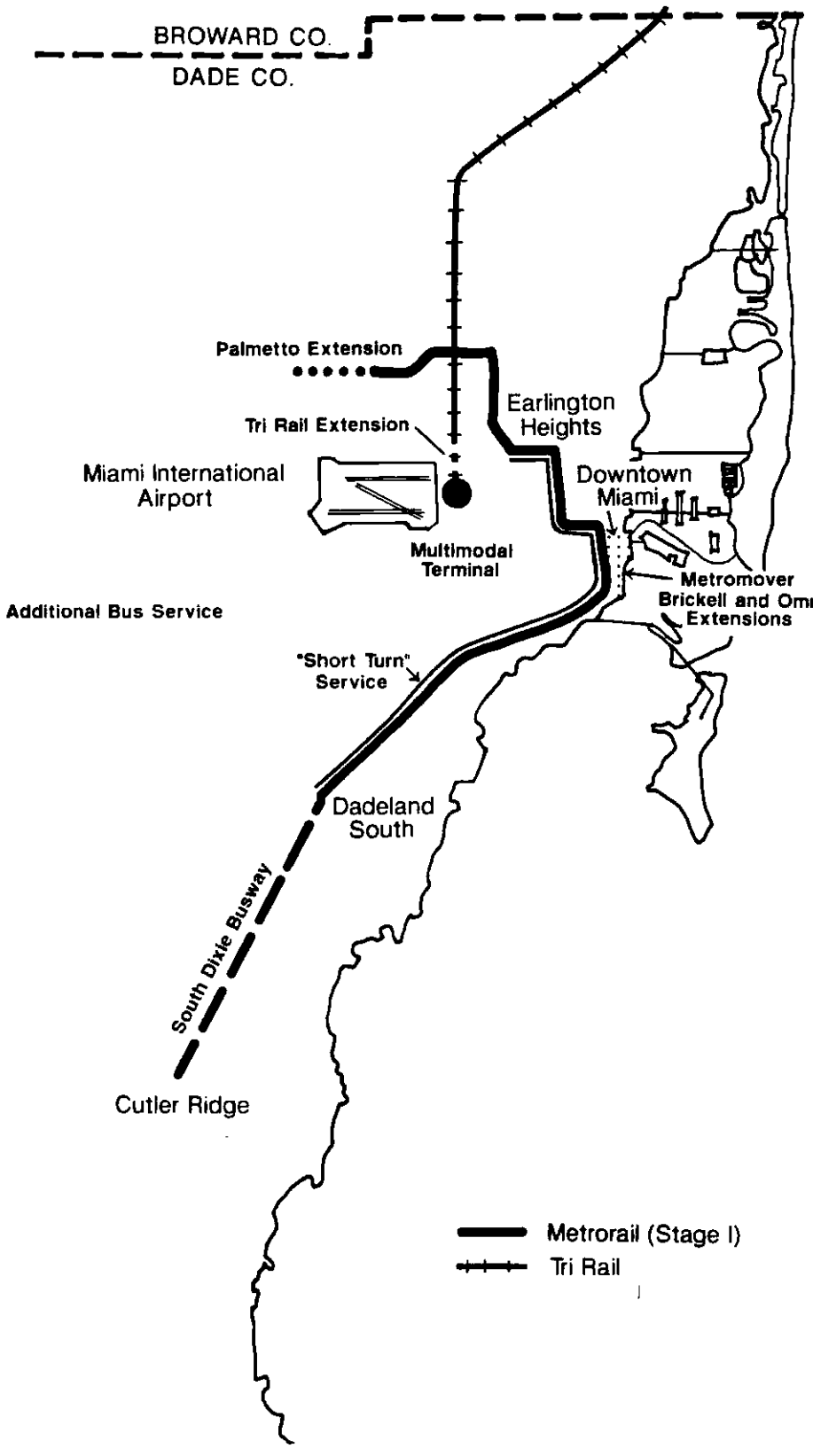
TSM ALTERNATIVE

Description of Services and Assumptions

A 2010 transit network was created to serve as a base line for comparing each of the corridor alternatives. This network was prepared following the guidelines specified by the Federal Transit Administration (FTA) which calls for the creation of a "transportation systems management" (TSM) alternative to serve as the basis for calculating various impacts and evaluation measures. The TSM alternative was developed on a regional basis so that a single, common network could be used as a base line for all of the corridor alternatives. The network also includes transit improvements in other parts of the region and is designed to represent a reasonable representation of future transit services in Dade County if no major investments are made in additional fixed-rail facilities.

The TSM network is based on current Dade County transit services and reflects those improvements, such as the Metromover extensions, which are well underway or which could be considered part of the future transportation network for the purpose of this study. Among the key features of the network (Figure 2) are the following:

- Extension of the Metromover system to the Brickell and Omni areas and re-orientation of bus service to reduce bus demands on congested downtown streets.
- Addition of a "short-turn" Metrorail line from Dadeland South to Earlington Heights, providing a base line service to tie into several of the corridor extension alternatives considered in this study. They crossover needed for this exists at Earlington Heights.
- Construction of a South Corridor busway along South Dixie from Cutler Ridge to Dadeland South, including the construction of several park-and-ride lots and the addition of express and park-and-ride bus service to Dadeland South from the Homestead/Florida City area and along the corridor.
- Extension of the north end of the Stage I Metrorail system to a new station just west of the Palmetto expressway.
- Planned Multimodal terminal near Miami International Airport and on-airport people mover system served by a Tri-Rail extension and various Metrobus routes.
- Creation of park-and-ride lots and transit centers in the West Corridor, with express bus service to the CBD via SR 836.
- Addition of a West Corridor MAX service from FIU to downtown Miami along SW 8th Street and Flagler Street, addition of a Beach MAX service from 71st Street to downtown Miami, and addition of a NW 67th Avenue MAX service from the Miami Springs area to the employment centers west of the airport.



METRO-DADE

Dade County
Metropolitan Planning
Organization

Dade County
Transit Corridors
Transitional Analysis

2010
TSM Alternative
Baseline

NOT TO SCALE

Figure 2

- Extension of several local bus routes to serve growing areas in the western part of the county, as well as addition of new crosstown and other local routes connecting suburban growth areas.

Jitney service was added to the travel demand model system based on observations of the current system and estimation of usage. Because of the uncertainties associated with future jitney service, the current level of service is assumed to continue for the future system, thus the current jitney network was incorporated in the 2010 TSM base line. Changes in jitney ridership levels often have a direct effect on transit ridership levels.

The alternatives considered in each of the corridors are extensions or additions to the TSM network, particularly to the Stage I Metrorail system.

CORRIDOR ALTERNATIVES AND ANALYSIS

In the sections that follow, each corridor is described and the set of alternatives defined. Then the results of the ridership, travel benefits, capital and operating/maintenance costs, environmental assessment and cost effectiveness analyses are presented. The results of these analyses for the alternatives in all the corridors are summarized at the end of the report.

The six corridors under study (see Figure 1) are:

South: Dadeland South Metrorail Station to Homestead/Florida City (19.2 miles -- includes the programmed 9-mile South Dixie Busway between Dadeland South and Cutler Ridge)

Kendall: Dadeland North Metrorail Station to SW 137th Avenue (7.5 miles)

North: Dr. M.L. King Jr. Metrorail Station to NW 215th Street (8.5 miles)

Northeast: Downtown Miami to NE 199th Street (13.6 miles)

Beach: Downtown Miami to 71st Street on Miami Beach (10.9 miles)

West: Downtown Miami to Florida International University at the Homestead Extension of the Florida Turnpike (HEFT) (12.1 miles) with direct connection or branch service to Miami International Airport.

A seventh element which combines aspects of both the West and Beach Corridors, including a connection between Miami International Airport and the Seaport via downtown Miami, is also analyzed and evaluated:

West-Beach: Florida International University to the Miami Beach Convention Center via downtown Miami with a direct connection or branch service to both the airport and the Seaport (22.0 miles)

SOUTH CORRIDOR

Description of Corridor and Alternatives

The South Corridor extends southwest from the Dadeland area to Homestead and Florida City, following the former FEC railroad right-of-way and US Route 1 (Figure S.1). In the TSM Alternative, a busway is assumed to be constructed along the alignment as far south as Cutler Ridge. A total of three additional alternatives were examined, including extending the busway to Florida City and replacing the busway with "hybrid" rail or Metrorail service. A spur could connect all three of the alternatives to the Homestead Air Force Base. The three "build" alternatives are identified as "S1", "S2", and "S3" in the summary materials which follow.

Busway Alternative S1

This alternative consists of a busway extension along the Florida East Coast Railroad (FEC) right-of-way from the terminus of the planned South Dixie Busway at Cutler Ridge to SW 344th Street in Florida City.

"Hybrid" Metrorail Alternative S2

This alternative consists of an at-grade "hybrid" Metrorail line along the FEC right-of-way from the Dadeland South Metrorail station to SW 344th Street. Metrorail vehicles converted with a pantograph for overhead power collection would continue on the Stage I Metrorail line for a one-seat ride to downtown and points north. The South Dixie Busway is assumed to be removed in this alternative.

Metrorail Alternative S3

This alternative consists of an extension of Metrorail along the FEC right-of-way from the Dadeland South Metrorail station to SW 344th Street in Florida City. The alignment would be fully grade separated. The South Dixie Busway is assumed to be removed in this alternative.

Description of Services

As noted above, the busway alternative extends the TSM assumptions south to Homestead. An additional Homestead express run is added to Dadeland South, the Homestead limited service is operated via the busway making all station stops and two Florida City/Homestead local routes are extended to Dadeland South via the busway. Off-peak service is assumed to be somewhat less comprehensive in both the TSM and S1 alternatives, with some express routes eliminated and others converted to circulators.

Rail service in the busway alternative is the same as in the TSM alternative. In the two rail alternatives, the short-turn Metrorail line is extended south from Dadeland South to Florida City. Express bus routes are deleted or converted into feeder service at various stations.

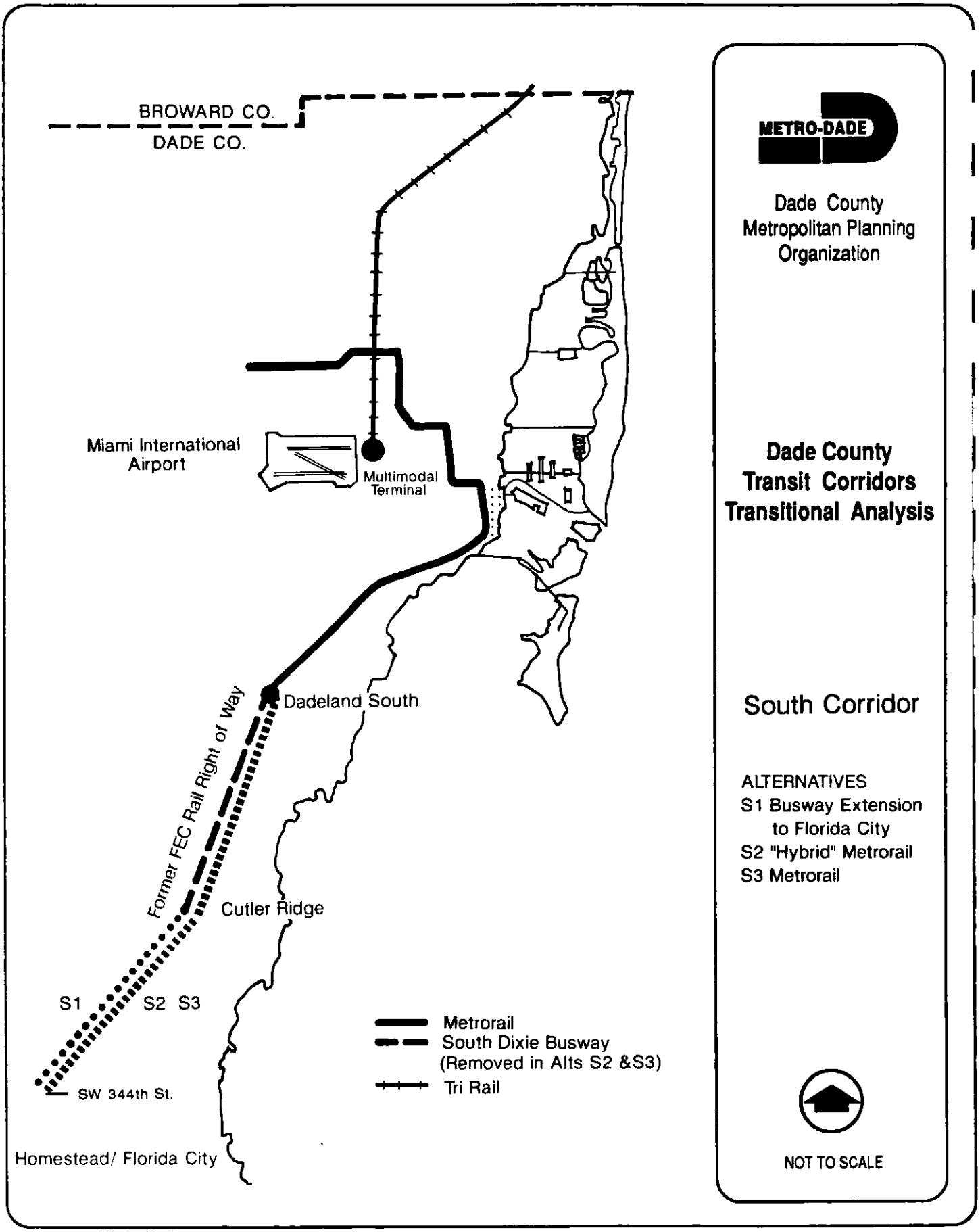

BROWARD CO.
DADE CO.
Miami International Airport
Multimodal Terminal
Dadeland South
Former FEC Rail Right of Way
Cutler Ridge
S1
S2 S3
SW 344th St.
Homestead/ Florida City
Metrorail
South Dixie Busway
(Removed in Alts S2 &S3)
Tri Rail
METRO-DADE
Dade County
Metropolitan Planning
Organization
Dade County
Transit Corridors
Transitional Analysis
South Corridor
ALTERNATIVES
S1 Busway Extension
to Florida City
S2 "Hybrid" Metrorail
S3 Metrorail
NOT TO SCALE

Figure S.1

Transit Proposals in Response to Hurricane Andrew

In the aftermath of Hurricane Andrew which extensively damaged south Dade County, several proposals have been, or are being, considered as means to extend fixed guideway transit service as soon as possible into devastated areas. The purpose of these immediate-response proposals is to provide additional transportation service, demonstrate a commitment to rebuilding south Dade County, and act as a stimulus and focus for redevelopment.

One proposal to extend the South Dixie Busway from its programmed terminus at Cutler Ridge to the Homestead/Florida City area along the former FEC right of way is basically the same as the Transitional Study's Alternative S1. A proposal to extend Metrorail at-grade along the former FEC right of way from its Dadeland South terminus to the Homestead/Florida City area is similar the study's Alternative S2. The immediate-response alternatives were conceived so that they could be implemented as quickly and as inexpensively as possible with minimal facilities, such as extensive use of single track sections, minimal stations and parking provisions, and retrofitted vehicles. At a later date, as needs require and resources permit, the service, facilities and equipment could be upgraded. The Transitional Study used a consistent set of design standards for all the corridors comparable to existing Metrorail and similar facilities. Because of the different assumptions for design and service standards, the cost estimates for the immediate-response proposals differ from the cost estimates for the Transitional Analysis Study South Corridor alternatives.

The **South Dade Transit Linkage** (Figure S.2) is a proposal to extend Tri-Rail from the Miami International Airport to the Metrorail Dadeland North Station via existing FEC and former CSX railroad right of way. The South Dixie Busway, whose northern terminus is at the Dadeland South Metrorail Station, is extended northward to the Dadeland North Station. These extensions combine to form a transit hub at Dadeland North combining Metrorail, bus, and Tri-Rail services. The transit linkages provided by this program serve additional markets to those served by the Transitional Study South Corridor alternatives and will complement rather than compete with or preclude each other.

One other immediate response proposal is an extension of Tri-Rail to the Homestead/Florida City area via the CSX railroad right of way which runs west of the corridor served by the former FEC right of way. A concern with this particular proposal is that it runs through an area that is planned to remain in predominantly agricultural use and not slated for development, and it does not serve the US 1 corridor where most of the communities are. If Tri-Rail were to be extended to Dadeland North as proposed in the South Dade Transit Linkage Study, consideration could be given to a joint use of the right-of-way with the Transitional Study's Alternatives S2 and S3 south to Florida City.

Summary of Results

Table S.1 presents the results of the ridership and travel benefits, cost and other analyses of the alternatives. Key findings are highlighted below.

Ridership

Ridership results are summarized in Table S.1. The information in the top section of the table shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking Metrobus to Cutler Ridge, transferring to Metrorail to Government Center, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip.

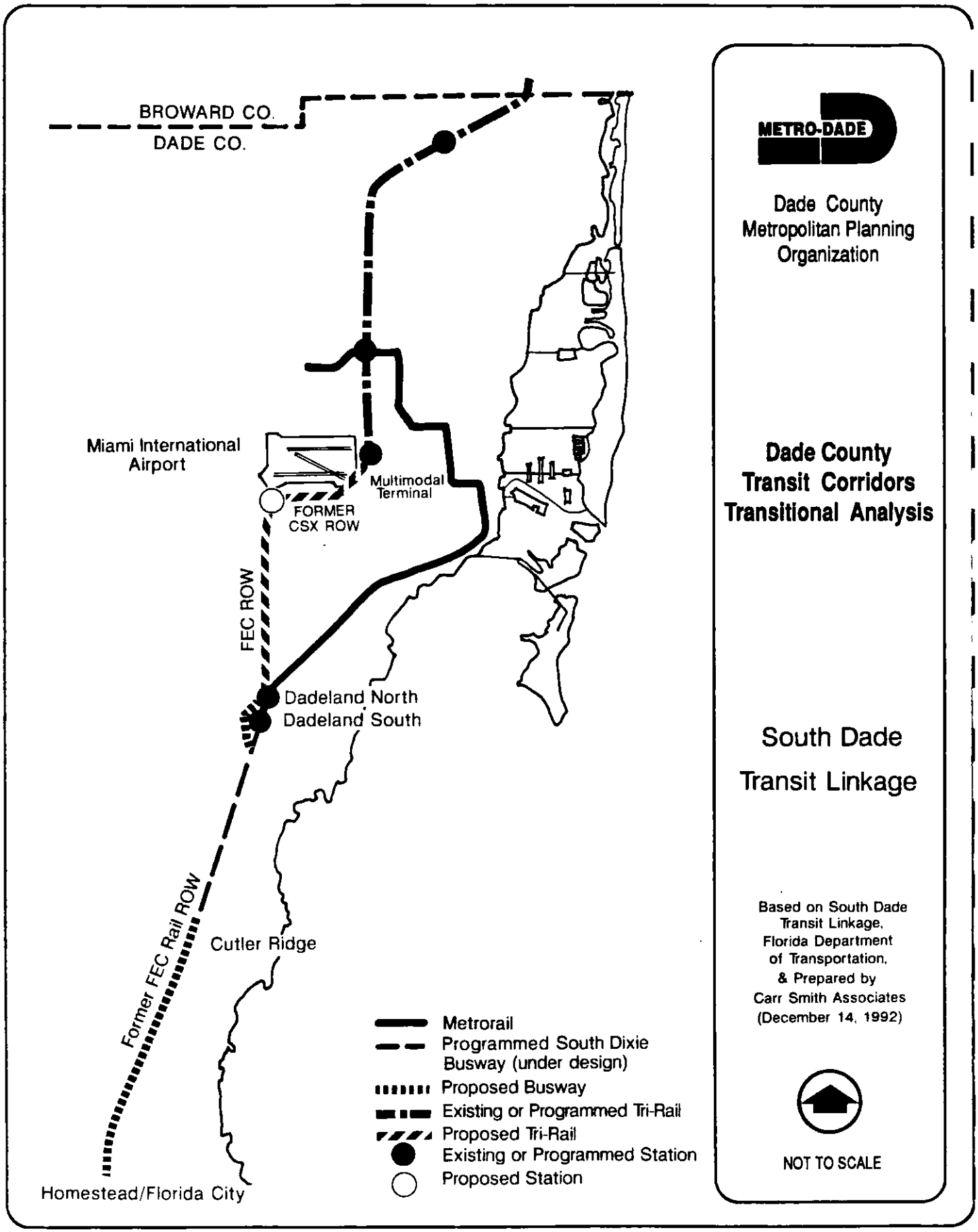

BROWARD CO.
DADE CO.
Miami International Airport
Multimodal Terminal
FORMER CSX ROW
FEC ROW
Dadeland North
Dadeland South
Former FEC Rail ROW
Cutler Ridge
Homestead/Florida City
Metrorail
Programmed South Dixie Busway (under design)
Proposed Busway
Existing or Programmed Tri-Rail
Proposed Tri-Rail
Existing or Programmed Station
Proposed Station
METRO-DADE
Dade County Metropolitan Planning Organization
Dade County Transit Corridors Transitional Analysis
South Dade Transit Linkage
Based on South Dade Transit Linkage, Florida Department of Transportation, & Prepared by Carr Smith Associates (December 14, 1992)
NOT TO SCALE

Figure S.2

The data in the third line of the upper part of the table reflects boardings on the primary corridor services and at other key locations on the system. The boardings on new alignment include all stations along the South Corridor alignment south of Dadeland, including the busway stations in the TSM Alternative. The TSM and busway alternatives also include passengers on express buses prior to their entry onto the busway.

The ridership on the busway alternative, which extends the South Dixie Busway included in the TSM baseline from Cutler Ridge to the Homestead/Florida City area, is only slightly higher than for TSM as the major benefit of the busway occurs along the more congested portions of Route 1 north of Cutler Ridge. The two rail alternatives attract somewhat greater numbers of passengers due to higher speeds, more uniform service at all intermediate stations, and avoidance of a need to transfer at the Dadeland South Metrorail Station. The Metrorail alternative attracts slightly more work trips because of higher speeds allowed by the grade-separated alignment, but actually attracts slightly fewer non-work trips because of fewer stations and thus less local access for shorter trips.

A few front-to-back rail transfers are recorded for passengers traveling to or from areas along the Stage I Metrorail line beyond Earlington Heights. Outbound ridership (southbound in the morning peak period and northbound in the evening peak) is fairly modest and drops even further south of Cutler Ridge.

Travel Impacts

Cost effectiveness measures computed in accordance with FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown Table S.1. The incremental ridership is shown both for total transit trips (including jitneys) and Metro Dade-only ridership (excluding jitneys). Since jitney activity is insignificant in the South Corridor, these ridership differences are identical. As noted above, the incremental ridership is rather modest for the busway extension and is about 4,400 to 4,900 daily trips for the rail alternatives.

Travel time savings form another element of typical FTA cost-effectiveness calculation. The travel time savings are computed relative to existing passengers (really, passengers projected for the TSM alternative) and thus reflect the benefits of the alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specific values of $4.00 per hour for work trips and $2.00 per hour for non-work trips.

Some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami. The times show a mixture of results, reflecting the fact that some areas benefit more from the express service options in the busway alternative while others benefit more from the rail service plan. As expected, the greatest savings are generally from the outermost areas.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The VMT reduction is less

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS EVALUATION MATRIX
SOUTH CORRIDOR

EVALUATION CRITERIA		S1 Busway Extension to Florida City	S2 "Hybrid" Metrorail	S3 Metrorail
RIDERSHIP AND REVENUE				
Total Daily Regional Transit Trips (Linked)		333,100	336,500	337,000
New Daily MetroDade & Jitney Transit Trips (Linked)		1,000	4,400	4,900
New Daily MetroDade Transit Trips (Linked)		1,000	4,400	4,900
Daily Boarding on New Alignments		28,400	30,900	31,400
Reverse Commuter Trips (Percent)		5%	3%	3%
Fare Box Revenue (Annual)		$575,000	-$490,000	-$299,000
TIME SAVINGS				
Total Daily Time Savings				
Hours		700	800	1,600
Value		$758,000	$835,000	$1,680,000
Selected Travel Time (Min.)				
FROM	TO*			
Country Walk (845)	CBD A	61.0	69.7	68.5
Franjo (961)	CBD W	61.1	64.8	60.8
Homestead (1024)	CBD W	108.1	90.2	83.2
Princeton (1059)	CBD A	65.4	60.2	55.3
Florida City (1086)	CBD A	67.1	66.7	61.4
TRAFFIC OPERATIONS IMPACTS				
Diverted Auto Daily Vehicle Trips		909	4,000	4,455
Diverted Daily Vehicle Miles Travelled (VMT)		45,300	105,000	136,900
CAPITAL COST		$30,752,000**	$508,013,000***	$831,736,000
OPERATIONS AND MAINTENANCE COST		$1,493,000	$13,242,000	$11,592,000
COST EFFECTIVENESS INDEX				
MetroDade & Jitney		$14.30	$49.79	$66.60
MetroDade Only		$14.30	$49.79	$66.60

* A = Auto Access
W = Walk Access

** A near-term implementation busway extension proposal has been estimated to cost $19.6 million.

*** A near-term implementation single-track rail extension proposal with passing sidings has been estimated to cost $200 - 300 million.

Table S.1

for the busway alternative, in part because the busway alternative best serves the longest distance trips by providing non-stop service, while the rail alternatives compete more favorably in the shorter trip markets.

Capital Costs

The busway alternative, S1, is the least costly of the options at $30.8 million. This estimate only includes the cost of constructing the busway from Cutler Ridge to Homestead/Florida City because the section from Dadeland South to Cutler Ridge is assumed to be built under the TSM baseline. Of the two rail extension options, S3, Metrorail, is more expensive at $831.7 million because of its exclusive elevated guideway, than S2, "hybrid" Metrorail which runs totally at-grade and costs $508.0 million. The capital cost of constructing S2 and S3 only as far south as Cutler Ridge is $220 million and $357 million, respectively.

Operating and Maintenance Costs

The busway alternative, S1, results in a net O&M cost increase of $1.5 million annually. The rail extension alternatives, S2 and S3, provide substantial bus O&M savings of $3.8 million per year which help to offset the increase in rail operations. Alternative S2, "hybrid" LRT has a net O&M cost increase of $13.2 million while Alternative S3, Metrorail, increases cost by $11.6 million.

Environmental Assessment

The South Corridor alternatives consist a of busway, "hybrid" Metrorail, and Metrorail options, all of which utilize the FEC right-of-way from the Dadeland Metrorail station to SW 344th Street. All alternatives are considered to be consistent with approved plans, visually acceptable, and able to accomplish the project objectives with a minimum of disruption. No historic properties or 4f properties are involved in the South Corridor.

At least two concerns must be addressed in subsequent study of this corridor. First is the concern for the natural features at U.S. 1 and SW 144th Street - SW 152nd Street (known as the Rockdale Tract). The South Corridor alternatives call for the disruption of Deltoid Spurge, a biological element on the endangered species list.

Secondly, serious traffic and parking concerns will have to be addressed in the rail alternatives owing to the large number of parking spaces -- 3,750 to 4,080 -- in the South Corridor and a number of grade crossings under Alternatives S1 and S2. The Metrorail alternative, for example, calls for in excess of 500 spaces at SW 175th Street, SW 202nd Street, SW 268th Street, SW 288th Street and SW 312th Street (at SW 344th Street, bus and walk are expected to be the principal means of access). Careful planning will have to be undertaken to provide that access roads, signalization, and turning lanes are designed to enhance the transit station and project rather than create congestion, especially at peak hours. Alternatives S1 and S2 run at grade and will have several crossings of streets that intersect with U.S. 1.

Some of these intersections are fairly close to the rail crossings so that careful planning and coordination of the traffic signals and grade crossing protection will be needed.

FTA Cost Effectiveness Index

The FTA cost effectiveness index, described in detail at the beginning of the report, provides one means of combining the mobility benefits and costs into one measure. This measure is an annualized increment cost per new transit rider. The lower the cost per new rider, the more "cost effective" the alternative. While the FTA cost effectiveness index does not include every impact and benefit (environmental or community impacts, for instance), it does provide a means to compare alternatives with varying costs and levels of mobility benefits. Also as discusses in the Overview section a the beginning of the report, the cost component of the index can be graphically plotted against the ridership component to see the degree to which increased levels of investment in terms of capital and O&M costs generate ridership benefits (See Figure S.3). The alternatives that lie highest and furthest to the left on the graph are connected. The resulting boundary, or "frontier," indicates the best that can be done with increasing levels of investment in the corridor; those alternatives that are lower and to the right indicate less cost-effective investment opportunities.

Of the three South Corridor alternatives, only Alternative S1 has a relatively low (good) FTA cost-effectiveness index. The busway alternative has relatively low incremental ridership but also low capital cost, which result in a $14.30 C/E index. The two rail extension alternatives, S2 and S3, attract much higher incremental ridership but with their higher capital costs, the resulting C/E indices are $49.79 to $66.60. As can be seen in Figure S.3, all three alternatives are on the "frontier" but that as the investment (cost) increases, the rate of increase in new ridership slows down, especially going from Alternative S2 to S3.

Summary Evaluation

The busway alternative, which is an extension to the programmed South Dixie Busway to Cutler Ridge, represents a relatively low cost, and cost effective option for the South Corridor. Although it does not attract as many new riders as the rail options, it does carry nearly the same number of total riders. This option provides improved access for bus riders and improved operating reliability to the Metrorail from south Dade County. The rail extension alternatives attract more new ridership but at a higher cost. Of the rail extension alternatives, the S2 cost to construct is over $300 million less than S3 while it only attracts slightly fewer new riders. Therefore, it appears that little transportation benefit is gained from the added cost of the grade-separated guideway provided by Alternative S3. Because all three alternative are proposed in the same former FEC right of way, the relatively minor community/environmental impacts are comparable.

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
SOUTH CORRIDOR COST EFFECTIVENESS INDEX

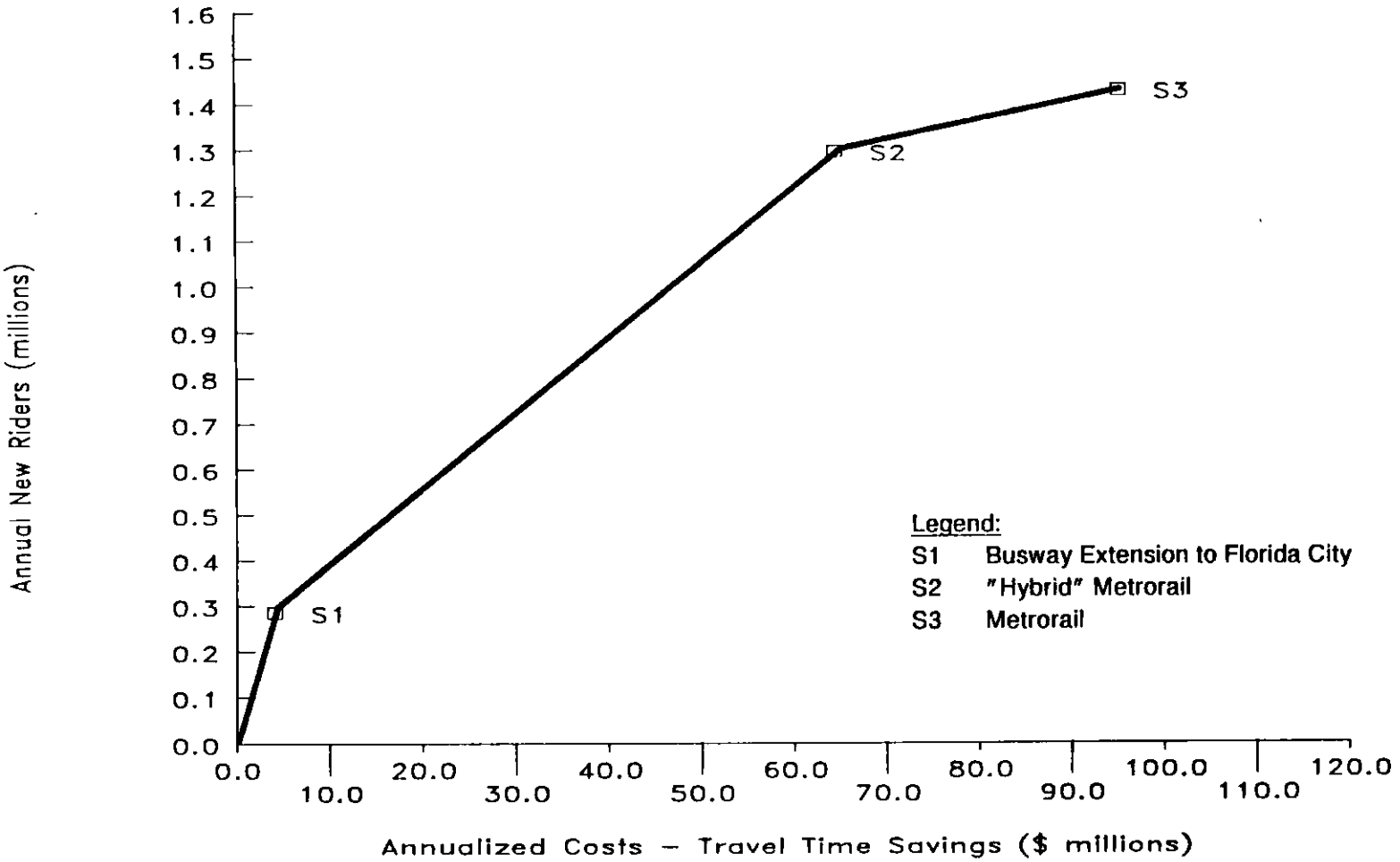
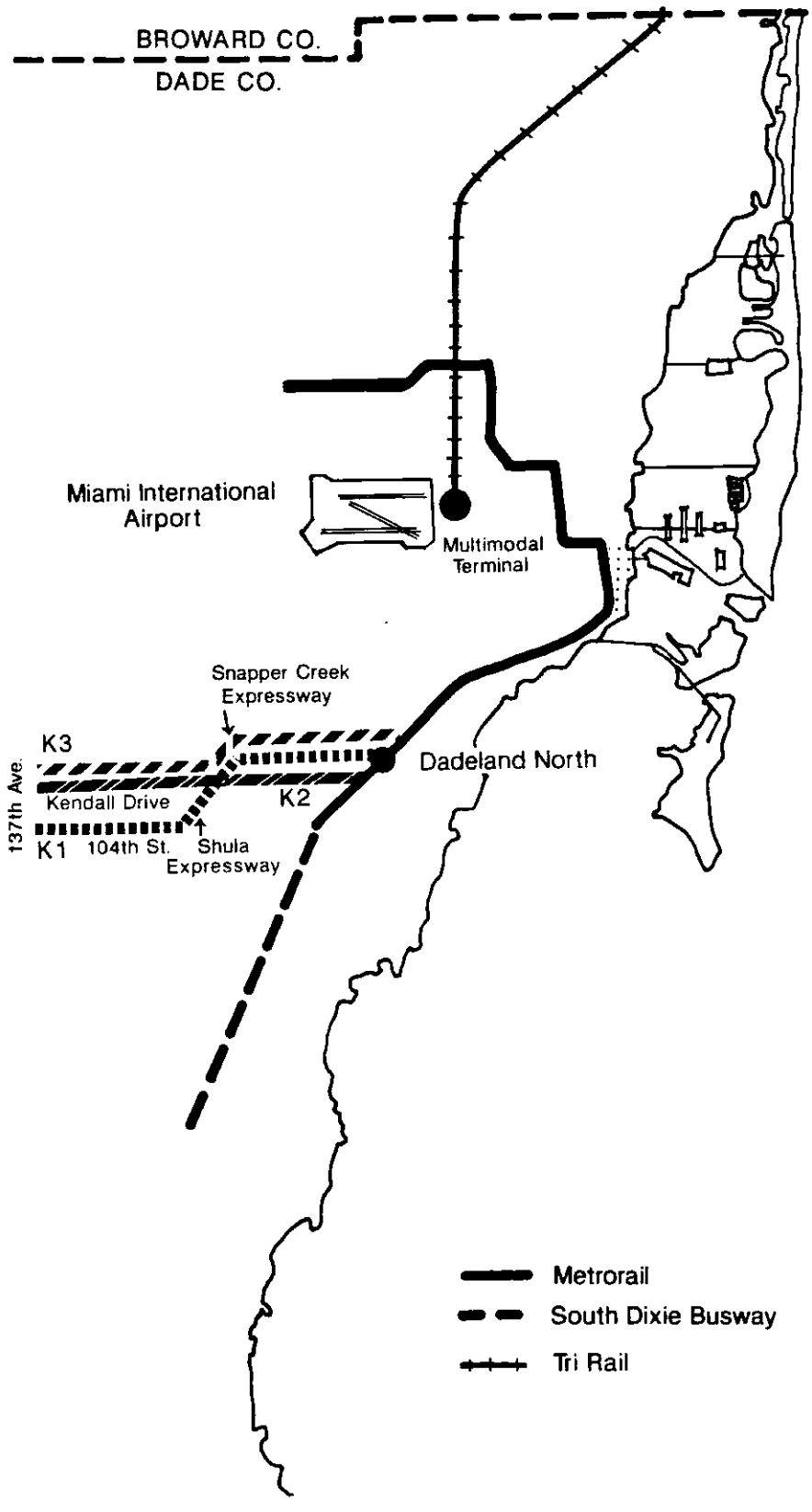


Figure S.3



METRO-DADE

Dade County
Metropolitan Planning
Organization

Dade County
Transit Corridors
Transitional Analysis

Kendall Corridor

ALTERNATIVES
K1 Busway
K2 "Hybrid" Metrorail
K3 Metrorail

NOT TO SCALE

Figure K.1

KENDALL CORRIDOR

Description of Corridor and Alternatives

The Kendall Corridor extends westward from the Dadeland area to the rapidly growing southwestern suburbs (Figure K.1). Alignments were considered along SR 878, Kendall Drive, and Killian Drive, extending westward to the vicinity of SW 137th Avenue. A total of three "build" alternatives were examined in the corridor, identified as "K1", "K2", and "K3" in the summary materials which follow.

Busway Alternative K1

This alternative consists of an express busway which begins at the Dadeland North Metrorail Station, then follows the Snapper Creek Expressway (SR 878) and Shula Expressway (SR 874) to SW 104th Street. A single reversible bus lane would follow the median of SW 104th Street west to SW 137th Avenue. Local buses and buses operating in the reverse peak direction would operate in local traffic on SW 104th Street.

"Hybrid" Metrorail Alternative K2

This alternative consists of a "hybrid" Metrorail line which would follow the median of Kendall Drive from the Dadeland North station to SW 137th Avenue. The rail line would have an at-grade right-of-way in the median of Kendall Drive with signal preemption at intersections. "Hybrid" rail vehicles would continue on the Stage I Metrorail line for a one-seat ride to downtown and points north.

Metrorail Extension K3

This alternative consists of an extension of the Metrorail line which begins north of the Dadeland North Metrorail Station, then follows the Snapper Creek and Shula Expressways (SR 878 and 874) and Kendall Drive to SW 137th Avenue.

Description of Services

The busway alternative (K1) runs along Killian Drive from the vicinity of SW 137th Avenue to SR 874, then along SR 874 and SR 878 to the Dadeland North station. The Killian KAT and one of the Kendall KAT's are routed onto the busway, as well as an additional park-and-ride service route running express from the parking lots along the route. The "hybrid" Metrorail alternative (K2) runs along Kendall Drive from SW 137th Avenue and is through routed with the short-turn Metrorail line at Dadeland South, providing direct service to downtown Miami, the Civic Center, and other destinations along Stage I Metrorail. The remaining alternative (K3) features fully grade-separated Metrorail service from SW 137th Avenue along Kendall Drive, SR 874 and SR 878, merging with the Stage I Metrorail alignment north of the Dadeland North station. Thus, the first common station on the Metrorail line is South Miami. Like the "hybrid" rail alternative, through service is provided to downtown Miami and beyond.

Bus service changes are very minor for the two rail alternatives. The Kendall and Killian KAT's are converted into feeders serving appropriate rail stations. Local bus service along Kendall is reduced with the introduction of competing rail service. Some additional minor variations are made to other local and crosstown routes to serve appropriate rail stations.

Summary of Results

Table K.1 presents the results of the ridership and travel benefits, cost and other analyses of the alternatives. Key findings are highlighted below.

Ridership

Ridership results are summarized in Table K.1. The information in the top section of the table shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking Metrobus to Dadeland South, transferring to Metrorail to Government Center, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip.

The data in the third line of the upper part of the table reflects boardings on the primary corridor services and at other key locations on the system. The boardings on the proposed alternatives include those stations along the Kendall Corridor alignments west of Dadeland. For the busway alternative, K1, boardings also include passengers on express buses prior to their entry onto the busway.

The results show virtually no ridership changes for the busway alternative, K1. In a more detailed examination of the results, it was found that boardings along the Killian busway are largely offset by losses in ridership due to reduction in service along the more heavily developed Kendall Drive. Only relatively few auto access trips are made to the busway stations, with most of these trips continuing to Dadeland or other Metrorail stations to avoid the need to transfer from the express buses.

Both rail alternatives are found to serve additional riders, with the Metrorail alternative (K3) attracting more work trip commuters because of faster travel times while the "hybrid" Metrorail alternative (K2) attracts more non-work trips because of its service to additional stations particularly along Kendall east of SR 874. The overall results for the rail alternatives reflect some drops in ridership at the Dadeland stations due to the diversion of Metrorail service to the Kendall Corridor and the resulting longer waiting times for the remaining Dadeland trains. Also, as expected, outbound ridership is very low, reflecting the primary function of this corridor as a commuter facility feeding Metrorail and activities in the Dadeland area.

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS EVALUATION MATRIX
KENDALL CORRIDOR

EVALUATION CRITERIA			K1 Busway	K2 "Hybrid" Metrorail	K3 Metrorail
RIDERSHIP AND REVENUE					
Total Daily Regional Transit Trips (Linked)			332,100	335,400	335,300
New Daily MetroDade & Jitney Transit Trips (Linked)			110	3,300	3,160
New Daily MetroDade Transit Trips (Linked)			110	3,300	3,160
Daily Boarding on New Alignments			2,800	19,100	19,800
Reverse Commuter Trips (Percent)			0%	2%	1%
Fare Box Revenue (Annual)			$423,000	$372,000	$185,000
TIME SAVINGS					
Total Daily Time Savings					
Hours			100	800	1,200
Value			$70,000	$991,000	$1,313,000
Selected Travel Time (Min.)					
FROM		TO*			
Hammocks W (834)		CBD A	54.4	49.5	45.9
Calusa (857)		CBD W	58.7	63.1	64.2
TRAFFIC OPERATIONS IMPACTS					
Diverted Auto Daily Vehicle Trips			100	3,000	2,873
Diverted Daily Vehicle Miles Travelled (VMT)			-5,400	36,100	33,300
CAPITAL COST			$22,003,000	$348,373,000	$474,586,000
OPERATIONS AND MAINTENANCE COST			$85,000	$11,630,000	$8,638,000
COST EFFECTIVENESS INDEX					
MetroDade & Jitney			$102.10	$43.14	$57.36
MetroDade Only			$102.10	$43.14	$57.38

* A = Auto Access
W = Walk Access

Table K.1

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top part of Table K.1. The incremental ridership is shown both for total transit trips (including jitneys) and Metro Dade-only ridership (excluding jitneys). These values are virtually identical in the Kendall Corridor since jitney activity is not nearly as significant as in other areas. As noted above, the incremental ridership for the busway alternative (K1) is very small while the incremental daily ridership is 3,200 to 3,300 for the rail alternatives.

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed for existing passengers (passengers projected for the TSM alternative) and thus reflect the benefits of an alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips.

Some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. The auto access travel times are generally the same for the TSM and busway alternatives since, as noted above, most of the park-and-ride passengers use the same stations in both alternatives, since parking at the busway stations, boarding an express bus to Dadeland, and transferring to Metrorail is not the fastest travel path. The travel time savings for auto access to the rail alternatives is more significant, with a shorter auto access time and a non-transfer ride to downtown Miami. Another significant travel time reduction is from locations along the inner part of the Kendall Corridor under the "hybrid" Metrorail alternative (K2) where direct boarding of rail service to downtown saves significant time compared with boarding a local bus along Kendall and transferring at Dadeland.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The change in VMT under the busway is very small (actually it increases slightly due to changes in means of access to the bus services) while the rail alternatives produce modest reductions in VMT.

Capital Costs

The busway option, K1, is the least costly option at $22.0 million. Of the two rail extension alternatives, K2 - "hybrid" Metrorail, is less expensive at $348.4 million than K3, Metrorail, because K3 requires a totally exclusive guideway (no grade crossings) and has some more elaborate stations.

Operating and Maintenance Costs

Alternative K1, the busway, results in a net annual cost increase of only $85,000 because it enables the TSM baseline bus service to run faster and more efficiently. Both of the rail extension options, K2 and

K3, result in bus cost savings of $500,000 but with the increase in rail costs, the annual O&M cost increases are $11.6 million for K2 and $8.6 million for K3.

Environmental Assessment

The Kendall Corridor alternatives consist of a busway using SW 104th Street, a "hybrid" LRT along the Kendall Drive median, and a Metrorail alternative along the Kendall Drive median.

The Kendall Corridor alternatives pose no threat to historic or 4f properties. Disruption of natural features do not appear to pose problems. Three other important factors, however, will have to be addressed to proceed with the project.

First is disruption to the community. Kendall Drive, under the rail alternatives (K2 and K3), would have to undergo major alterations (especially in the Metrorail configuration), lane closures and three to four years of construction-related disruption. In view of the fact that Kendall Drive has been under some form of construction or widening for the past eight years, plans to reconfigure Kendall Drive would cause significant community concern.

Secondly, displacement and land acquisition may be prohibitive in the Kendall area. Land costs are medium to high, while vacant and under-utilized land is at a minimum.

Lastly, the station and parking requirements at SW 97th Avenue, SW 107th Avenue, and SW 137th Avenue would have to be addressed in a manner which would ease traffic and parking concerns rather than adding to those concerns.

FTA Cost Effectiveness Index

The FTA cost effectiveness index, described in detail at the beginning of the report, provides one means of combining the mobility benefits and costs into one measure. This measure is an annualized increment cost per new transit rider. The lower the cost per new rider, the more "cost effective" the alternative. While the FTA cost effectiveness index does not include every impact and benefit (environmental or community impacts, for instance), it does provide a means to compare alternatives with varying costs and levels of mobility benefits. Also as discusses in the Overview section at the beginning of the report, the cost component of the index can be graphically plotted against the ridership component to see the degree to which increased levels of investment in terms of capital and O&M costs generate ridership benefits. (See Figure K.2.) The alternatives that lie highest and furthest to the left on the graph are connected. The resulting boundary, or "frontier," indicates the best that can be done with increasing levels of investment in the corridor; those alternatives that are lower and to the right indicate less cost-effective investment opportunities.

The FTA cost effectiveness indices for the Kendall Corridor alternative are all relatively high meaning that based on this one measure, these alternatives do not produce much ridership and travel benefit relative to the cost. The busway, K1, has low incremental ridership which drives up the C/E to over $100 per new rider. The rail alternatives, K2 and K3, attract much higher incremental ridership but the higher

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
KENDALL CORRIDOR COST EFFECTIVENESS INDEX

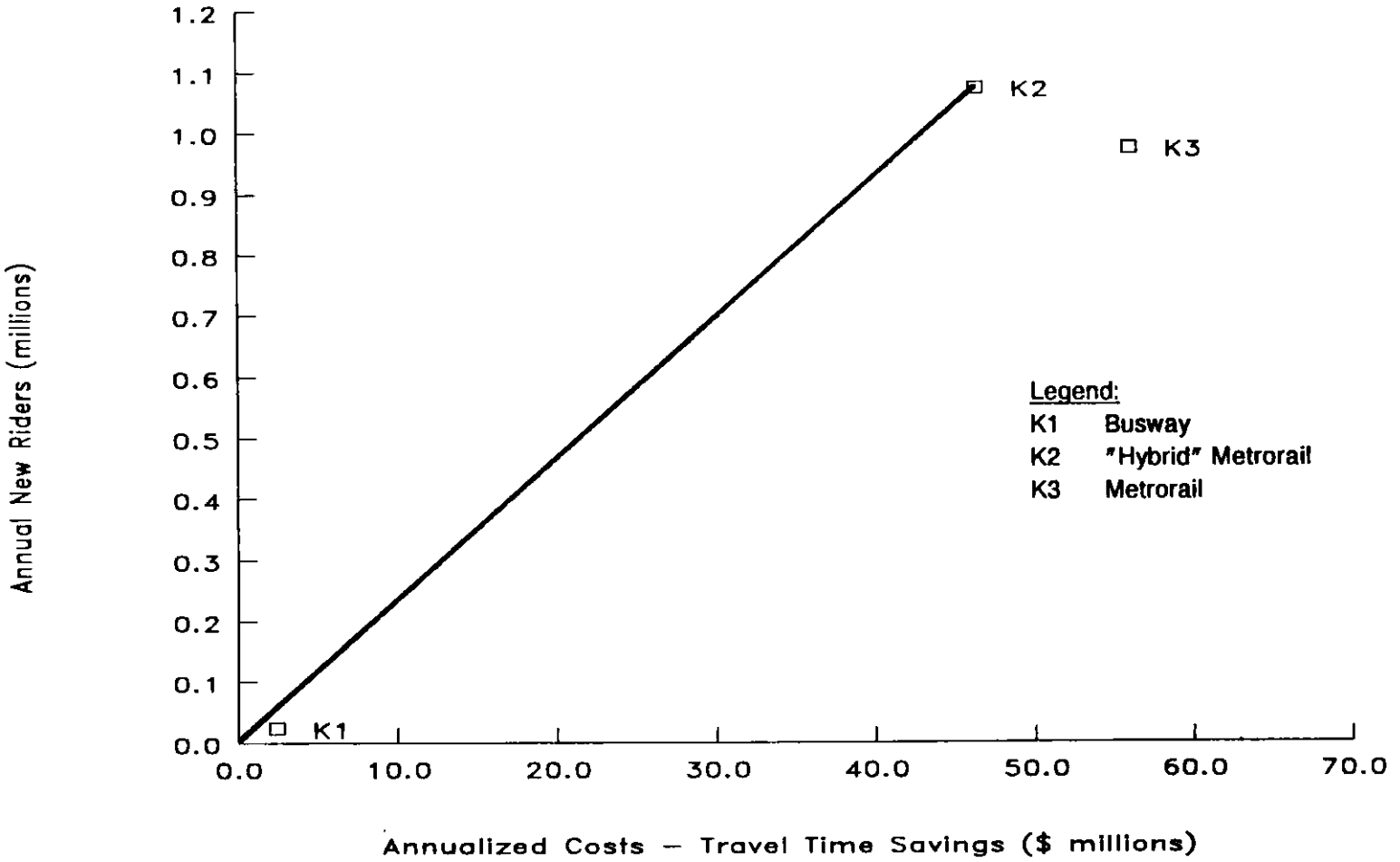
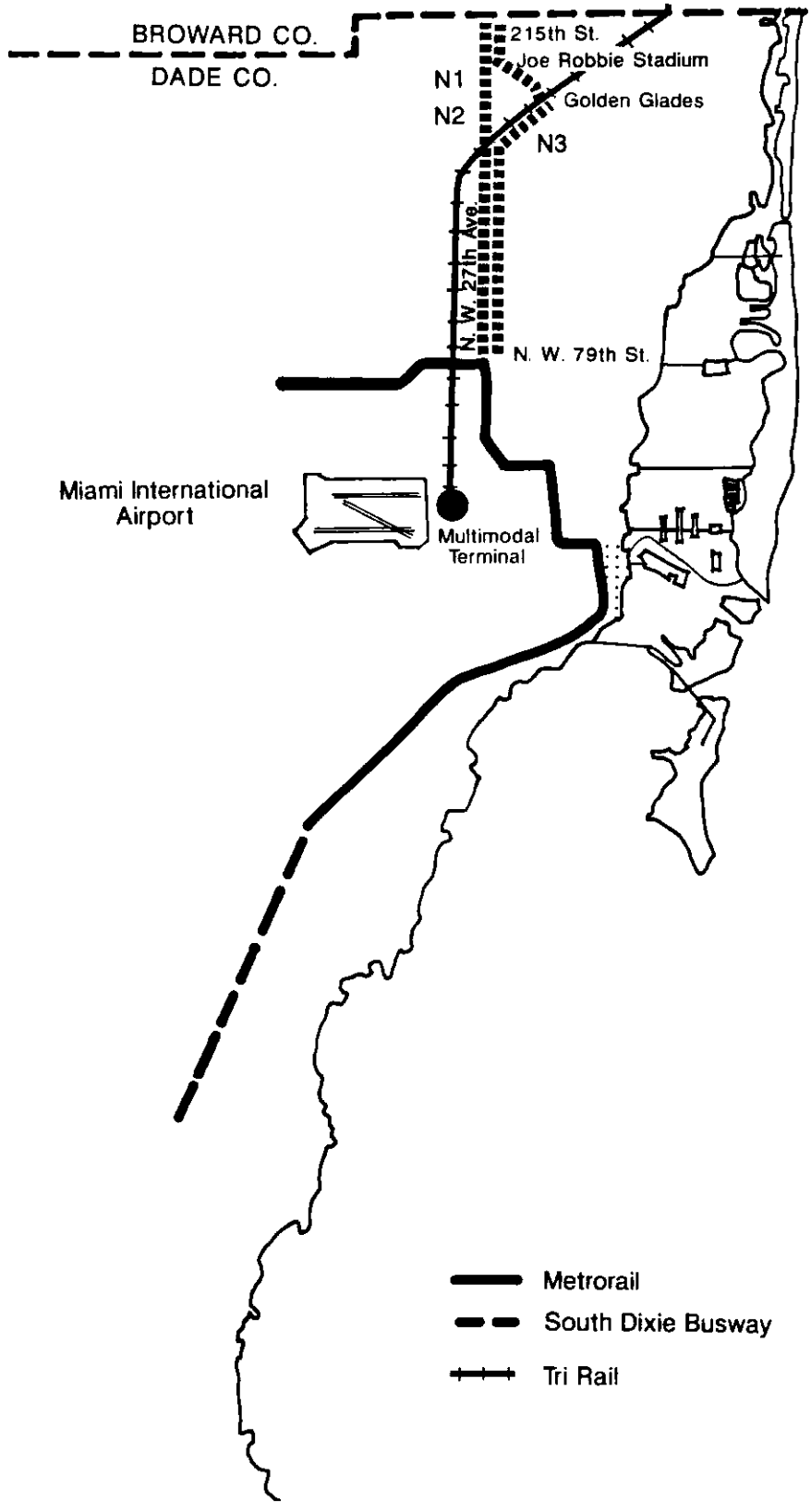


Figure K.2

capital cost results in C/Es of $43 to $57. As seen in Figure K.2, only Alternative K2 is on the "frontier," meaning it is the most cost effective of the corridor alternatives (based on this index), even though it requires a much higher level of investment than the busway option, K1.

Summary Evaluation

While the overall capital cost of the busway under K1 is substantially less than the rail options, not much new ridership is attracted so that the principal benefit is improved bus access to the Metrorail. Similarly, the rail extensions benefit both new and existing riders but at a much higher capital and O&M cost. Of the two, K2, "hybrid" Metrorail is the more cost effective. Any of these major capital investment alternatives could be very disruptive to the community and expensive relative to the transportation benefits gained. The transit service improvements included in the TSM alternative, represent an inexpensive, non-disruptive and effective means of addressing transportation needs in the Kendall Corridor. These transit service improvements could be enhanced with some modest capital projects such as traffic queue by-pass lanes and other transit priority treatments at selected locations.



METRO-DADE

Dade County
Metropolitan Planning
Organization

Dade County
Transit Corridors
Transitional Analysis

North Corridor

ALTERNATIVES
N1 Reversible Bus Lane
N2 Direct Metrorail
N3 Metrorail via
Golden Glades

NOT TO SCALE

Figure N.1

NORTH CORRIDOR

Description of Corridor and Alternatives

The North Corridor extends northward from the existing Metrorail line along NW 27th Avenue to the vicinity of Joe Robbie Stadium and Calder racetrack, just south of the Broward County line (Figure N.1). Alignments were considered straight north along NW 27th Avenue and along a diversion to Golden Glades and back via SR 9 and Florida's Turnpike. A total of three "build" alternatives were examined in the corridor, identified as "N1", "N2", and "N3" in the summary materials which follow.

Reversible Bus Lane Alternative N1

This alternative consists of a single, reversible bus lane which would follow the median of NW 27th Avenue from NW 79th Street to NW 215th Street. Buses would connect with Metrorail at the Northside station. Local buses would continue to operate in mixed traffic on NW 27th Avenue.

Direct Metrorail Alternative N2

This alternative consists of an extension of the Metrorail line north on NW 27th Avenue to NW 215th Street. The line would be elevated over the median of NW 27th Avenue throughout except for a short diversion to the east at Joe Robbie Stadium to locate a station closer to the stadium.

Metrorail via Golden Glades Alternative N3

This alternative consists of an extension of the Metrorail line which follows NW 27th Avenue to the Tri-Rail right-of-way then follows that route to the Golden Glades Park-and-ride. The alignment then turns northwest along the Florida Turnpike and passes Joe Robbie Stadium to end at the intersection of NW 27th Avenue and NW 215th Street. The alignment would be grade separated throughout.

Description of Services

The bus lane alternative N1 runs directly north along NW 27th Avenue to a terminal near Joe Robbie Stadium. Express buses are assumed to operate from the terminal station and from an intermediate location at NW 135th Street to a transfer location with Metrorail at the Northside station. The NW 27th Avenue MAX service is rerouted via the busway to provide limited-stop service. Local bus service along NW 27th Avenue is reduced and some local buses were modified to serve busway stations.

Bus service changes are relatively minor for the two rail alternatives (N2 and N3). Local service along NW 27th Avenue is reduced as in the busway alternative with circulating service at the north end of the corridor changed to a rail feeder. Changes are made to the NW 32nd Avenue service to be consistent with the busway operating plan. The NW 27th MAX service is eliminated, since its function was replaced by rail. Some additional minor variations are made to other local and crosstown routes to serve appropriate rail stations.

In the TSM alternative, 95X services are assumed to operate in accordance with the planned revisions to downtown bus routes, consolidating several destinations into a single route serving the downtown transit center with convenient transfer opportunities to Metromover for additional downtown circulation and transfer to Metrorail for longer, regional trips. Some additional 95X service to the Civic Center area and the airport area is maintained in a pattern similar to that currently operated. The 95X service is very competitive with the North Corridor alternatives because it provides direct, relatively fast, and a "one seat" (no transfer) service into downtown Miami.

These routes are adjusted only slightly in the North Corridor bus lane and Direct Metrorail alternative, primarily by converting the Carol City branches which originate west of NW 27th Avenue into either busway routes or rail feeders. Civic Center routes are also converted to the bus lane or to rail feeders. In the Metrorail via Golden Glades alternative, all of the 95X services except those to the airport area are deleted or converted to rail feeders.

Summary of Results

Table N.1 presents the results of the ridership and travel benefits, cost and other analyses of the alternatives. Key findings are highlighted below.

Ridership

Ridership results are summarized in Table N.1. The information in the top section of the table shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking Metrobus to the Opa Locka station, transferring to Metrorail to Government Center, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip.

The data in the third line of the upper part of the table reflects boardings on the primary corridor services and at other key locations on the system. The boardings on the proposed alternatives include those stations along the North Corridor alignments north of the junction with Metrorail. Boardings at Golden Glades are included only in Alternative N3 when a new facility is added. For the bus lane alternative, boardings also include passengers on express buses prior to their entry onto the busway.

Ridership increases are fairly modest for the bus lane alternative since a transfer to Metrorail is still required for a trip to the Civic Center, downtown, or beyond. Since 95X service from Golden Glades is assumed to remain, many park-and-ride routes continue to be faster via this facility since a transfer is not required. Ridership is higher for the rail alternatives (N2 and N3) since the need to transfer is eliminated. The ridership for the direct alterative (N2) is slightly higher than for the longer route via Golden Glades (N3), since the service to the JRS and Calder areas is longer for this alternative and offsets any benefits to replacing 95X bus service with Metrorail at Golden Glades.

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS EVALUATION MATRIX
NORTH CORRIDOR

EVALUATION CRITERIA		N1 Reversible Bus Lane	N2 Direct Metrorail	N3 Metrorail via Golden Glades
RIDERSHIP				
Total Daily Regional Transit Trips (Linked)		334,000	338,000	337,100
New Daily MetroDade & Jitney Transit Trips (Linked)		1,880	5,880	5,050
New Daily MetroDade Transit Trips (Linked)		1,940	6,290	5,420
Daily Boarding on New Alignments		7,100	17,700	18,700
Reverse Commuter Trips (Percent)		16%	12%	10%
Fare Box Revenue (Annual)		$933,000	$1,713,000	$1,302,000
TIME SAVINGS				
Total Daily Time Savings				
Hours		400	1,200	1,000
Value		$509,000	$1,429,000	$1,133,000
Selected Travel Time (Min.)				
FROM	TO*			
Norwood (102)	CBD A	46.3	47.3	46.1
Carol City (114)	CBD W	61.2	53.8	51.1
Miami Gardens (126)	CBD A	60.5	45.0	53.7
Opa Locka (214)	CBD W	56.1	53.5	53.5
TRAFFIC OPERATIONS IMPACTS				
Diverted Auto Daily Vehicle Trips		1,709	5,345	4,591
Diverted Daily Vehicle Miles Travelled (VMT)		-1,500	43,800	32,500
CAPITAL COST		$30,571,000	$495,478,000	$529,974,000
OPERATIONS AND MAINTENANCE COST		$2,455,000	$7,948,000	$8,154,000
COST EFFECTIVENESS INDEX				
MetroDade & Jitney		$5.69	$23.48	$28.04
MetroDade Only		$5.59	$22.34	$26.64

* A = Auto Access
W = Walk Access

Table N.1

The North Corridor alternatives extend to and serve Joe Robbie Stadium and Calder Racetrack. Patrons of baseball games, football games, and races and other events at these facilities, who start their trip in the area served by the Metro Dade transit system, will have improved transit access as an option under there alternatives. Given that the stadium and racetrack are in the northwestern quadrant of Dade County, event patrons from Broward and other counties to the north are not served by the alternatives.

Based on an analysis of service quality and market area served and the number of patrons expected at events, Alternative N1, Bus Lane, is expected to gain an additional 326,000 trips per year while Alternatives N2 and N3, rail extensions, are estimated to gain an additional 652,000 trips per year from the event at these facilities.

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top part of Table N.1. The incremental ridership is shown both for total transit trips (including jitneys) and Metro Dade-only ridership (excluding jitneys). These values are slightly higher for the Metro Dade-only comparison, since there is some competition with jitneys in this corridor. The daily ridership shown in this table also reflects an estimate of ridership attracted from Broward County which is not directly addressed in the travel demand modeling system. The incremental ridership is about 1,900 trips daily for the bus lane alternative (N1), and between 5,400 and 6,300 daily trips for the rail alternatives (N2 and N3.)

External trips from Broward County are only partially handled within the existing travel demand modeling system. For purposes of this study, a simple factoring approach was applied to observed Broward County commuters accessing Metro Dade services at Golden Glades, via either transfers from Broward County buses or users of the park-and-ride lot.

In addition, transit users from Broward County also have Tri-Rail service available from numerous locations within the county. Although Tri-Rail does not connect to downtown Miami as conveniently as the North Corridor alternatives nor does it provide as frequent service, it does "compete" for potential transit users. Such competition is also not included in any meaningful way in the current Miami model structure. The Broward County MPO has indicated willingness to participate in future studies of the North Corridor.

Travel time savings is another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed for existing passengers (passengers projected for the TSM alternative) and thus is a reflection of the benefits of an alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips.

Some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. The park-and-ride travel times are similar because many of the routes continue to run via Golden Glades, as noted above. As expected, some of the greatest savings are for travelers along the rail corridor, such as in the Community College area, who can board a train direct to downtown with the rail alternatives.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The Direct Metrorail alternative (N2) shows the greatest VMT reduction, probably because it attracts more of the longest trips from the northern part of the County.

Capital Costs

The Bus Lane Alternative, N1, is the least expensive option at $27.0 million while the two rail extension options are expected to cost $495.5 to $530.0 million. Alternative N3 is the more costly rail extension because in running over to Golden Glades, the alignment is two miles longer.

Operating and Maintenance Costs

The increased bus service under Alternative N1 raises the annual O&M costs by $2.5 million. The rail extension options result in bus O&M cost savings of $0.6 million to $1.6 million per year which helps offset the increased rail O & M costs. The net increase in O&M cost for N2 is $7.9 million per year while for N3, it is $8.2 million.

Environmental Assessment

The North Corridor consist of three alternatives including: a bus lane north in the median of NW 27th Avenue; a Metrorail configuration on NW 27th Avenue; and a Metrorail north to NW 215th Street via the Golden Glades park-and-ride facility.

All three alternatives avoid historic properties as well as 4f properties and the disruption of natural features. The bus lane which will require some street widening along NW 27th Street raises serious questions regarding loss of parking along the street, impacts on local businesses and property impacts. Extensive subsequent investigation regarding these matters together with a strong community involvement program would be needed to help address and mitigate these concerns. The rail alternatives involve alignments close to the Rolling Oaks, Norland, and Crestview residential subdivisions. These areas are particularly sensitive to development associated with Joe Robbie Stadium. Careful planning and a strong community involvement program would be needed to avoid potential community disruption.

FTA Cost Effectiveness Index

The FTA cost effectiveness index, described in detail at the beginning of the report, provides one means of combining the mobility benefits and costs into one measure. This measure is an annualized increment cost per new transit rider. The lower the cost per new rider, the more "cost effective" the alternative. While the FTA cost effectiveness index does not include every impact and benefit (environmental or community impacts, for instance), it does provide a means to compare alternatives with varying costs and levels of mobility benefits. Also as discusses in the Overview section at the beginning of the report, the cost component of the index can be graphically plotted against the ridership component to see the degree to which increased levels of investment in terms of capital and O&M costs generate ridership benefits. (See Figure N.2.) The alternatives that lie highest and furthest to the left on the graph are connected. The resulting boundary, or "frontier," indicates the best that can be done with increasing levels of investment in the corridor; those alternatives that are lower and to the right indicate less cost-effective investment opportunities.

Of the three alternatives, the bus lane, N1, has the best C/E at $5.27. By this measure, this makes the busway very cost effective in that it gains substantial new ridership at a relatively modest cost. The rail options, N2 and N3, have C/Es in the low- to mid-$20s. N2, which runs directly up NW 27th Avenue is more cost effective than N3. This indicates that the additional capital and operating cost of running over to Golden Glades is not matched by comparable gains in ridership.

Summary Evaluation

The bus lane, N1, represents a very cost effective, albeit modest transportation improvement for the North Corridor. It carries only about a third of the riders as the rail options and only attracts about a third as many new transit trips. The required street widening under the bus lane alternative raise serious community impact questions because of the loss of parking and the associated business and property impacts. Alternative N2, the rail extension that goes straight up NW 27th Street and serves Joe Robbie Stadium generates the most ridership, but at a higher investment of capital and operating costs. Alternative N2 provides higher ridership and costs less than Alternative N3, which runs by way of Golden Glades, as can be seen in Figure N.2. These extensions could be implemented in phases with the initial segment running north to Gratigny Parkway.

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
NORTH CORRIDOR COST EFFECTIVENESS INDEX

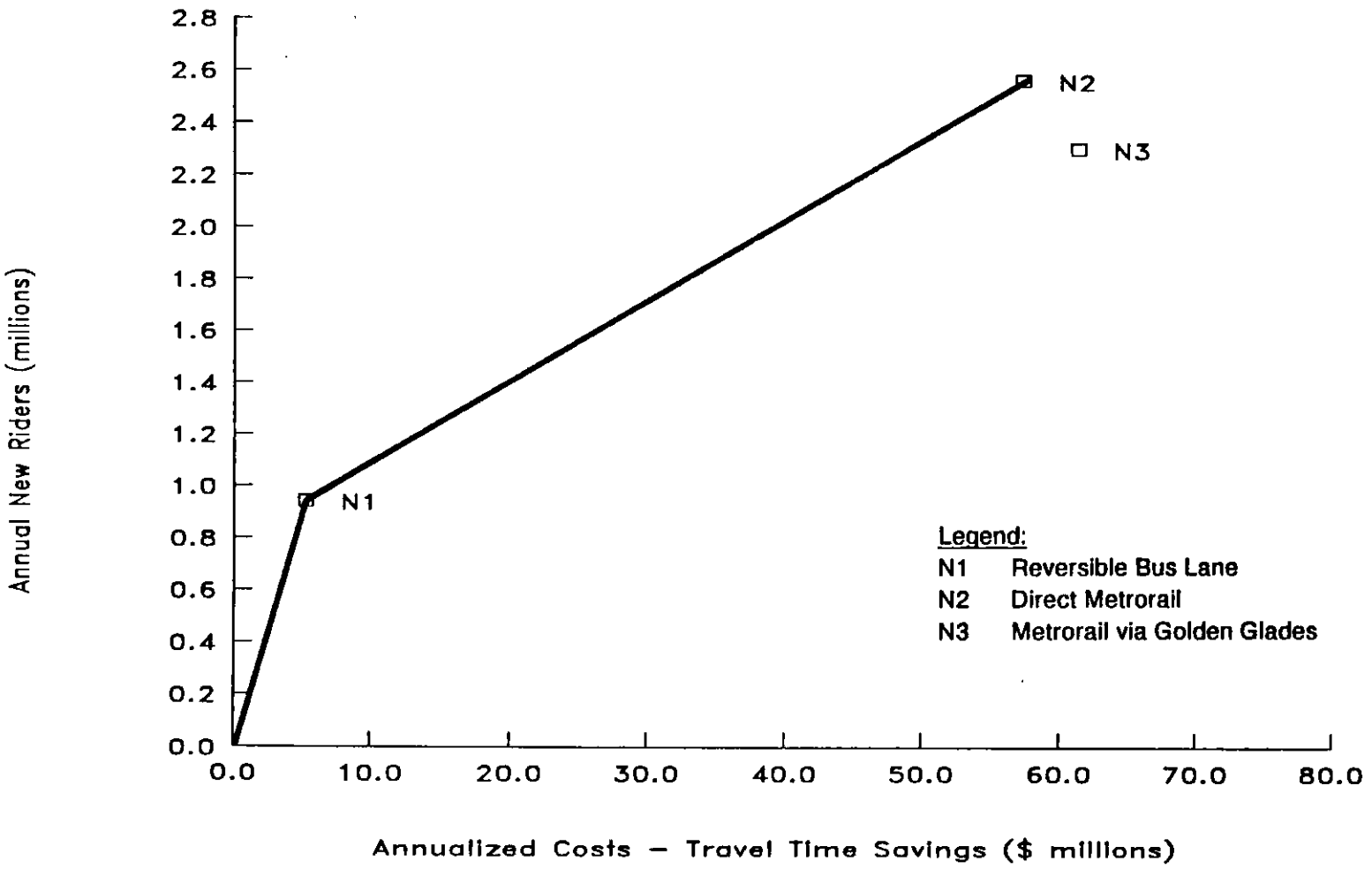
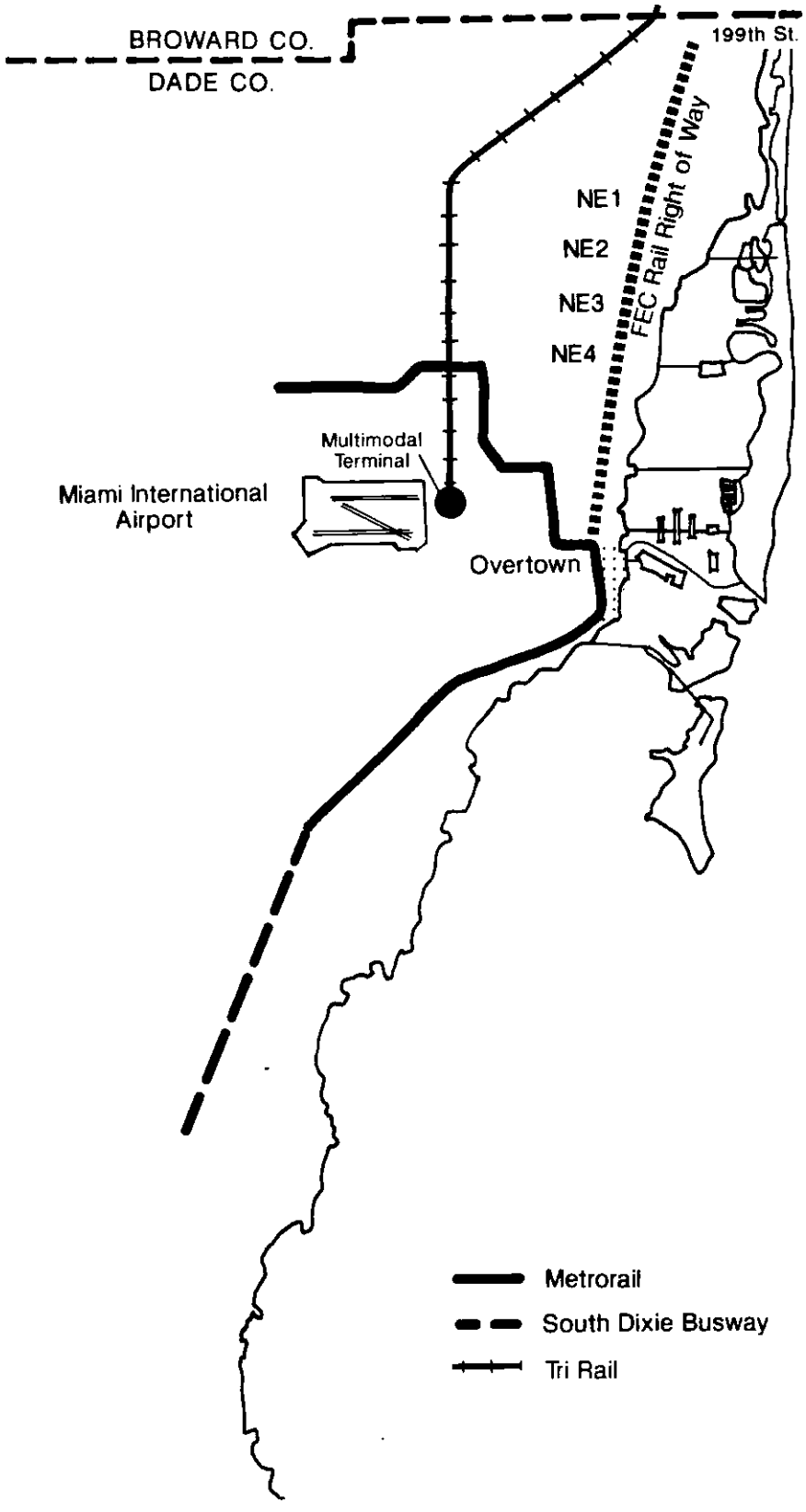


Figure N.2



METRO-DADE

Dade County
Metropolitan Planning
Organization

Dade County
Transit Corridors
Transitional Analysis

Northeast
Corridor

ALTERNATIVES
NE1 Busway
NE2 Standard LRT
NE3 "Hybrid" Metrorail
NE4 Metrorail

NOT TO SCALE

Figure NE.1

NORTHEAST CORRIDOR

Description of Corridor and Alternatives

The Northeast Corridor extends northeast from downtown along the Florida East Coast (FEC) railroad right-of-way, generally parallel to Biscayne Boulevard, to the vicinity of Aventura Mall, just south of the Broward County line (Figure NE.1). Rail freight service is assumed to remain along the FEC railroad tracks. The alternatives share the right-of-way but operate on separate facilities from the freight trains. A total of four "build" projects were examined, all of which follow the same general alignment between similar end points and are identified as "NE1", "NE2", "NE3", and "NE4" in the summary materials which follow.

Busway Alternative NE1

This alternative consists of a busway in the FEC right-of-way from downtown Miami to NE 199th Street. Bus bays would be provided so that buses making stops would pull out of the through bus lanes to allow express buses to pass without slowing. Local buses would continue to operate along US-1.

Standard LRT Alternative NE2

This alternative consists of a standard (non "hybrid") LRT service along the FEC right-of-way from downtown to NE 199th Street. The at-grade line would begin at a station adjacent to the Metrorail Overtown Station and one block from the Metromover State Plaza/Arena Station where a convenient transfer to those lines would be available.

"Hybrid" Metrorail Alternative NE3

This alternative consists of a "hybrid" Metrorail line on the FEC right-of-way. The line would diverge from the Stage I Metrorail line north of the Overtown Station and follow the FEC right-of-way to NE 199th Street. All intersections would have overpasses or signal preemption.

Metrorail Alternative NE4

This alternative consists of an extension of Metrorail along the FEC right-of-way from the Overtown Station to NE 199th Street. The alignment would be elevated in most areas and grade separated at all crossings.

Description of Services

The busway alternative (NE1) is assumed to have on-line stations and also provide for express service from several intermediate points. The Biscayne MAX service was rerouted to the busway to provide a limited stop service between all busway stations. Existing local routes were revised to include a circulation portion in a nearby neighborhood, a stop at a busway station, a non-stop run to the northern

part of downtown, then all stops through the downtown area. All portions of the existing routes on local streets received similar or better coverage, but through routes were effectively broken at the busway stations.

Rail operation under the three rail alternatives is similar within the corridor, but differs in its linkage to the regional system. In Alternative NE2, a light rail system, is assumed which terminates within downtown near the Arena and Government Center stations. In alternatives NE3 and NE4, rail service is through-routed onto the existing Stage I Metrorail system, linking with the short-turn Metrorail service to Dadeland South. Thus, with these two alternatives, some service is removed from the Stage I system between downtown and Earlington Heights, as compared with the TSM, busway, and NE2 alternatives. Also, within the corridor, operating speeds and station spacing differ among the rail alternatives, which also contribute to the ridership results noted below.

Bus service is extensively modified in the corridor to serve the rail stations, reduce the amount of parallel and competing service, and maintain consistency with the service plan developed for the busway alternative (NE1). Thus, long routes are broken into two or three parts, with at least one end at a rail station. These bus service changes are virtually identical for all of the rail alternatives. Changes to crosstown routes are very minor in all alternatives, generally only affecting the location of end-of-line turnaround points.

Summary of Results

Table NE.1 presents the results of the ridership and travel benefits, cost and other analyses of the alternatives. Key findings are highlighted below.

Ridership

Ridership results are summarized in Table NE.1. The information in the top section of the table shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking a crosstown Metrobus to the 163rd Street Station, transferring to Metrorail to Government Center, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip. The data in the third line of the upper part of the table reflects boardings on the primary corridor services and at other key locations on the system. The boardings on the proposed alternatives include those stations along the Northeast Corridor alignments north of downtown. For the busway alternative (NE1), boardings also include passengers on express buses prior to their entry onto the busway.

The ridership results are very similar for all alternatives, including the busway. The busway alternative serves somewhat fewer work trips but attracts more non-work trips than any of the rail alternatives due to its mix of local and express services which are assumed to operate throughout the day. The results for the through-routed rail alternatives (NE3 and NE4) are net of any losses from service reductions in the Civic Center area. The impact can be partially seen in the corridor boardings on the new alignments,

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS EVALUATION MATRIX
NORTHEAST CORRIDOR

EVALUATION CRITERIA		NE1 Busway	NE2 Standard LRT	NE3 "Hybrid" Metrorail	NE4 Metrorail
RIDERSHIP					
Total Daily Regional Transit Trips (Linked)		339,300	338,500	338,200	338,400
New Daily MetroDade & Jitney Transit Trips (Linked)		7,220	6,440	6,130	6,290
New Daily MetroDade Transit Trips (Linked)		10,410	8,710	8,810	8,720
Daily Boarding on New Alignments		26,100	28,000	33,900	34,200
Reverse Commuter Trips (Percent)		17%	16%	14%	12%
Fare Box Revenue (Annual)		$4,957,000	$1,758,000	$1,447,000	$1,305,000
TIME SAVINGS					
Total Daily Time Savings					
Hours		2,200	2,400	2,600	3,000
Value		$2,504,000	$2,718,000	$2,798,000	$3,245,000
Selected Travel Time (Min.)					
FROM	TO*				
Highland Oaks (88)	CBD A	49.3	49.6	43.7	41.5
N. Miami Beach (261)	CBD W	39.6	41.4	39.5	38.5
N. Miami (270)	CBD A	47.4	39.0	34.7	33.2
Miami Shores (306)	CBD W	37.9	36.8	34.9	33.9
Little Haiti (456)	CBD W	27.6	24.6	21.7	21.7
TRAFFIC OPERATIONS IMPACTS					
Diverted Auto Daily Vehicle Trips		6,564	5,855	5,573	5,718
Diverted Daily Vehicle Miles Travelled (VMT)		50,900	60,800	65,500	62,700
CAPITAL COST		$87,379,000	$395,716,000	$439,409,000	$653,053,000
OPERATIONS AND MAINTENANCE COST		$3,408,000	$4,345,000	$9,718,000	$7,025,000
COST EFFECTIVENESS INDEX					
MetroDade & Jitney		$4.68	$22.81	$30.82	$41.15
MetroDade Only		$3.24	$17.09	$21.44	$29.76

* A = Auto Access
W = Walk Access

Table NE.1

where these two alternatives attract more total boardings than the light rail alternative (NE2). However, a more detailed analysis shows that some of this ridership is diversion from the Stage I line rather than new riders. The impact on the Stage I line can also be seen in the reduction in the peak load on the line north of Overtown.

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top part of Table NE.1. The incremental ridership is shown both for total transit trips (including jitneys) and Metro Dade-only ridership (excluding jitneys). These values are quite different, since extensive jitney activity occurs in this corridor. The daily ridership shown in this table also reflects an estimate of ridership attracted from Broward County which is not directly addressed in the travel demand modeling system. On a daily basis, the incremental ridership is highest for the busway alternative, NE1, which reflects its superior performance in non-work travel markets and thus might be expected to perform well on weekends and other times with less work ridership than average weekdays.

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed for existing passengers (passengers projected for the TSM alternative) and thus reflect the benefits of an alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips.

Some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. Auto access time savings are substantial virtually everywhere, since available parking opportunities in this corridor are very limited in the TSM alternative. Walk access times are also improved over TSM reflecting the higher speeds that are achievable on the fixed guideway facilities as compared to local bus or MAX times on congested Biscayne Boulevard. Times for the rail alternatives are generally shorter than for the busway, with the highest speed Metrorail alternative (NE4) having the shortest times.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The VMT reductions are somewhat greater for the two through-routed rail alternatives (NE3 and NE4), while the results for the busway and light rail alternatives are very similar to one another.

Capital Costs

The busway alternative, NE1, is the least costly option at $87.4 million. The standard LRT option, NE2, costs $395.7 million which is less than the two rail extension alternatives, NE3 and NE4. Of the two

options that represent extensions of the Metrorail system, NE3, "hybrid" Metrorail, is less expensive at $439.4 million because it does not involve the grade separations at roadway crossing required by NE4, Metrorail, which increases the cost to $653.1 million.

Operating and Maintenance Costs

Alternative NE1, the busway, increases bus O&M costs by $3.4 million because of improved levels of bus service. The three rail options reduce bus O&M costs by $4.7 million to $6.2 million per year which helps offset the added costs of the rail operations. The standard LRT alternative, NE2, has a net increase in annual O&M cost of $4.3 million while the "hybrid" Metrorail option, NE3, has an incremental cost of $9.7 million and NE4, the Metrorail extension, increases O&M costs by $7.0 million per year.

Environmental Assessment

This long corridor -- more than 12 miles -- contains four alternatives which use the same alignment, the FEC right-of-way. Because of the nature of this property which is used for heavy freight trains, it is felt that any of the four alternatives would improve the visual character of the corridor (or at minimum, not worsen it) while achieving the transportation objectives. The project is consistent with approved plans, and displacement and land acquisition would be minimal. The project does not affect either historic properties or 4F properties.

Alternatives NE1, NE2 and NE3 run at-grade and will have numerous crossings of streets that intersect with U.S. 1, although Alternative NE3 and the "hybrid" LRT would have some overpasses at major streets. Some of these intersections are fairly close to the rail crossing, and careful planning and coordination of the traffic signals and grade crossing projection will be needed.

FTA Cost Effectiveness Index

The FTA cost effectiveness index, described in detail at the beginning of the report, provides one means of combining the mobility benefits and costs into one measure. This measure is an annualized increment cost per new transit rider. The lower the cost per new rider, the more "cost effective" the alternative. While the FTA cost effectiveness index does not include every impact and benefit (environmental or community impacts, for instance), it does provide a means to compare alternatives with varying costs and levels of mobility benefits. Also as discusses in the Overview section a the beginning of the report, the cost component of the index can be graphically plotted against the ridership component to see the degree to which increased levels of investment in terms of capital and O&M costs generate ridership benefits. (See Figure NE.2.) The alternatives that lie highest and furthest to the left on the graph are connected. The resulting boundary, or "frontier," indicates the best that can be done with increasing levels of investment in the corridor; those alternatives that are lower and to the right indicate less cost-effective investment opportunities.

The busway alternative, NE1, has a very good C/E index of $3.24. This is due to its relatively low capital cost and highest ridership increase. It is the only alternative on the "frontier" in Figure NE.2. Of the rail

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
NORTHEAST CORRIDOR COST EFFECTIVENESS INDEX

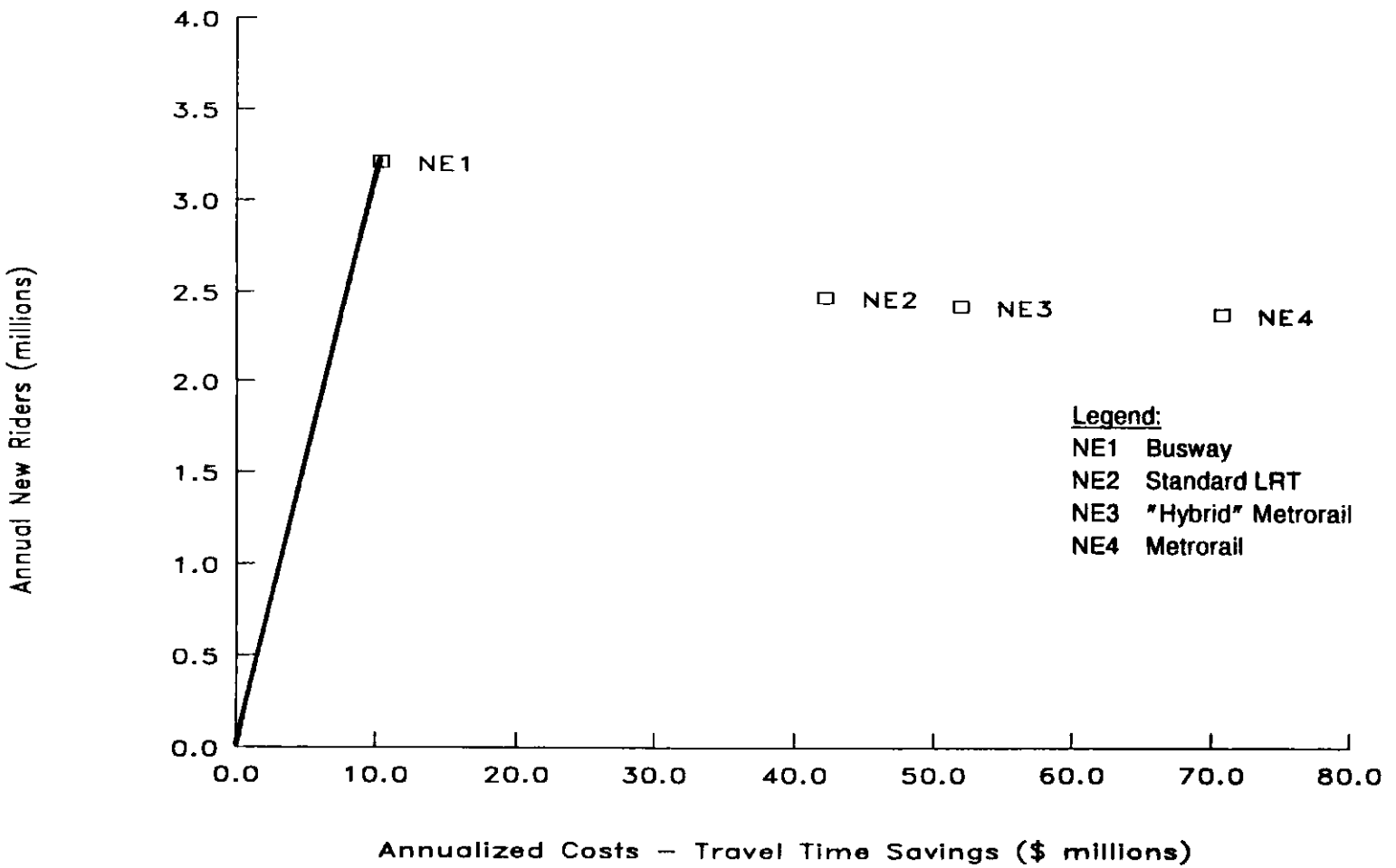


Figure NE.2

options, NE2, light rail transit, has the best C/E at $17, determined primarily by it having the lowest capital cost of the three rail options. Of the two Metrorail extensions, NE3, the "hybrid" Metrorail option is more cost effective because of its lower capital cost and higher ridership.

Summary Evaluation

The busway alternative, NE1, represents a very cost effective, low cost improvement option for the Northeast Corridor. It gains more new ridership than any of the rail options and costs substantially less to build and operate. Of the Northeast Corridor rail alternatives, NE2, Standard Light Rail Transit, is the most cost-effective. It generates comparable ridership benefits to the other rail alternatives, NE3 and NE4, but at a lower capital cost and operating and maintenance cost. Because the alternatives run along the existing FEC railroad right of way, the community and environmental effects are minimal.

WEST CORRIDOR

Description of Corridor and Alternatives

The West Corridor extends westward from the downtown Miami area to the rapidly growing western suburbs and includes major activity centers surrounding Miami International Airport (Figures W.1 and W.2). Alignments were considered along SR 836, SW 8th Street, Flagler, and the existing north leg of Metrorail. All corridor alternatives are assumed to terminate in the vicinity of the western campus of Florida International University (FIU) near SW 8th Street (Tamiami Trail) and the Homestead Extension of the Florida Turnpike (HEFT). A total of four alternatives were examined, noted as "W1", "W2", "W3", and "W4" in the summary materials which follow. Service between the airport and the seaport are examined as part of the West-Beach Corridor.

Direct Metrorail Alternative W1

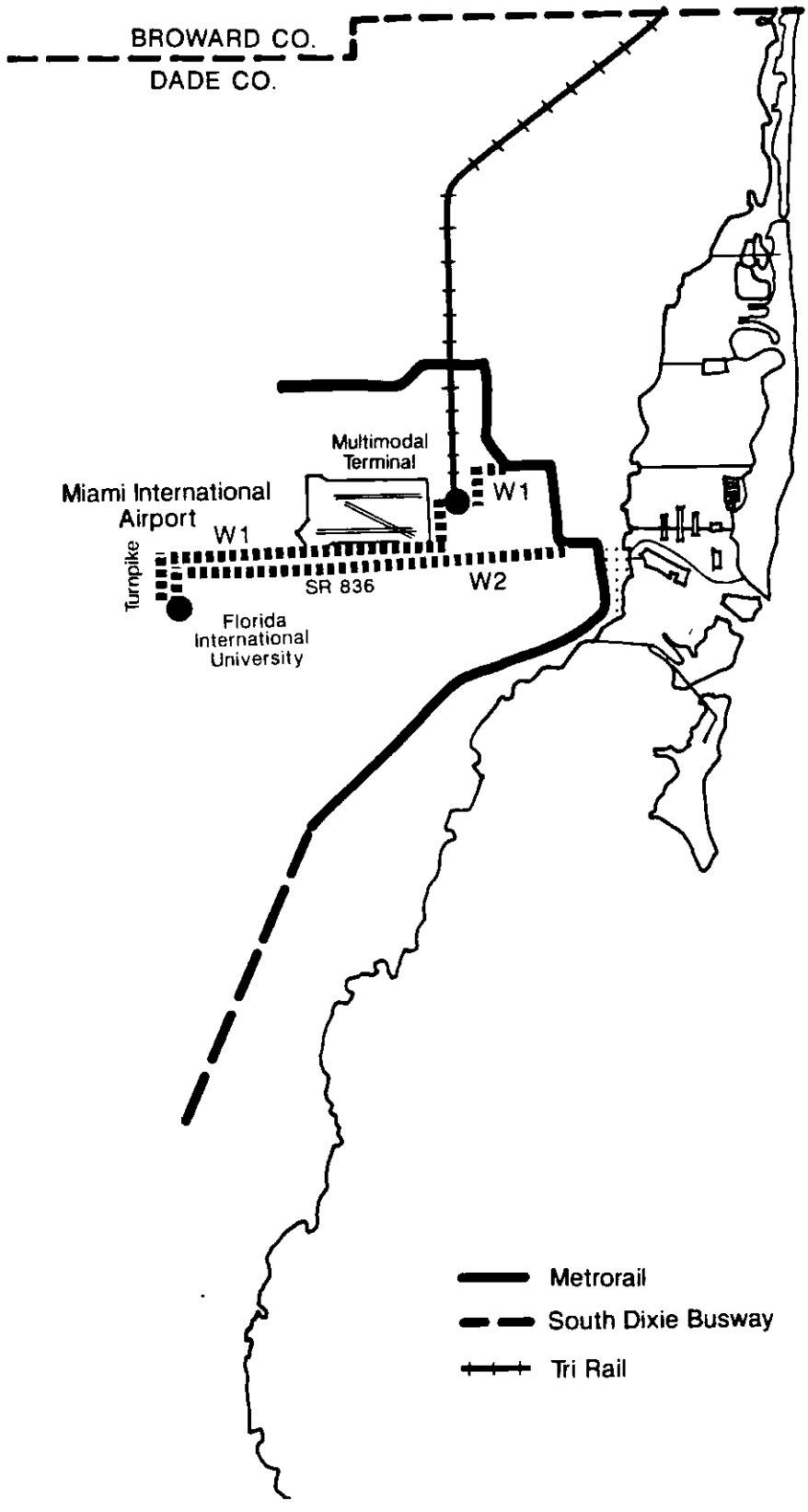
This alignment begins at Florida International University (FIU) along the Turnpike Extension. From FIU the alignment follows the east side of the Turnpike Extension north to SR 836, then the south side of SR 836 east to NW 57th Avenue. East of NW 57th Avenue, the alignment passes under SR 836 then follows LeJeune Road north to the Airport Multimodal Access Facility to be located east of LeJeune Road. From the Multimodal Facility the line would continue north then turn east along the Airport Expressway (SR 112) to join the Stage I Metrorail line at NW 27th Avenue. This alternative would be fully grade separated at crossings (Figure W.1).

"Hybrid" Metrorail via SR 836 Alternative W2

This alignment begins at Florida International University (FIU) along the Turnpike Extension. From FIU the alignment follows the east side of the Turnpike Extension north to SR 836, then SR 836 east to the Miami River. After crossing the Miami River, the alignment diverges from SR 836 to join the Metrorail line in the vicinity of Culmer station. A branch line begins at the Airport Multimodal Access Facility and follows LeJeune Road south to join the line from FIU at SR 836. This alternative would be fully grade separated at all crossings (Figure W.1).

"Hybrid" Metrorail via SR 836/SW 8th Street Alternative W3

This "hybrid" Metrorail alignment begins at Florida International University (FIU) along the Turnpike Extension. From FIU the alignment follows the median of SW 8th Street to the FEC railway right-of-way, then north on the FEC to the Blue Lagoon area. From here the alignment turns northeast to meet SR 836 at NW 57th Avenue and continues east along SR 836 to the Miami River. After crossing the Miami River, the alignment diverges from SR 836 to join the Metrorail line in the vicinity of Culmer station. A branch line begins at the Airport Multimodal Access Facility and follows LeJeune Road south to join the line from FIU at SR 836. This alternative would be at-grade along SW 8th Street and the FEC right-of-way and grade-separated at crossings along SR 836 and LeJeune Road (Figure W.2).



METRO-DADE

Dade County Metropolitan Planning Organization

Dade County Transit Corridors Transitional Analysis

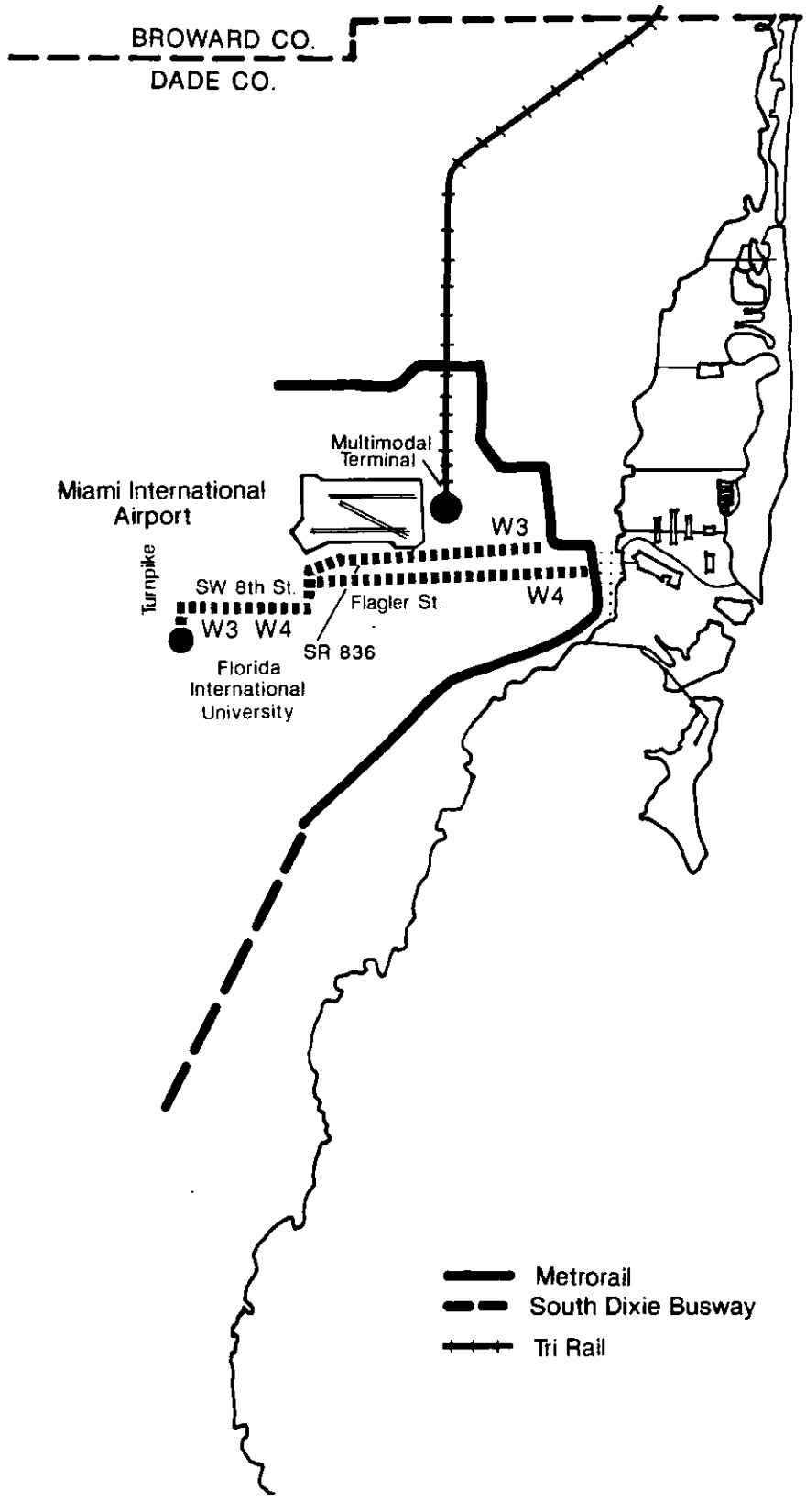
West Corridor

ALTERNATIVES
W1 Metrorail
W2 SR 836 "Hybrid" Metrorail

See Fig. W.2 for Alts W3 & W4.

NOT TO SCALE

Figure W.1



METRO-DADE

Dade County
Metropolitan Planning
Organization

Dade County
Transit Corridors
Transitional Analysis

West Corridor

ALTERNATIVES
W3 SR 836- SW 8th St.
"Hybrid" Metrorail
W4 Flagler St. LRT

See Fig. W.1 for Alts
W1 & W2.

NOT TO SCALE

Figure W.2

Standard LRT via Flagler Street Alternative W4

This LRT alignment begins at Florida International University (FIU) along the Turnpike Extension, follows SW 8th Street (Tamiami Trail) east to the FEC railway right-of-way, then turns north along the FEC to Flagler Street. The alignment then follows Flagler Street to 24th Avenue where the tracks separate to follow Flagler and SW 1st Streets. At approximately Seventh Avenue the tracks transition north to cross the Miami River to end at Government Center. A branch line begins at the Airport Multimodal Access Facility and follows NW 37th Avenue to join the line from FIU at Flagler Street. This alignment would be at-grade west of the Miami River and elevated east of the river (Figure W.2).

Description of Services

All four alternatives feature rail as the primary mode. In the first alternative (W1), the short-turn Metrorail line is assumed to diverge from the Stage I alignment west of Earlington Heights, continue on a new alignment through the proposed Multimodal terminal near the airport, and then run along SR 836 and the HEFT to FIU. The second alternative (W2) diverts from Stage I Metrorail just west of the Culmer station and follows SR 836 and the HEFT to FIU, with a branch to the Multimodal terminal near LeJeune Road. The third alternative (W3) is very similar, deviating at the west end to approach FIU via surface streets. The fourth alternative (W4) is assumed to be light rail at-grade all the way into downtown via SW 8th Street and Flagler, with a branch to Multimodal terminal along NW 37th Avenue. In all but the first alternative, separate operating routes are created to serve the FIU/downtown, FIU/Multimodal, and Multimodal/downtown markets. Also, it should be noted that alternatives W2 and W3 result in lower levels of service to the Civic Center and nearby areas, since the short-turn trains are diverted onto the West Corridor.

Bus service plans are very similar for all alternatives, differing only in response to variations in the rail alignments. All of the West Corridor express bus services via SR 836 in the TSM alternative are either deleted or converted into feeders to convenient rail stations. The Flagler MAX service is curtailed with alternatives W3 and W4 where it would duplicate rail service along the same streets. The west end of the East/West MAX from the airport through downtown to the Beach is deleted for all alternatives.

Local bus service changes are primarily to the NW 7th Street and Flagler routes. These bus routes are rerouted to serve rail stations, better match transit supply and demand, and to minimize direct competition with rail service. Several other local routes are modified slightly, including consolidation of the ends of several routes at the FIU rail terminal station which would then function as a major bus-rail transit center. Other changes are made to provide additional distribution service from rail stations in the western part of the corridor to serve employment areas west of the airport.

Summary of Results

Table W.1 presents the results of the ridership and travel benefits, cost and other analyses of the alternatives. Key findings are highlighted below.

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS EVALUATION MATRIX
WEST CORRIDOR

EVALUATION CRITERIA		W1 Direct Metrorail	W2 "Hybrid" Metrorail via 836	W3 "Hybrid" Metrorail via 836-8th St.	W4 Standard LRT via Flagler
RIDERSHIP					
Total Daily Regional Transit Trips (Linked)		341,500	343,300	342,400	339,000
New Daily MetroDade & Jitney Transit Trips (Linked)		9,370	11,190	10,340	6,930
New Daily MetroDade Transit Trips (Linked)		9,810	12,290	11,670	9,140
Daily Boarding on New Alignments		28,000	38,700	37,900	30,600
Reverse Commuter Trips (Percent)		39%	38%	36%	33%
Fare Box Revenue (Annual)		$2,632,000	$3,480,000	$3,223,000	$2,394,000
TIME SAVINGS					
Total Daily Time Savings					
Hours		1,900	3,000	2,700	800
Value		$2,260,000	$3,435,000	$3,199,000	$945,000
Selected Travel Time (Min.)					
FROM	TO*				
Doral West (157)	CBD A	53.4	45.4	48.6	54.4
Tamiami Plaza (617)	CBD A	42.7	42.7	47.3	58.9
Blue Lagoon (577)	CBD W	47.5	40.5	37.7	51.7
Auditorium area (689)	CBD W	29.3	29.3	29.3	27.0
Brickell (719)	MIA W	43.3	36.3	36.3	52.5
TRAFFIC OPERATIONS IMPACTS					
Diverted Auto Daily Vehicle Trips		8,518	10,173	9,400	6,300
Diverted Daily Vehicle Miles Travelled (VMT)		46,800	47,000	28,600	10,100
CAPITAL COST		$604,309,000	$760,753,000	$712,982,000	$513,614,000
OPERATIONS AND MAINTENANCE COST		$16,001,000	$19,125,000	$19,194,000	$16,891,000
COST EFFECTIVENESS INDEX					
MetroDade & Jitney		$26.47	$27.39	$28.22	$31.85
MetroDade Only		$25.30	$25.10	$25.21	$24.52

* A = Auto Access
W = Walk Access

Table W.1

Ridership

Ridership results are summarized in the Table W.1. The information in the top section of the table shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking a Metrobus feeder to FIU, transferring to Metrorail to Government Center, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip.

The data in the third line of the upper part of the table reflects boardings on the primary corridor services and at other key locations on the system. The boardings on the proposed alternatives include those stations along the West alignments west of downtown and include all rail boardings at the Multimodal terminal. Boardings along the existing Stage I alignment in Alternative W1 are not included.

Ridership results are quite similar for all alternatives, with the light rail alternative (W4) attracting somewhat lower ridership than the other three. Alternative W1 shows somewhat lower rail boardings than the other three, reflecting its lack of service to new travel markets east of LeJeune. Outbound ridership is substantial in this corridor, with outbound volumes approaching 40 percent of inbound volumes, reflecting the presence of the major employment centers at the airport and surrounding areas.

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top part of Table W.1. The incremental ridership is shown both for total transit trips (including jitneys) and Metro Dade-only ridership (excluding jitneys). The results show the impact of some jitney diversion in the Flagler corridor.

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed for to existing passengers (passengers projected for the TSM alternative) and thus reflect the benefits of an alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips. The travel time savings are the greatest for the most direct alternatives (W2 and W3), carrying long-distance commuters from western Dade County to central area destinations.

Some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. The travel time savings to downtown are highly variable, depending upon the specific locations relative to the alignment for a given alternative. As expected, travel times are shortest from the western part of the corridor for the more direct and higher speed alternatives (W2 and W3). Very substantial time savings occur for trips to the airport where direct service from any location along the line is far superior to the indirect service often requiring two or more local buses in the TSM alternative.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The VMT savings are less for the light rail alternative (W4) reflecting its greater attractiveness to shorter trips and less attractiveness to long distance commuting trips.

Capital Costs

The West Corridor involves four rail options ranging in cost from $513.6 to $760.8 million. W4, a stand alone at-grade LRT system is the least costly of the alternatives, at $513.6 million. Alternatives W2 and W3 are both "Hybrid" Metrorail options that vary slightly in length and number of stations. W2 is estimated at cost $760.8 million while W3's cost is $713.0 million. Alternative W1 which branches off the existing Metrorail system, is estimated to cost $604.3 million. All these alternatives are long (12.4 to 14.7 miles) and involve expensive crossings of the Miami River.

Operating and Maintenance Costs

All four West Corridor rail options result in bus O&M cost savings which offset the increased cost of running the rail services. The incremental O&M cost of Alternative W1 is $16.0 million while for W2 and W3, it is $19.1 and $19.2 million respectively. Under Alternative W4, the net annual increase is $16.8 million.

Environmental Assessment

The West Corridor consists of four alternatives which vary considerably. Generally, the corridor begins at Florida International University (FIU) and ends at an eastern terminus in the Miami Central Business District. The width of the corridor, however, ranges from SW 8th Street on the south to SR 112 on the north.

Three of the alternatives require a medium to high degree of right-of-way associated with SR 836. It is not known at this time whether or not the existing right-of-way would be sufficient for the actual transit line section. It will be necessary, however, to acquire property for stations and parking. Because of the density of this corridor, displacement and land acquisition as well as community disruption will have to be carefully addressed in subsequent environmental assessments. The three alignments which use a portion of SR 836 should not encounter historic properties or 4f properties.

The fourth West Corridor alternative, the at-grade light rail using SW 8th Street and Flagler Street will need extensive investigation as to the environmental suitability of the alternative. The alignment, especially on Flagler Street, raises serious questions regarding aesthetics, business and neighborhood disruption, traffic and parking, and impacts to historic properties. Extensive subsequent investigation regarding these matters together with a strong community involvement program would be needed to help address and mitigate these concerns.

FTA Cost Effectiveness Index

The FTA cost effectiveness index, described in detail at the beginning of the report, provides one means of combining the mobility benefits and costs into one measure. This measure is an annualized increment cost per new transit rider. The lower the cost per new rider, the more "cost effective" the alternative. While the FTA cost effectiveness index does not include every impact and benefit (environmental or community impacts, for instance), it does provide a means to compare alternatives with varying costs and levels of mobility benefits. Also as discusses in the Overview section at the beginning of the report, the cost component of the index can be graphically plotted against the ridership component to see the degree to which increased levels of investment in terms of capital and O&M costs generate ridership benefits (see Figure W.3). The alternatives that lie highest and furthest to the left on the graph are connected. The resulting boundary, or "frontier," indicates the best that can be done with increasing levels of investment in the corridor; those alternatives that are lower and to the right indicate less cost-effective investment opportunities.

All the West Corridor alternatives are rail options. They also have similar CE indices of around $25. Alternative W4, Flagler LRT, has the lowest C/E (using the index calculated with new Metro Dade Transit ridership only) of $24.52. W4, however, has the highest C/E when the jitney trips are added, demonstrating the influence of jitney service in this corridor. The Flagler LRT option, has major concerns regarding traffic and community impacts associated with its running at grade in Flagler Street. The other three West Corridor alternatives have C/E indices only slightly higher than Alternative W4 -- between $25.10 and $25.30. (If the West Corridor alternatives were extended to the seaport, as examined in the West-Beach Options, the cost effectiveness index for the alternatives would drops to around $16.00). Using the C/E index computed with Metro Dade and jitney trips, Alternative W1, Direct Metrorail, has the best CE of $26.47, while W2, "hybrid" Metrorail via SR 836 has a C/E of $27.39, and "hybrid" Metrorail via SR 836-SW 8th Street, has a C/E of $28.22. As discussed above, W4, Flagler Street LRT has the highest C/E using this index. Nevertheless, given the closeness of the various C/E indices, the four alternatives are all about the same given the level of analysis in this study.

Summary Evaluation

Alternative W2, "hybrid" Metrorail via SR 836, attracts the highest ridership of any of the alternatives and also has the highest cost. Alternative W3, "hybrid" Metrorail via SR 836-SW 8th Street, attract slightly less riders and cost slightly less. Alternative W1, Direct Metrorail, is third in both the ridership gains and cost rankings, while Alternative W4, the Flagler Street LRT, attracts the lowest ridership gains and has the lowest cost. This alternative, however, has some serious traffic and community impacts that may affect its ability to be implemented. Except for Alternative W4 with its traffic and community disruption concerns, the other West Corridor alternatives are generally equivalent, although W1 has the lowest cost but also the lowest ridership gains of the three.

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
WEST CORRIDOR COST EFFECTIVENESS INDEX

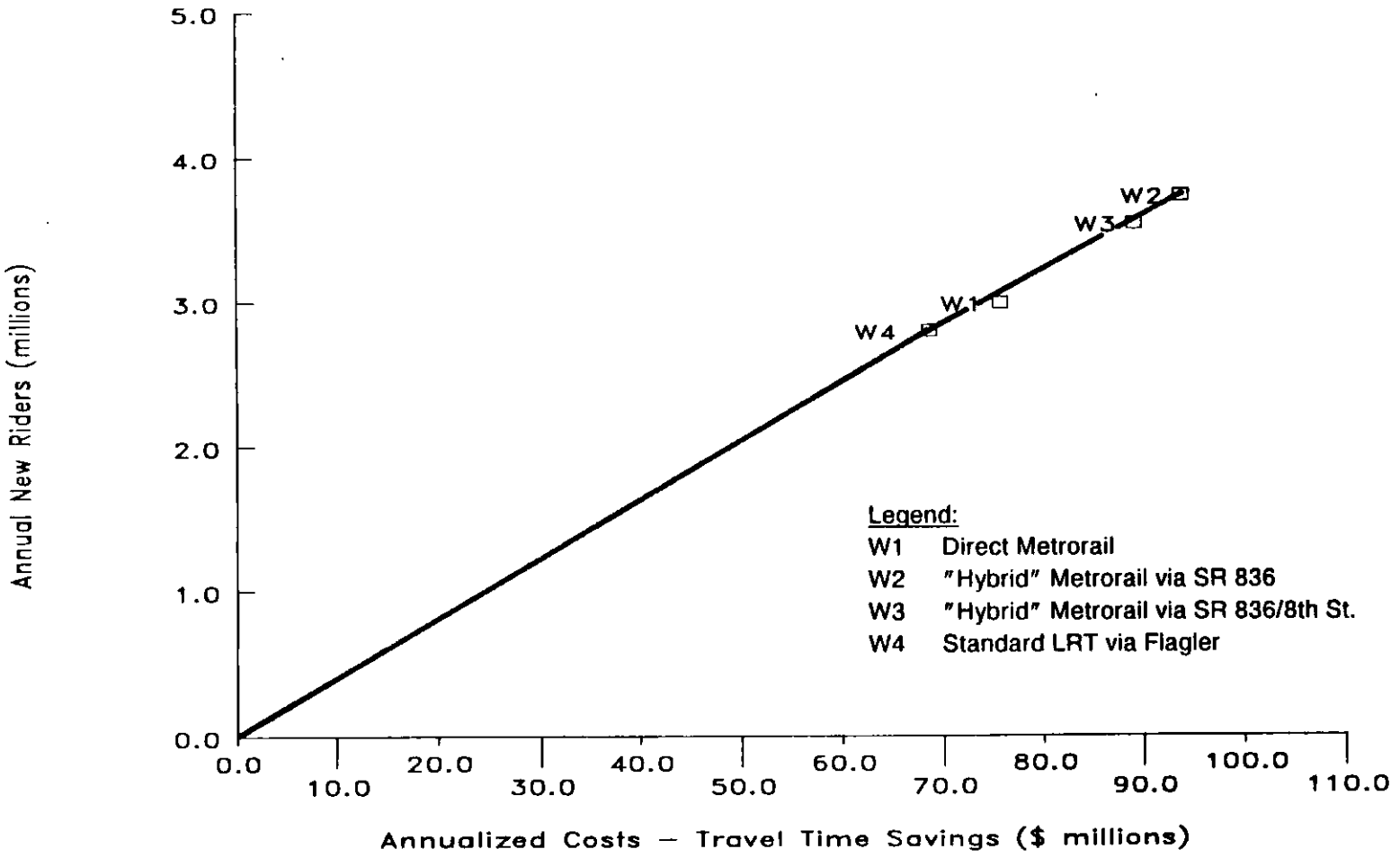
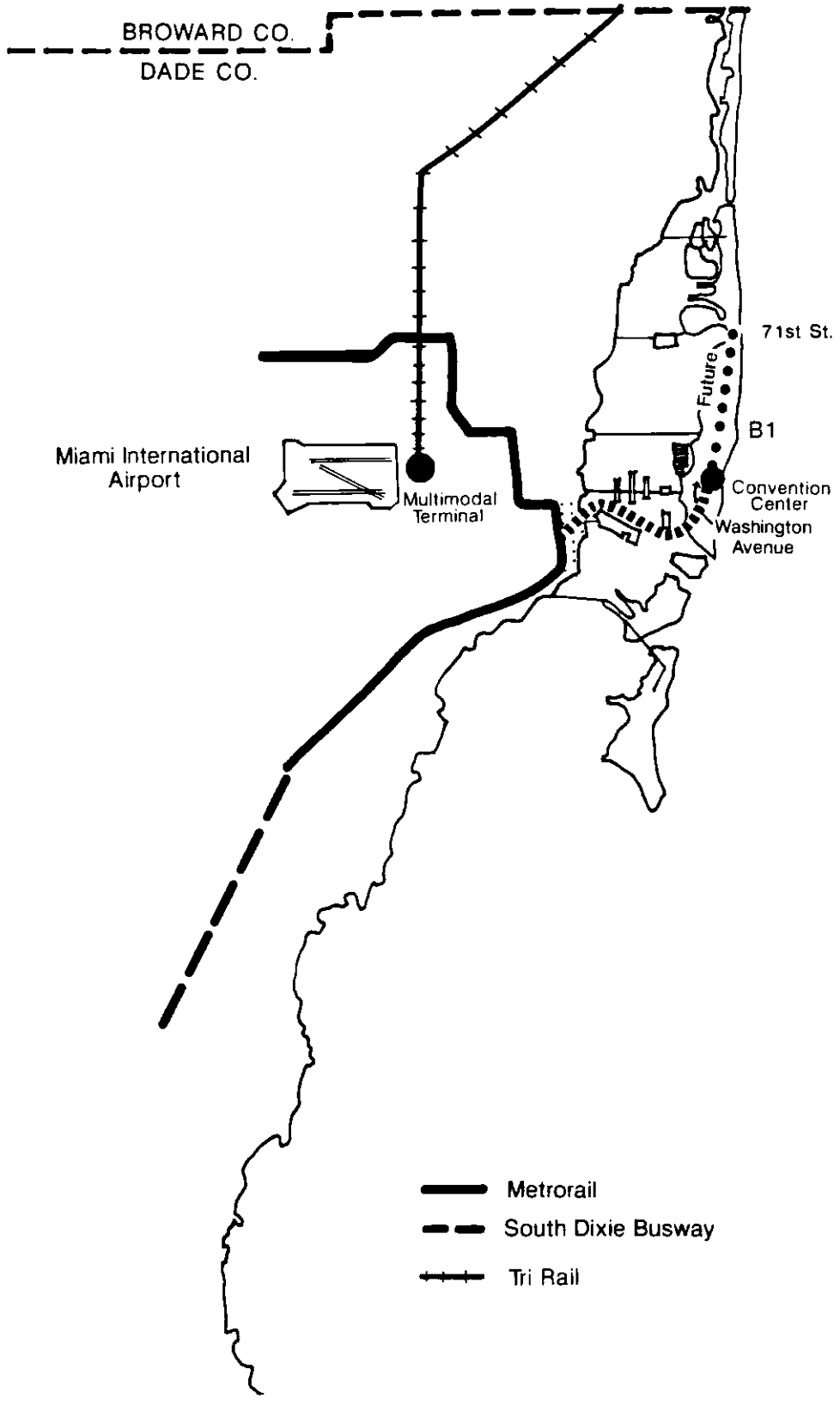


Figure W.3



METRO-DADE

Dade County
Metropolitan Planning
Organization

Dade County
Transit Corridors
Transitional Analysis

Beach Corridor

ALTERNATIVE:
B1 MacArthur
Causeway LRT

NOT TO SCALE

Figure B.1

BEACH CORRIDOR

Description of Corridor and Alternatives

The Beach Corridor extends from the CBD across Biscayne Bay to Miami Beach, then northward along Collins Avenue to the vicinity of 71st Street (Figure B.1). Only a single alternative, featuring light rail at-grade, was examined for this corridor, identified as "B1" in the summary materials which follow.

Standard LRT via MacArthur Causeway Alternative B1

This LRT alignment begins adjacent to Overtown station, follows the FEC railway right-of-way east, then turns north along Biscayne Boulevard to the MacArthur Causeway. After crossing Biscayne Bay on the Causeway, the alignment turns north on Washington Avenue in Miami Beach to the Miami Beach Convention Center then it follows Dade Boulevard, Indian Creek Drive, and Collins Avenue to 71st Street. It is important to note that while this study analyzes the LRT as far north as 71st Street as defined in the Dade County Long Range Plan, any extension north of the Convention Centers is considered a "future" project.

Descriptions of Services

A single operating rail line is assumed to run from the vicinity of 71st Street, through Miami Beach, across the MacArthur Causeway, and into downtown Miami. No direct connection is assumed with the existing Metrorail line, although convenient transfers to Metrorail and Metromover would be provided within the downtown area.

Bus service changes are made so as to eliminate most direct duplication of service. The Beach MAX was eliminated and the Beach end of the East/West MAX was terminated. No bus service is provided across the MacArthur Causeway, with routes terminating at the 71st Street station or the Miami Beach Convention Center (MBCC). The local Beach portions of some routes are consolidated into a circulator route with the trans-bay service eliminated.

Summary of Results

Table B.1 presents the results of the ridership and travel benefits, cost and other analyses of the singular alternative. Key findings are highlighted below.

Ridership

Ridership results are summarized in Table B.1. The information in the top section of the table shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked"

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS EVALUATION MATRIX
BEACH CORRIDOR

EVALUATION CRITERIA		B1 Standard LRT
RIDERSHIP		
Total Daily Regional Transit Trips (Linked)		338,300
New Daily MetroDade & Jitney Transit Trips (Linked)		6,140
New Daily MetroDade Transit Trips (Linked)		12,410
Daily Boarding on New Alignments		33,300
Reverse Commuter Trips (Percent)		27%
Fare Box Revenue (Annual)		$3,528,000
TIME SAVINGS		
Total Daily Time Savings		
Hours		300
Value		$153,000
Selected Travel Time (Min.)		
FROM	TO*	
Bal Harbour (46)	CBD A	57.8
Indian Beach (35)	CBD W	44.8
Lummus Beach (14)	CBD W	28.8
Brickell (719)	MBCC W	34.4
TRAFFIC OPERATIONS IMPACTS		
Diverted Auto Daily Vehicle Trips		5,582
Diverted Daily Vehicle Miles Travelled (VMT)		39,500
CAPITAL COST		$288,883,000
OPERATIONS AND MAINTENANCE COST		$10,085,000
COST EFFECTIVENESS INDEX		
MetroDade & Jitney		$20.60
MetroDade Only		$10.11

* A = Auto Access
W = Walk Access

Table B.1

passenger trips. For example, a commuter taking Metrobus from north beach to 71st Street station, transferring to Metrorail to downtown, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip.

The data in the third line of the upper part of the Table B.1 reflects boardings on the primary corridor services and at other key locations on the system. The boardings on the proposed alternatives include all stations along the Beach line.

The results show an increase in ridership attributed to the Beach service. Non-work ridership increases more than work ridership which might be expected given the close station spacing on most of the line and its attractiveness for shorter trips. Outbound ridership is quite high with the outbound peak load exceeding one-fourth of the inbound load.

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" alternative over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top part of Table B.1. The incremental ridership is shown both for total transit trips (including jitneys) and Metro Dade-only ridership (excluding jitneys). The incremental Metro Dade-only ridership is approximately double the incremental total ridership, reflecting the competitiveness of the light rail service with the extensive jitney service in this corridor.

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed for existing passengers (passengers projected for the TSM alternative) and thus reflect the benefits of an alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips. The savings is very modest for this alternative and reflects, in part, offsets from the reduction in local bus service.

Some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. The travel time savings are relatively similar for all markets and reflect largely the running time improvements for the trans-bay portion of the trip.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The VMT reduction is relatively large given the change in transit ridership because of the relatively long trans-bay trips that are diverted to transit.

Capital Costs

The LRT alternative, B1, is estimated to cost $288.9 million, or about $31.1 million per mile.

Operating and Maintenance Costs

The LRT alternative, B1, results in a substantial $8.3 million annual savings in bus O&M costs which when combined with incremental rail O&M costs, results in a net incremental annual O&M cost of $10.1 million.

Environmental Assessment

This alternative consists of an LRT alignment across the MacArthur Causeway to 71st Street in Miami Beach. At the present time, the Causeway is being widened to improve automobile capacity while simultaneously reserving a portion of the right-of-way for LRT. On the Beach, traffic and visual issues will have to be addressed. No environmental matters exist at this time which would not be able to be mitigated should this project be selected for further study.

FTA Cost Effectiveness Index

The FTA cost effectiveness index, described in detail at the beginning of the report, provides one means of combining the mobility benefits and costs into one measure. This measure is an annualized increment cost per new transit rider. The lower the cost per new rider, the more "cost effective" the alternative. While the FTA cost effectiveness index does not include every impact and benefit (environmental or community impacts, for instance), it does provide a means to compare alternatives with varying costs and levels of mobility benefits. The Beach Corridor light rail transit alternative, B1, has a relatively good C/E of $10.11.

Summary Evaluation

While the light rail alternative is the only "build" evaluated in this study, it attracts substantial new ridership and serves existing transit patrons at a relatively modest cost. While the alternative has no major community/environmental impacts, there are some concerns relating to traffic and visual impacts.

WEST-BEACH OPTIONS

Description of Corridor and Alternatives

The West-Beach options provide through service from the western campus of Florida International University (FIU) to the Miami Beach Convention Center (MBCC) area, with intermediate service to the Multimodal terminal near the Miami International Airport and downtown Miami (Figure WB.1 and WB.2. Three options were examined which varied in their access to Multimodal and in the way they crossed Biscayne Bay. These options are noted as "WB1", "WB2", and "WB3" in the summary materials which follow.

This proposal includes aspects of the West and Beach Corridors and includes a connection from Miami International Airport to the Port of Miami via downtown Miami. All alternatives include a loop connecting the airport terminal to the Airport Multimodal Access Facility and a loop serving the various passenger ship terminals.

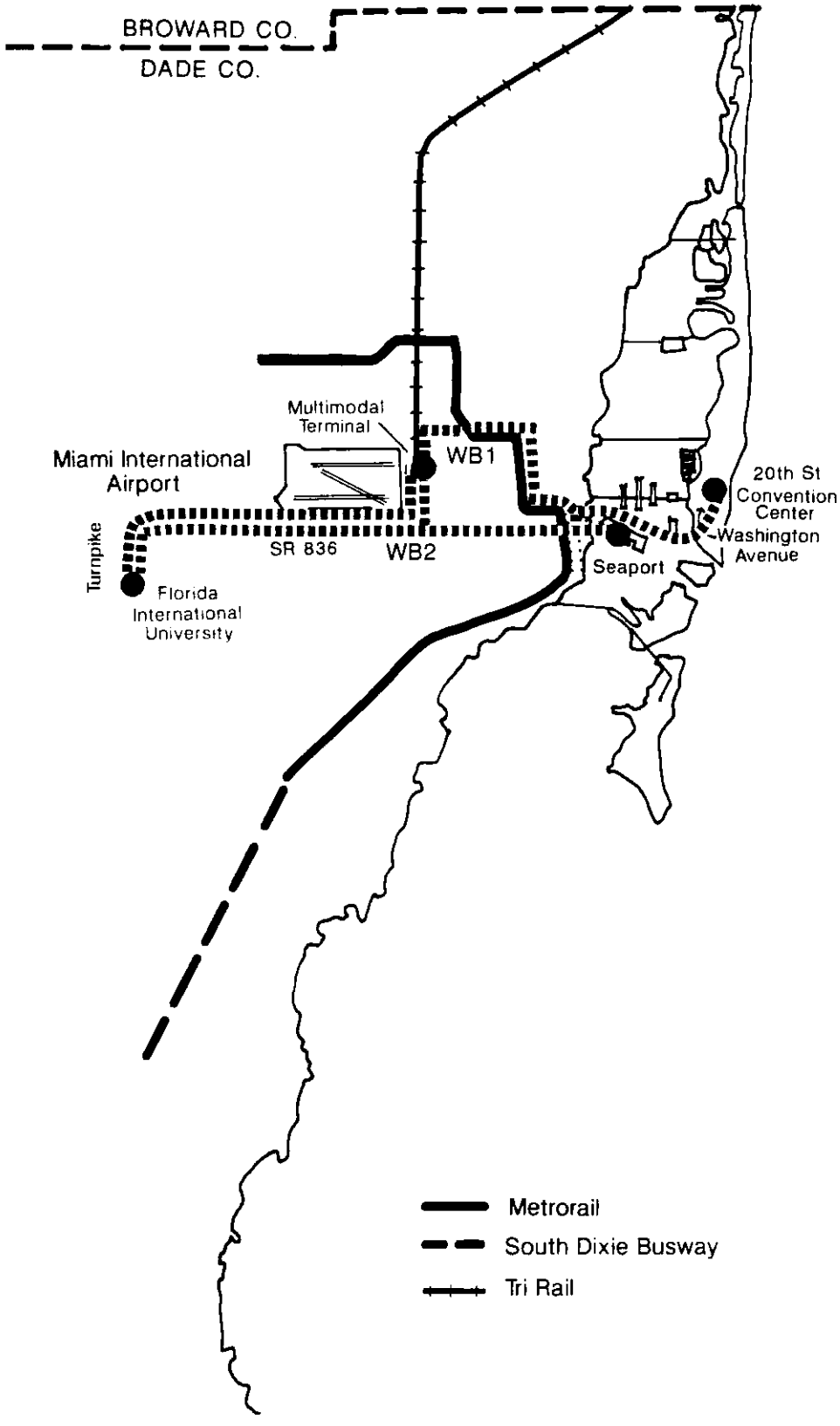
"Hybrid" LRT via Metrorail/MacArthur Causeway Alternative WB1 (Figure WB.1)

This "hybrid" LRT alternative consists of two lines added to the Stage I Metrorail line. The first line begins at FIU, follows the east side of the Turnpike Extension north to SR 836, then follows SR 836 east to NW 57th Avenue. East of NW 57th Avenue, the alignment passes under SR 836 then follows LeJeune Road north to the Airport Multimodal Access Facility to be located east of LeJeune Road. From the Multimodal Facility the line would continue north then turn east along the Airport Expressway (SR 112) to join the Stage I Metrorail line at NW 27th Avenue. This line would be grade-separated throughout.

The second line diverges from the Stage I Metrorail line at Overtown station, follows the FEC railway right-of-way east, then turns north along Biscayne Boulevard to the MacArthur Causeway. After crossing Biscayne Bay on the causeway the alignment turns north on Washington Avenue in Miami Beach to end at the Miami Beach Convention Center. This line would be elevated through downtown Miami and at-grade on the causeway and in Miami Beach. A branch extends from Biscayne Boulevard at the FEC right-of-way to the Seaport.

"Hybrid" LRT via SR 836/MacArthur Causeway Alternative WB2 (Figure WB.2)

This "hybrid" LRT alignment begins at FIU along the Turnpike Extension. From FIU the alignment follows the east side of the Turnpike Extension north to SR 836, then SR 836 east to the Miami River. After crossing the river the alignment would follow the north side of the river to 6th Street then turn east, passing over the Metrorail line just south of the Overtown station. From here the alignment follows the Florida East Coast Railway right-of-way to Biscayne Boulevard, follows Biscayne Boulevard to the MacArthur Causeway, then crosses Biscayne Bay on the causeway. In Miami Beach the alignment would turn north on Washington Avenue to end at the Miami Beach Convention Center. In a variation of this alignment, the line would run parallel to the Metrorail Stage I Line from Culmer station to Overtown Station instead of paralleling the river. This alignment would be grade separated west of the Miami River, elevated through downtown Miami, and at-grade on the causeway and in Miami Beach.



METRO-DADE

Dade County
Metropolitan Planning
Organization

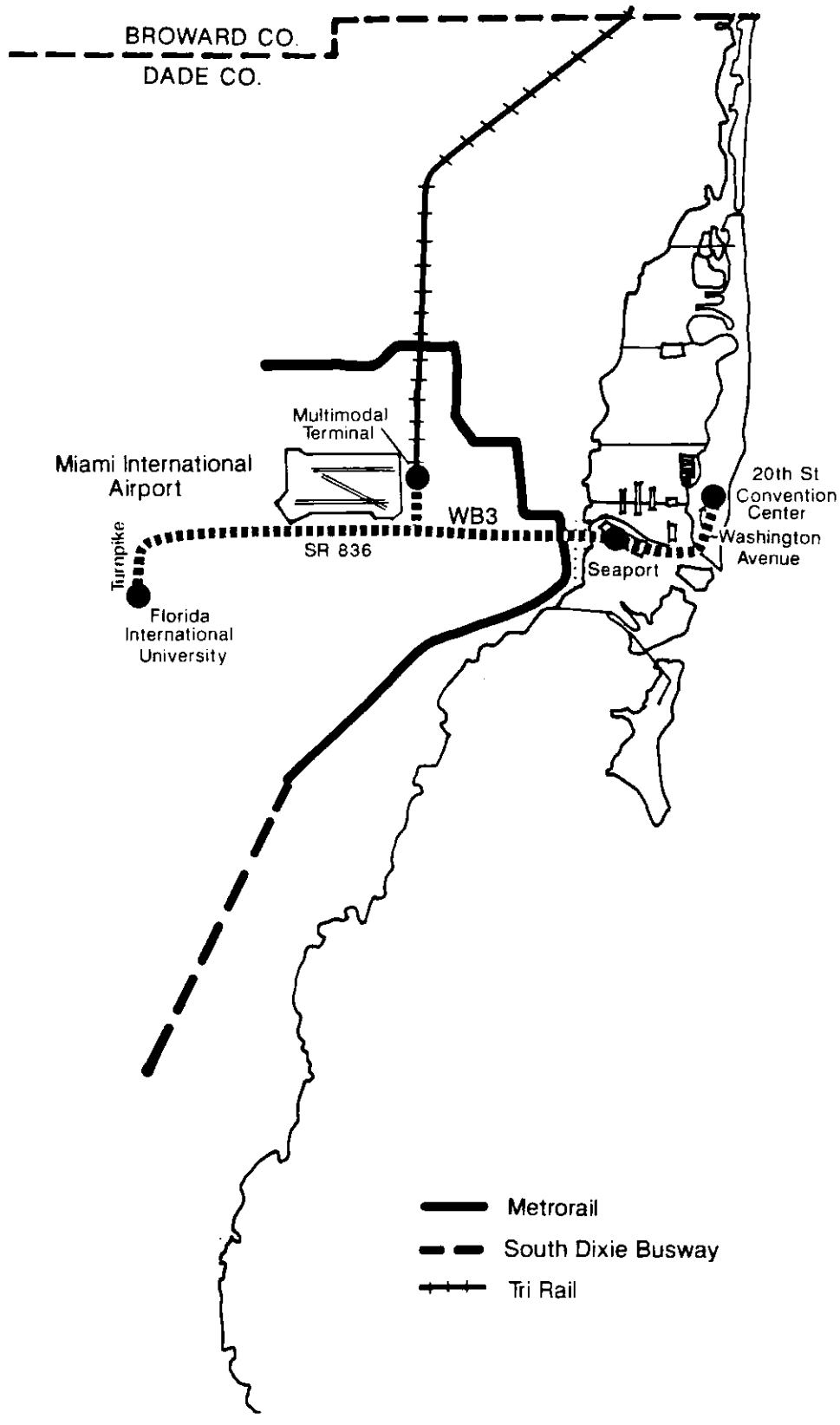
Dade County Transit Corridors Transitional Analysis

West-Beach Corridor

ALTERNATIVES:
WB1 "Hybrid" LRT via Metrorail MacArthur Causeway
WB2 "Hybrid" LRT- SR836- MacArthur Causeway
See Figure WB.2 for Alt. WB3

NOT TO SCALE

Figure WB.1



METRO-DADE

Dade County
Metropolitan Planning
Organization

Dade County
Transit Corridors
Transitional Analysis

West-Beach
Corridor

ALTERNATIVES

WB3 "Hybrid" LRT SR836-Government Cut

See Figure WB.1 for Alts. WB2 and WB3

NOT TO SCALE

Figure WB.2

One branch begins at the Airport Multimodal Access Facility then follows LeJeune Road to join the line from FIU at SR 836. A second branch extends from Biscayne Boulevard at the FEC right-of-way to the Seaport.

"Hybrid" LRT via SR 836/Government Cut Alternative WB3 (Figure WB.2)

This alignment is similar to Alternative WB2 except that instead of crossing the MacArthur Causeway, it reaches Miami Beach via the Port of Miami and a tunnel under Government Cut.

Description of Services

In the first option (WB1), the short-turn Metrorail line from Dadeland South is diverted from the Stage 1 line west of the Culmer station, proceeds on a separate alignment to the Multimodal terminal, then continues west along SR 836 and south along the HEFT to FIU. A third operating line runs from FIU through Multimodal and downtown Miami to MBCC. A fourth line provides additional service between downtown Miami and MBCC. Both of the last two lines run on an alignment across the MacArthur Causeway from downtown to Miami Beach.

The second and third alternatives (WB2 and WB3) are identical except for access to Miami Beach. In these options, the short-turn Stage 1 line remains as in the TSM alternative, running from Dadeland South to Earlington Heights. A third line runs from FIU along the HEFT and SR 836 to the Miami River, then on a new alignment through downtown and across the MacArthur Causeway to Miami Beach. A fourth line runs from FIU to Multimodal via a branch near LeJeune Road and a fifth line runs from Multimodal south to SR 836 and then through the CBD to MBCC as line 3. The only difference between the second and third alternatives is that the latter (WB3) runs directly from downtown to the Seaport, then through a tunnel under Government Cut to Miami Beach.

All three options also provide for special Airport-Seaport service which is not available to the general public and is thus addressed separately in the travel demand modeling process. In the first and second alternatives, this service is provided by a branch from the downtown line near Biscayne Boulevard out to the Seaport. In the third option, service is provided directly over the main alignment, similar to line 5 but without intermediate local stops.

Bus service changes are virtually identical for all alternatives. The express buses from western Dade County in the TSM alternative are terminated at outer rail stations or eliminated. The Flagler MAX is retained but both the East/West MAX and the Beach MAX are deleted. Parallel bus service on NW 7th Street and Flagler is re-oriented to serve the Multimodal terminal and broken at that point to minimize duplicative service and allow for better balancing of transit supply and demand. All local bus service across the MacArthur Causeway from the Beach is eliminated, with most routes cutback at MBCC or converted to local area circulation. A few other minor changes are made to other local and crosstown routes, primarily to serve the FIU terminal station at the west end and to improve circulation from stations along SR 836 to employment areas west of the airport.

Summary of Results

Table WB.1 presents the results of the ridership and travel benefits, cost and other analyses of the alternatives. Key findings are highlighted below.

Ridership

Ridership results are summarized in top part of Table WB.1. The information in the top section of the table shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking a Metrobus from north beach area to MBCC, transferring to rail to the NW 87th Avenue station at SR 836, and then transferring to a distributor bus to a final destination behind the airport is counted as only a single "linked" trip.

The data in the third line of the upper part of the table reflects boardings on the primary corridor services and at other key locations on the system. The boardings on new alignment include all new stations along the West-Beach alignments including Multimodal. Boardings at stations on the existing Stage 1 line between downtown and Earlington Heights in option WB1 are not included in the totals.

Ridership results are quite similar for all alternatives, with option WB2 carrying slightly more passengers. The service patterns to other parts of the region are very different, particularly to south county, as reflected in the much lower transfer values for option WB1. Option WB2 carries slightly more riders than option WB3 even though the latter is faster through the tunnel than the former along the Causeway, because WB2 provides additional distribution directly to the northern part of downtown while a transfer to Metromover is required in WB3. Outbound ridership is significant on both branches, being over 40 percent of the inbound values on the west leg and over 25 percent on the Beach leg.

Airport-Seaport Activity

One of the principal benefits of combining the West and Beach corridors is the ability to provide a direct transit service connecting the Miami International Airport and the Seaport. The seaport attracts 33,000 to 34,000 cruise line passengers a week; most of whom arrive in Miami through the airport. Today, the connection is made by charter buses operating over the local highway network. The passenger activity between the airport and seaport is concentrated on four days during the week -- Friday, Saturday, Sunday, and Monday. As activity increases, this could increase to five or more days

During the four day period, the estimated 33,000 to 34,000 patrons using the cruise line generate 66,000 to 68,000 trips to and from the seaport. Assuming 80 percent of the trips use the airport (20 percent are local or use non-airline means to arrive in the Miami area) and 80 percent of the airport-seaport patrons use transit (the others would take a taxi or limo or not make the trip directly), then an estimated 64 percent of the seaport cruise line patrons would use a direct transit link between the airport and the seaport. This assumes that the bus service connection would not operate.

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS EVALUATION MATRIX
WEST-BEACH OPTIONS

EVALUATION CRITERIA		WB1 "Hybrid" LRT via Metrorail/ Causeway	WB2 "Hybrid" LRT via SR 836/ Causeway	WB3 "Hybrid" LRT via SR 836/ Government Cut
RIDERSHIP				
Total Daily Regional Transit Trips (Linked)		348,900	350,200	348,800
New Daily MetroDade & Jitney Transit Trips (Linked)		16,830	18,120	16,710
New Daily MetroDade Transit Trips (Linked)		22,450	24,820	22,870
Daily Boarding on New Alignments		58,200	63,700	58,100
Reverse Commuter Trips (Percent)				
West Corridor		39%	41%	42%
Beach Corridor		25%	26%	28%
Fare Box Revenue (Annual)		$6,380,000	$7,005,000	$6,493,000
TIME SAVINGS				
Total Daily Time Savings				
Hours		2,900	4,000	4,700
Value		$3,346,000	$4,655,000	$5,499,000
Selected Travel Time (Min.)				
FROM	TO*			
Tamiami Plaza (617)	CBD A	50.1	45.0	45.0
Blue Lagoon (577)	CBD W	46.5	42.4	42.4
Indian Beach (35)	CBD W	45.1	44.2	38.2
Tamiami Plaza (617)	MBCC A	64.2	56.8	52.7
Blue Lagoon (577)	MBCC W	63.5	56.5	50.5
Indian Beach (35)	MIA W	69.1	62.1	56.1
TRAFFIC OPERATIONS IMPACTS				
Diverted Auto Daily Vehicle Trips		15,300	16,473	15,191
Diverted Daily Vehicle Miles Travelled (VMT)		83,900	89,100	86,600
CAPITAL COST**		$915,963,000	$1,056,002,000	$1,208,179,000
OPERATIONS AND MAINTENANCE COST		$33,287,000	$24,545,000	$21,664,000
COST EFFECTIVENESS INDEX				
MetroDade & Jitney		$23.84	$22.96	$27.20
MetroDade Only		$17.76	$16.74	$19.84

With Airport and Seaport Service

Additional Total Annual Airport-Seaport Trips	2,800,000	2,800,000	2,800,000
Total Fare Box Revenue (Annual)	$27,380,000	$28,005,000	$27,493,000
CAPITAL COST	$1,007,013,000	$1,139,052,000	$1,228,179,000
OPERATIONS AND MAINTENANCE COST	$39,949,000	$29,594,000	$26,731,000
COST EFFECTIVENESS INDEX			
MetroDade & Jitney	$17.49	$16.91	$18.51
MetroDade Only	$14.31	$13.55	$14.92

* A = Auto Access
W = Walk Access

** Cost of Multimodal Terminal ($130 million) included as part of TSM
(Does not include cost of rail link to airport terminal)

Table WB.1

Cruise line activity in the year 2010 is difficult to forecast but a 25 percent growth is relatively conservative. Therefore, in the year 2010, an airport-seaport transit link is expected to carry upwards of 43,000 trips per week, or 2.8 million trips annually. All three West-Beach Corridor alternatives provide direct airport-seaport service.

The fare for the Airport-Seaport bus connection is $15 for the round trip, which is included in the cruise ship fare. For the purposes of this study, a $7.50 per trip fare was used which generates $21,000,000 in annual fare box revenues.

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top part of Table WB.1. The incremental ridership is shown both for total transit trips (including jitneys) and Metro Dade-only ridership (excluding jitneys). The results show the significant combined impact of jitney diversion from the Beach and Flagler corridors.

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed for existing passengers (passengers projected for the TSM alternative) and thus reflect the benefits of an alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips. The travel time savings are the greatest for the WB3 option with trans-bay travelers benefiting from higher operating speeds. The travel times in option WB1 are also offset by the longer travel times from the West Corridor via Multimodal and the Stage 1 Metrorail alignment. New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The VMT savings are slightly higher for the WB2 option than for the other two.

Finally, some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. The travel time savings are fairly substantial from most locations, showing the benefits of rail over bus operations in mixed traffic. The travel time savings are very dramatic for trips to the airport, where direct service (in most cases) replaces inconvenient local bus access, generally requiring one or more transfers.

Capital Costs

All these alternatives are rail options involving relatively long alignments (20.0 to 21.8 miles) and costly crossings of the Miami River and several other obstacles. The costs run from $915 million for WB1, to $1,056 million for WB2, to $1,208 million for WB3.

If the Airport-Seaport service and connection is included, the extra vehicles and guideways increase the cost to $1,007 million for WB1, $1,139 million for WB2, and $1,228 million for WB3. These estimates do not include the cost of the Airport Multimodal Terminal and the associated airport people mover system.

Operating and Maintenance Costs

While all three rail alternatives decrease annual bus O&M costs by $9.9 to $10.0 million, the net cost increases because of the rail services to $33.3 million for WB1, $24.5 million for WB2, and $21.7 million for WB3.

If the Airport-Seaport service is included, the annual O&M cost increase is $39.9 million for WB1, $29.6 million for WB2, and $26.7 million for WB3.

Environmental Assessment

This corridor is a combination of the West Corridor and the Beach Corridor.

The western portion of the three alternatives requires a medium to high degree of right-of-way associated with SR 836. It is not known at this time whether or not the existing right-of-way would be sufficient for the actual transit line section. It will be necessary, however, to acquire property for stations and parking. Because of the density of this corridor, displacement and land acquisition as well as community disruption will have to be carefully addressed in subsequent environmental assessments. The three alignments which use a portion of SR 836 should not encounter historic properties or 4(f) properties.

Two of the alternatives, WB1 and WB2, use the MacArthur Causeway to cross Biscayne Bay to reach 20th Street in Miami Beach. At the present time, the Causeway is being widened to improve automobile capacity while simultaneously reserving a portion of the right-of-way for LRT. No environmental matters exist at this time which would not be mitigated should this project be selected for further study. On the Beach, traffic and visual issues will have to be addressed. Alternative WB3 calls for a tunnel section from the eastern portion of the Port of Miami to South Miami Beach. Environmental approval and permitting for this alternative would need to deal with natural features such as disruption to the bottom of Biscayne Bay. This process could be extremely complex and will need intensive attention if further analysis is prescribed for this alternative.

FTA Cost Effectiveness Index

The FTA cost effectiveness index, described in detail at the beginning of the report, provides one means of combining the mobility benefits and costs into one measure. This measure is an annualized increment cost per new transit rider. The lower the cost per new rider, the more "cost effective" the alternative. While the FTA cost effectiveness index does not include every impact and benefit (environmental or community impacts, for instance), it does provide a means to compare alternatives with varying costs and levels of mobility benefits. Also as discusses in the Overview section at the

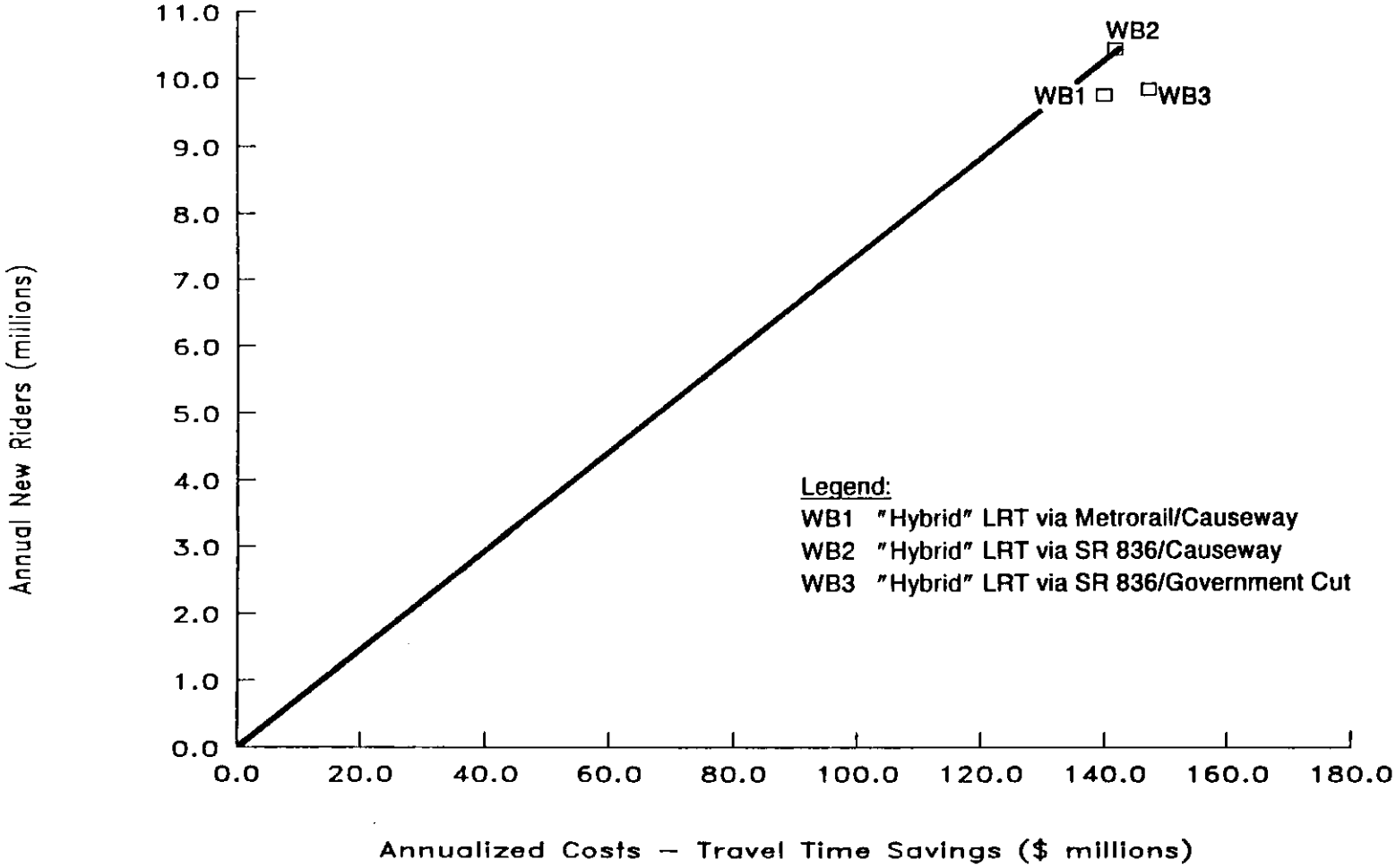
beginning of the report, the cost component of the index can be graphically plotted against the ridership component to see the degree to which increased levels of investment in terms of capital and O&M costs generate ridership benefits. (See Figure WB.3). The alternatives that lie highest and furthest to the left on the graph are connected. The resulting boundary, or "frontier," indicates the best that can be done with increasing levels of investment in the corridor; those alternatives that are lower and to the right indicate less cost-effective investment opportunities.

The C/E indices for the West-Beach Options were computed two ways: one without the ridership and cost associated with the Airport-Seaport service, where they range from $16.74 to $1'9.84; and one with these cost and riders, where the C/E goes down to a range of $13.55 to $14.92. The latter values are plotted in Figure WB.3. The relative ranking of the alternatives among one another does not change. C/E goes down $3.19 to $4.92. However, in either case, the combination of the West and Beach corridors alternatives, results in a relatively well performing set of alternatives. These small differences among the three options are not really distinguishably different in the cost effective measures given the system analysis level of detail.

Summary Evaluation

All three alternatives, especially WB2, attract substantial new ridership, have very high boardings on the services (60,000±,) and provide direct service between the airport and the seaport. All three alternatives are expensive, however, because of the length, number of stations, and the crossings of the Miami River and Biscayne Bay. Alternative WB1 is the least costly to build because it utilizes the existing Stage I Metrorail for a portion of its alignment, but is the most expensive to operate because of the many services involved. WB3 is the most costly option because of the tunnel construction to cross under Government Cut between the Seaport and the Beach, but it is also the least expensive to operate. The community/environmental impacts of the alternatives are similar, except that WB3 has issues associated with the construction of the tunnel under Government Cut, while WB1 and WB2 have lesser expected impacts going across the MacArthur Causeway. Given their high level of performance, however, all three alternatives should be considered in any further, more detailed analysis of alternatives for this corridor.

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
WEST-BEACH OPTIONS COST EFFECTIVENESS INDEX



*Includes Airport-Seaport Ridership and Costs

Figure WB.3

SUMMARY OF CORRIDORS

Ridership and Travel Benefits

The number of daily new riders attracted to the Metro Dade transit system and the daily boardings on the new alignment for the alternatives in all the corridors are listed in Table SUM.1 and displayed on Figures SUM.1 and SUM.2. Also listed on Table SUM.1 are the daily travel time savings for each alternative.

The West-Beach Options, by far, generate the most riders and travel benefits of all the corridors. This is the case, even if the 2.8 million airport-seaport annual riders are excluded. As separate corridors, the West Corridor and Beach Corridor rank next highest in terms of new transit riders and line passanger boardings, followed closely by the Northeast Corridor. The South Corridor has a fairly high number of boarding passengers but most are existing riders diverted from existing transit services. Both the Kendall and North corridors have modest ridership volumes, although the North Corridor rail options attract a much higher number of new transit riders.

Capital Costs

The capital cost estimates for the alternatives considered in all the corridors are summarized in Table SUM.2 along with the capital cost per mile. Figure SUM.3 graphically portrays the relative capital costs.

As a group, the West-Beach Options are the most costly because they are relatively long (with the exception of the South Corridor) and involve several expensive crossings of rivers and other obstacles. The South Corridor, being the longest, is the next most costly group, followed by the West Corridor. The North and Kendall Corridors are lower in cost than the above corridors because of their shorter length. The Beach Corridor is the least costly as a corridor by virtue of the relatively inexpensive at-grade light rail transit mode considered.

The busway alternatives -- S1, K1, N1 (bus lane) and NE1 -- are the least costly modal option. The at-grade light rail transit and "hybrid" rail transit are less costly on a per mile basis than the Metrorail options because they can have at-grade crossing of roadways and relatively simpler stations. The fully exclusive guideway and stations required under the Metrorail alternatives, make them the most expensive group of options.

Operating and Maintenance Costs

The incremental annual operating and maintenance costs for the alternatives considered in all the corridors are summarized in Table SUM.3 and displayed in Figure SUM.4. In general, the longer the corridor, the higher the O&M cost. The West-Beach Options as a group are the most costly to operate because they involve the longest route lengths and represent, for the most part, a separate line from the existing Metrorail system. For similar reasons, the West Corridor alternatives are the second costliest group. The rail alternatives for the South, North, Northeast, Beach, and Kendall Corridors have a similar

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
DAILY RIDERSHIP AND TRAVEL TIME SAVINGS

Alternatives		New Daily MetroDade Transit Trips (Linked)	Daily Boarding on New Alignment	Travel Time Savings (Hours)
S1	Busway Extension to Florida City	1,000	28,400	700
S2	"Hybrid" Metrorail	4,400	30,900	800
S3	Metrorail	4,900	31,400	1,600
K1	Busway	110	2,800	100
K2	"Hybrid" Metrorail	3,300	19,100	800
K3	Metrorail	3,160	19,800	1,200
N1	Reversible Bus Lane	1,940	7,100	400
N2	Direct Metrorail	6,290	17,700	1,200
N3	Metrorail via Golden Glades	5,420	18,700	1,000
NE1	Busway	10,410	26,100	2,200
NE2	Standard LRT	8,710	28,000	2,400
NE3	"Hybrid" Metrorail	8,810	33,900	2,600
NE4	Metrorail	8,720	34,200	3,000
W1	Direct Metrorail	9,810	28,000	1,900
W2	"Hybrid" Metrorail via SR 836	12,290	38,700	3,000
W3	"Hybrid" Metrorail via SR 836/8th St.	11,670	37,900	2,700
W4	Standard LRT via Flagler	9,140	30,600	800
B1	Standard LRT	12,410	33,300	300
WB1	"Hybrid" LRT via Metrorail/Causeway	22,450	58,200	2,900
WB2	"Hybrid" LRT via SR 836/Causeway	24,820	63,700	4,000
WB3	"Hybrid" LRT via SR 836/Government Cut	22,870	58,100	4,700

Table SUM.1

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
NEW DAILY METRODADE TRANSIT TRIPS (LINKED)

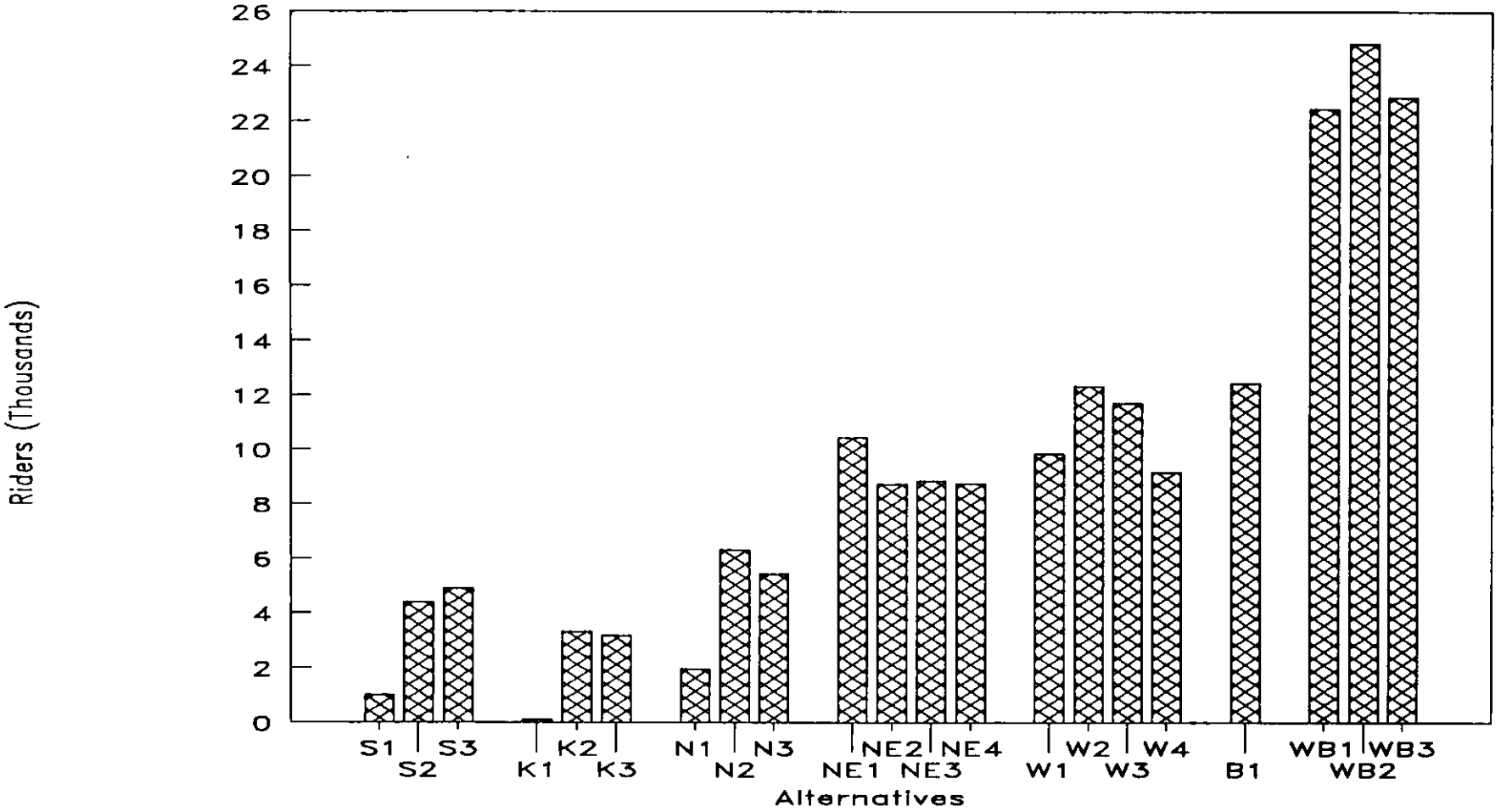


Figure SUM.1

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
DAILY BOARDING ON NEW ALIGNMENTS

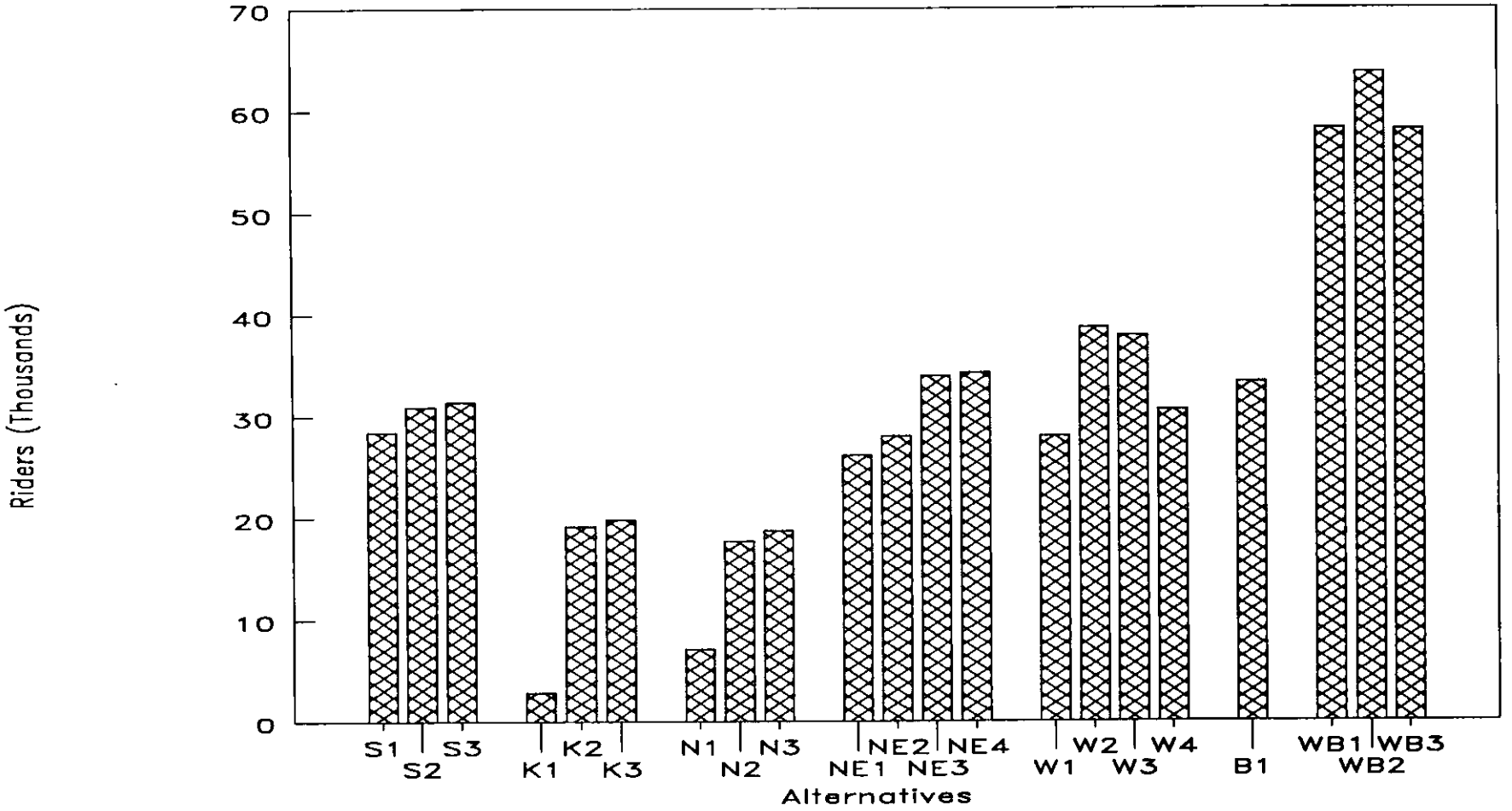


Figure SUM.2

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
INCREMENTAL CAPITAL COST ESTIMATE

Alternatives		Total Capital Cost	Cost/Mile
TSM/Base		N/A	N/A
S1	Busway Extension to Florida City	$30,752,000	$1,816,000
S2	"Hybrid" Metrorail	$508,013,000	$25,891,000
S3	Metrorail	$831,736,000	$42,390,000
K1	Busway	$22,003,000	$2,993,000
K2	"Hybrid" Metrorail	$348,373,000	$48,791,000
K3	Metrorail	$474,586,000	$60,732,000
N1	Reversible Bus Lane	$30,571,000	$3,930,000
N2	Direct Metrorail	$495,478,000	$52,349,000
N3	Metrorail via Golden Glades	$529,974,000	$45,836,000
NE1	Busway	$87,379,000	$6,807,000
NE2	Standard LRT	$395,716,000	$31,220,000
NE3	"Hybrid" Metrorail	$439,409,000	$33,382,000
NE4	Metrorail	$653,053,000	$51,216,000
W1	Direct Metrorail	$604,309,000	$48,938,000
W2	"Hybrid" Metrorail via SR 836	$760,753,000	$54,134,000
W3	"Hybrid" Metrorail via SR 836/8th St.	$712,982,000	$48,450,000
W4	Standard LRT via Flagler	$513,614,000	$37,302,000
B1	Standard LRT	$288,883,000	$31,063,000
WB1	"Hybrid" LRT via Metrorail/Causeway	$915,963,000	$45,842,000
WB2	"Hybrid" LRT via SR 836/Causeway	$1,056,002,000	$48,569,000
WB3	"Hybrid" LRT via SR 836/Government Cut	$1,208,179,000	$58,417,000
WB1	"Hybrid" LRT via Metrorail/Causeway*	$1,007,013,000	$50,398,000
WB2	"Hybrid" LRT via SR 836/Causeway*	$1,139,052,000	$52,389,000
WB3	"Hybrid" LRT via SR 836/Government Cut*	$1,228,179,000	$59,384,000

* Includes Airport and Seaport service vehicles

Table SUM.2

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
INCREMENTAL ANNUAL CAPITAL COST

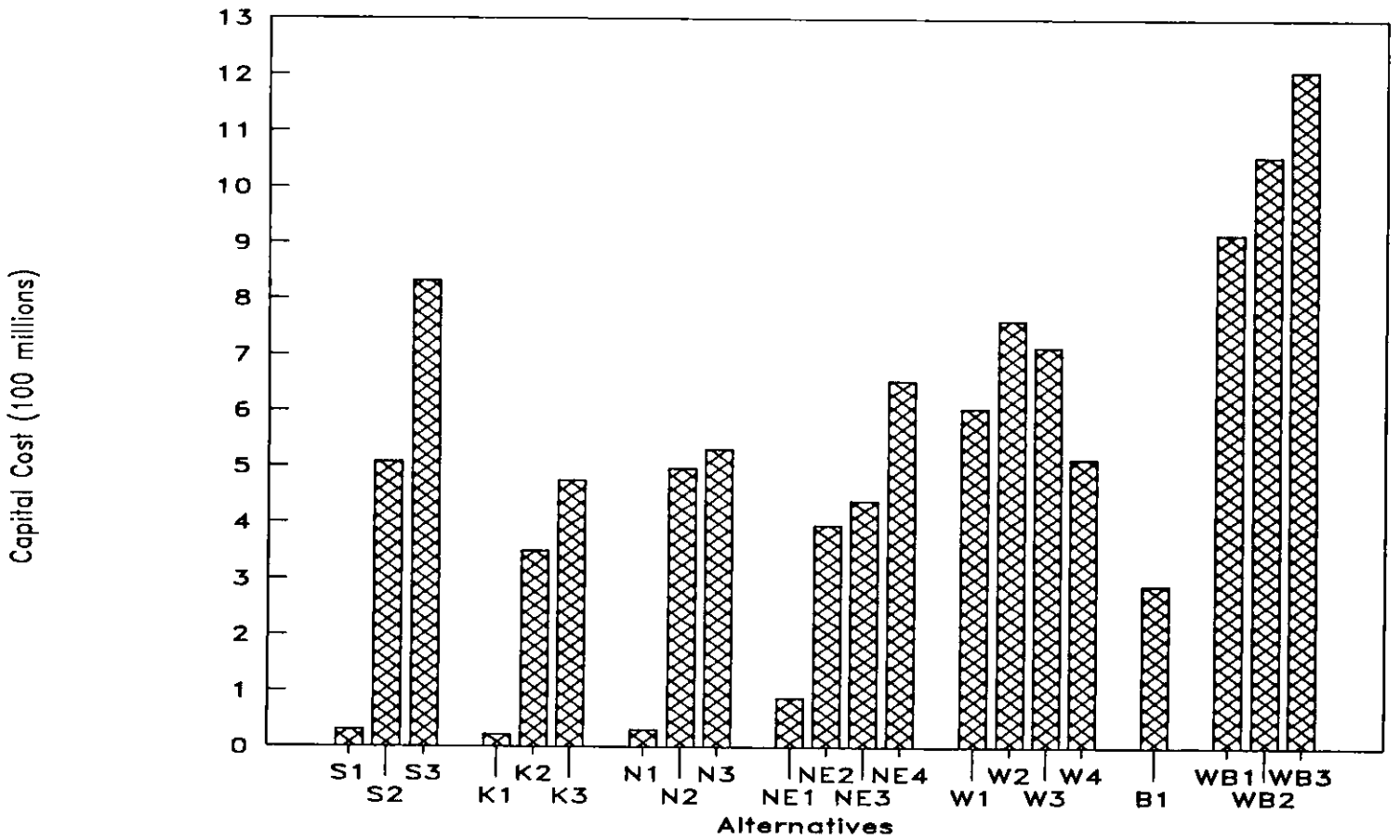


Figure SUM.3

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
ANNUAL OPERATING AND MAINTENANCE COSTS
NET CHANGE RELATIVE TO TSM*

Alternatives		Bus Component	Light Rail Transit Component	Metrorail Component	Costs Associated with Passenger Activities	Total
TSM/Base		N/A		N/A	N/A	N/A
S1	Busway Extension to Florida City	1,465,000		0	28,000	1,493,000
S2	"Hybrid" Metrorail	-3,777,000		16,890,000	129,000	13,242,000
S3	Metrorail	-3,777,000		15,226,000	143,000	11,592,000
K1	Busway	83,000		0	2,000	85,000
K2	"Hybrid" Metrorail	-463,000		11,986,000	107,000	11,630,000
K3	Metrorail	-445,000		8,986,000	97,000	8,638,000
N1	Reversible Bus Lane	2,361,000		0	94,000	2,455,000
N2	Direct Metrorail	-597,000		8,289,000	256,000	7,948,000
N3	Metrorail via Golden Glades	-1,562,000		9,486,000	230,000	8,154,000
NE1	Busway	3,088,000		0	320,000	3,408,000
NE2	Standard LRT	-4,701,000	8,800,000	0	246,000	4,345,000
NE3	"Hybrid" Metrorail	-4,701,000		14,177,000	242,000	9,718,000
NE4	Metrorail	-6,204,000		12,992,000	237,000	7,025,000
W1	Direct Metrorail	-2,284,000		17,986,000	299,000	16,001,000
W2	"Hybrid" Metrorail via SR 836	-2,218,000		20,971,000	372,000	19,125,000
W3	"Hybrid" Metrorail via SR 836/8th St.	-3,553,000		22,394,000	353,000	19,194,000
W4	Standard LRT via Flagler	-4,434,000	21,046,000	0	279,000	16,891,000
B1	Standard LRT	-8,316,000	18,011,000	0	390,000	10,085,000
WB1	"Hybrid" LRT via Metrorail/Causeway	-10,038,000		42,629,000	696,000	33,287,000
WB2	"Hybrid" LRT via Metrorail/Causeway	-9,972,000		33,753,000	764,000	24,545,000
WB3	"Hybrid" LRT via SR 836/Government Cut	-9,940,000		30,900,000	704,000	21,664,000
WB1	"Hybrid" LRT via Metrorail/Causeway**	-10,038,000		49,012,000	975,000	39,949,000
WB2	"Hybrid" LRT via Metrorail/Causeway**	-10,000,000		38,551,000	1,043,000	29,594,000
WB3	"Hybrid" LRT via SR 836/Government Cut**	-9,900,000		35,647,000	984,000	26,731,000

*In 1992 $

**Includes Airport and Seaport service

Table SUM.3

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
INCREMENTAL ANNUAL O&M COST

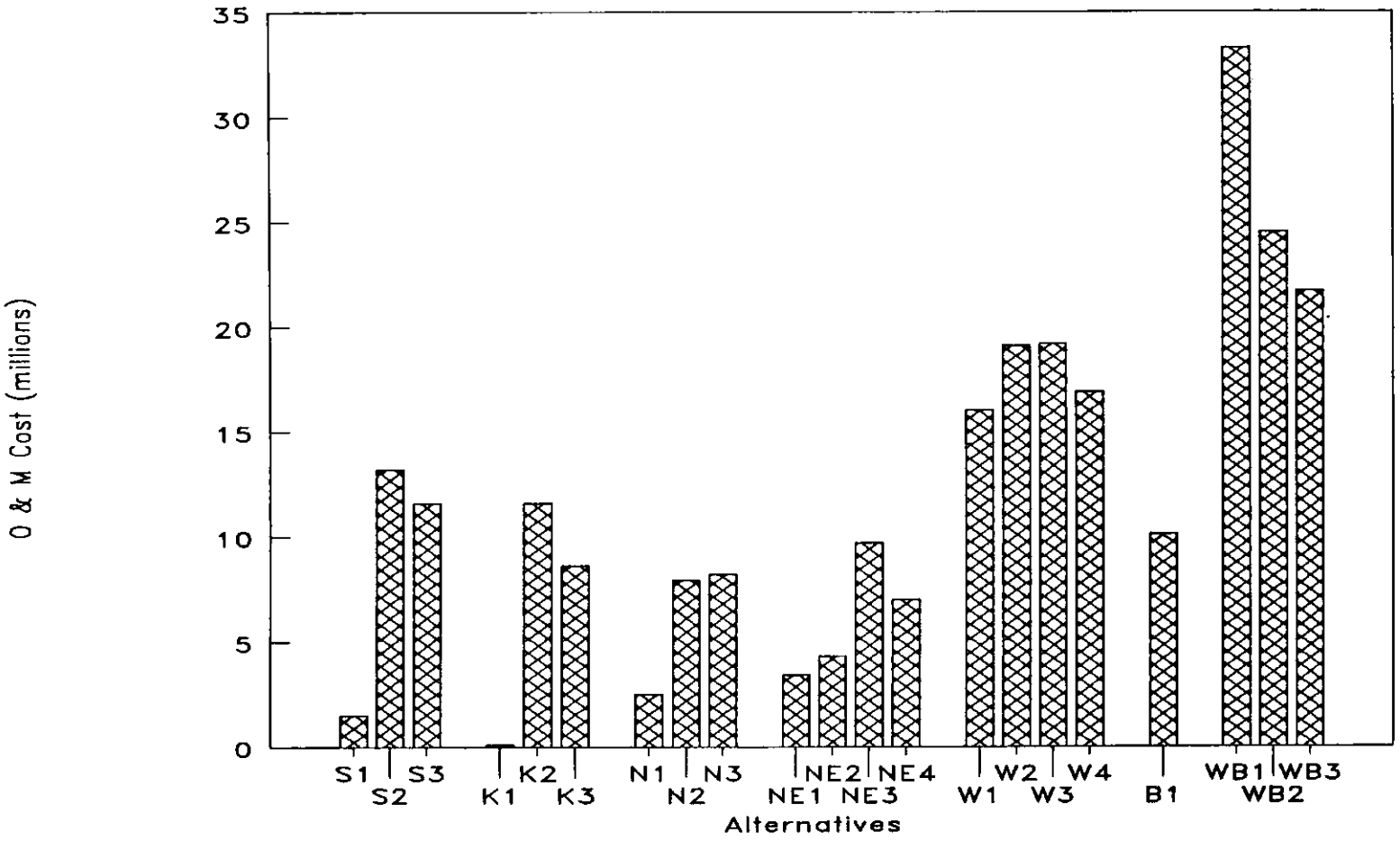


Figure SUM.4

order of magnitude costs. The busway options have small cost increases given that they represent TSM bus service plans operating over new guideways.

Many of the alternatives, particularly the rail options, free up bus vehicles which can be used for service in other areas of Dade County.

Environmental Assessment

The alternatives considered in this study were developed to avoid or minimize impacts to existing communities and the man-made and natural environments. Alignments or transit modes that would have major community/environmental impacts were screened out from consideration early in the study process. The alternatives considered in this study do have some impacts; however, most can be mitigated. Nevertheless, there are some impacts associated with the construction and/or the operation of an alternative which vary among the different alternatives and particularly among the different corridors.

Community disruption, loss of parking, property takings and related land use impacts are the major effects of many of the alternatives. This is particularly the case for the Kendall Corridor, the North Corridor bus lane (Alternative N1,) and along Flagler Street under Alternative W4, Standard LRT. These issues are probably the most serious environmental/community impacts associated with any of the alternatives or corridors and may well affect the viability or desirability of these possible improvements. Even those corridors and alternatives that use existing transportation alignments, such as the FEC right of way under the South Corridor and Northeast Corridor, and SR 836 under the West Corridor, additional require additional land for parking and access facilities at the stations. Land development issues are also a major concern along the North Corridor, especially around the northern segment near Joe Robbie Stadium.

Traffic concerns can readily be addressed around most station areas. The street grade crossings close to US 1 of the busway and at-grade rail options under the Northeast and South corridors, will require special design and coordination attention.

The two most critical natural environmental issues affecting the corridors are the presence of an endangered species, Deltoid Spurge (a plant,) along the South Corridor's FEC right of way, and water ecology issues associated with the construction of the tunnel under Government Cut in Alternative WB3.

Many issues such as noise and vibration are generally mitigatible and the cost estimates include allowances for these types of mitigation measures. A formal environmental impact statement (EIS) would be prepared on any project selected for implementation.

Air quality is an important environmental concern, particularly given the requirements of the federal Clean Air Act of 1990. Transit improvements are generally regarded as having a beneficial effect on air quality and part of an overall regional air quality improvement program. Key indicators of the degree to which the various alternatives improve air quality are the number of auto trips diverted to transit and the diverted number of auto vehicle miles travelled (VMT), as these are measures of the reduction in auto emissions. Diverted auto trips and VMT are presented in the evaluation matrix for each corridor.

Generally those alternatives that attract the most new riders, such as the West Beach options, have the greatest reductions in auto trips and VMT, and therefore auto emissions. While the amount of reductions in any one corridor may not be large on a regional basis, they nevertheless contribute to an overall program to improve air quality.

FTA Cost Effectiveness Index

The FTA cost effectiveness index, described in detail at the beginning of the report, provides one means of combining the mobility benefits and costs into one measure. This measure is an annualized increment cost per new transit rider. The lower the cost per new rider, the more "cost effective" the alternative. While the FTA cost effectiveness index does not include every impact and benefit (environmental or community impacts, for instance), it does provide a means to compare alternatives with varying costs and levels of mobility benefits. Also as discusses in the Overview section a the beginning of the report, the cost component of the index can be graphically plotted against the ridership component to see the degree to which increased levels of investment in terms of capital and O&M costs generate ridership benefits. Those alternatives that lie highest and furthest to the left on the graph are connected. The resulting boundary, or "frontier," indicates the best that can be done with increasing levels of investment; those alternatives that are lower and to the right on the graph indicate less cost-effective investment opportunities.

Table SUM.4 shows the input values and cost-effectiveness indices for the alternatives in all the corridors. Figure SUM.5 plots the measure as discussed above for those alternatives in each corridor that are on its "frontier." Thus, the figure show how the most cost-effective alternatives in each corridor stack up against on another. Based on this measure, the Northeast Corridor busway, NE1, and the West-Beach Options (all three has similar C/E indices,) are the most cost-effective alternatives and corridor considered. Other alternatives that are in close proximity to the "frontier" are the South Corridor busway, the North Corridor busway, and the Beach LRT, although this latter option is also part of the West-Beach combination. The Kendall Corridor is the least attractive investment opportunity, based solely on the FTA C/E measure.

Summary Evaluation

This study examined and evaluated sets of transportation improvement alternatives for seven corridors in Dade County. The results of the technical analyses are presented and various indicators of performance, benefits, costs and impacts are listed and used to identify those alternatives and corridors, of those considered, that represent the best opportunities for transportation investment. To the extent possible within the scope of this systems level of technical analysis, consideration of community and environmental impacts and sensitivities have been incorporated into the development and evaluation of the alternatives. An ongoing financial analysis is examining the resources and opportunities to fund the construction and operations of potential improvements.

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS

COST EFFECTIVENESS INDEX

Alternatives		Change in Travel Time Savings (TT)	Change in O&M Costs (OM)	Change in Equivalent Annualized Capital Cost (EAC)	Change in Riders (R)		FTA Cost Effectiveness Index (C/E)*	
					MetroDade + Jitney	MetroDade Only	MetroDade + Jitney	MetroDade Only
S1	Busway Extension to Florida City	$758,000	$1,493,000	$3,339,667	285,194	284,889	14.30	14.30
S2	"Hybrid" Metrorail	$835,000	$13,242,000	$52,071,333	1,295,194	1,294,889	49.79	49.79
S3	Metrorail	$1,680,000	$11,592,000	$85,252,940	1,428,194	1,428,889	66.60	66.60
K1	Busway	$70,000	$85,000	$2,389,526	23,551	23,551	102.10	102.10
K2	"Hybrid" Metrorail	$991,000	$11,630,000	$35,708,233	1,074,284	1,074,284	43.14	43.14
K3	Metrorail	$1,313,000	$8,638,000	$48,645,065	975,720	975,466	57.36	57.38
N1	Reversible Bus Lane	$509,000	$2,455,000	$3,320,011	924,971	942,307	5.69	5.59
N2	Direct Metrorail	$1,429,000	$7,948,000	$50,786,495	2,440,119	2,564,948	23.48	22.34
N3	Metrorail via Golden Glades	$1,133,000	$8,154,000	$54,322,335	2,187,685	2,303,030	28.04	26.64
NE1	Busway	$2,504,000	$3,408,000	$9,489,359	2,221,697	3,210,077	4.68	3.24
NE2	Standard LRT	$2,718,000	$4,345,000	$40,560,890	1,849,331	2,468,122	22.81	17.09
NE3	"Hybrid" Metrorail	$2,798,000	$9,718,000	$45,039,423	1,685,893	2,423,547	30.82	21.44
NE4	Metrorail	$3,245,000	$7,025,000	$66,937,932	1,718,610	2,376,353	41.15	29.76
W1	Direct Metrorail	$2,260,000	$16,001,000	$61,941,673	2,859,066	2,991,597	26.47	25.30
W2	"Hybrid" Metrorail via SR 836	$3,435,000	$19,125,000	$77,977,183	3,419,586	3,732,062	27.39	25.10
W3	"Hybrid" Metrorail via SR 836/8th St.	$3,199,000	$19,194,000	$73,080,655	3,156,585	3,534,009	28.22	25.21
W4	Standard LRT via Flagler	$945,000	$16,891,000	$52,645,435	2,153,464	2,797,341	31.85	24.52
B1	Standard LRT	$153,000	$10,085,000	$29,610,508	1,919,209	3,911,038	20.60	10.11
WB1	"Hybrid" LRT via Metrorail/Cswy.	$3,346,000	$33,287,000	$93,886,208	5,194,640	6,972,129	23.84	17.76
WB2	"Hybrid" LRT via SR 836/Cswy.	$4,655,000	$24,545,000	$108,240,205	5,580,368	7,655,409	22.96	16.74
WB3	"Hybrid" LRT via SR 836/Gov't Cut	$5,499,000	$21,664,000	$123,838,348	5,146,923	7,057,337	27.20	19.84
WB1	"Hybrid" LRT via Metrorail/Cswy.**	$3,346,000	$39,949,000	$103,218,833	7,994,640	9,772,129	17.49	14.31
WB2	"Hybrid" LRT via SR 836/Cswy.**	$4,655,000	$29,594,000	$116,752,830	8,380,368	10,455,409	16.91	13.55
WB3	"Hybrid" LRT via SR 836/Gov't Cut**	$5,499,000	$26,731,000	$125,888,347	7,946,923	9,857,337	18.51	14.92

* C/E = ($OM + $EAC - $TT) / R
= Annualized Cost per New Rider

** Includes Airport and Seaport service

Table SUM.4

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
COST EFFECTIVENESS FRONTIER

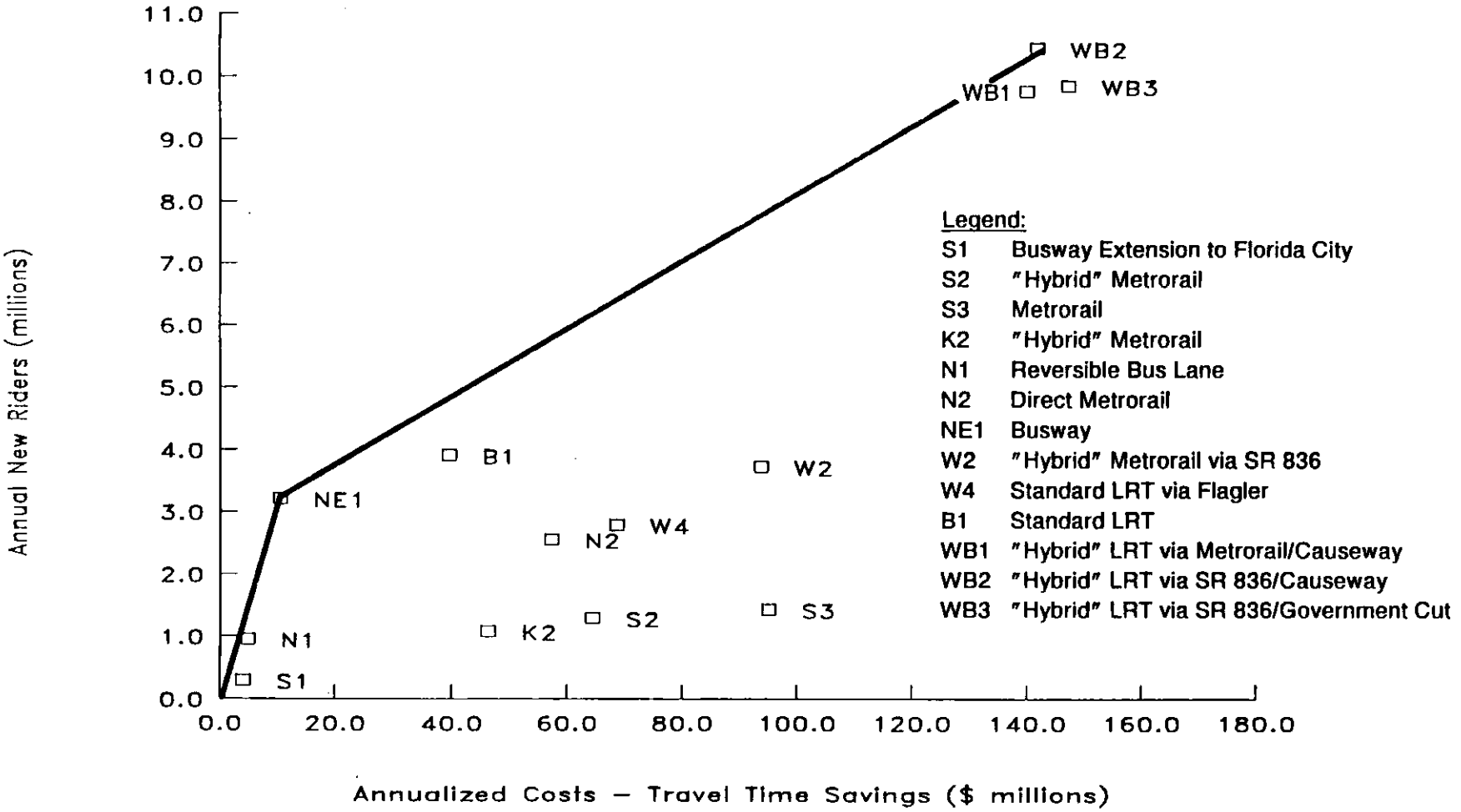


Figure SUM.5

The following findings can be drawn from the results of the technical analysis presented above:

- The **South Corridor** busway alternative, which is an extension to the programmed South Dixie Busway to Cutler Ridge, represents a relatively low cost, and cost effective option for the South Corridor. Although it does not attract as many new riders as the rail options, it does carry nearly the same number of total riders. This option provides improved access for bus riders and improved operating reliability to the Metrorail from south Dade County. The rail extension alternatives attract more new ridership but at a higher cost.

- The alternatives in **Kendall Corridor** improve access and travel times for existing riders but only attract relatively modest new ridership compared to the investment required. Therefore, the transit service improvements included in the TSM alternative for this corridor, enhanced with some modest capital projects such as traffic queue by-pass lanes and other transit priority treatments at selected locations, represent an inexpensive, non-disruptive, and effective means of addressing the transportation needs in the Kendall Corridor.

- Improvements in the **North Corridor** attract many new riders as well as serve existing users. The rail extension straight up NW 27th Avenue is the most attractive investment for the corridor. The bus lane is a cost effective, lower cost investment, although its transportation benefits are modest as it carries only about a third of riders as the rail options and only attracts about a third as many new transit trips. The required street widening under the bus lane alternative raises serious community impact questions because of the loss of parking and the associated business and property impacts.

- The **Northeast Corridor** busway is a very cost effective and relatively low cost option. It gains more new riderships than any of the rail options examined in the corridor and costs substantially less to build and operate. Of the Northeast Corridor rail alternatives, Standard Light Rail Transit is the most cost-effective. It generates comparable ridership benefits to the other rail alternatives, but at a lower capital cost and operating and maintenance cost. Because these alternatives run along the existing FEC railroad right of way, the community and environmental impacts are minimal. The Northeast Corridor Busway has the best FTA C/E index of all the alternatives considered in this study.

- The **West-Beach Options** represent an opportunity to provide a major transportation improvement to better serve existing riders, attract a large number of new riders to transit, and provide a economically-valuable direct connection between the Miami International Airport and the Seaport. While the benefits are great, so is the investment. The two components that comprise this corridor -- **West Corridor and Beach Corridor** -- each are viable, beneficial, and reasonably cost-effective investments by themselves, especially the Beach LRT. This opens up the opportunity for staged implementation of an overall program for the corridors based on availability of funding. The alignment in the West Corridor and the connection the Beach across Biscayne Bay require more detailed analysis to determine the preferred configuration.