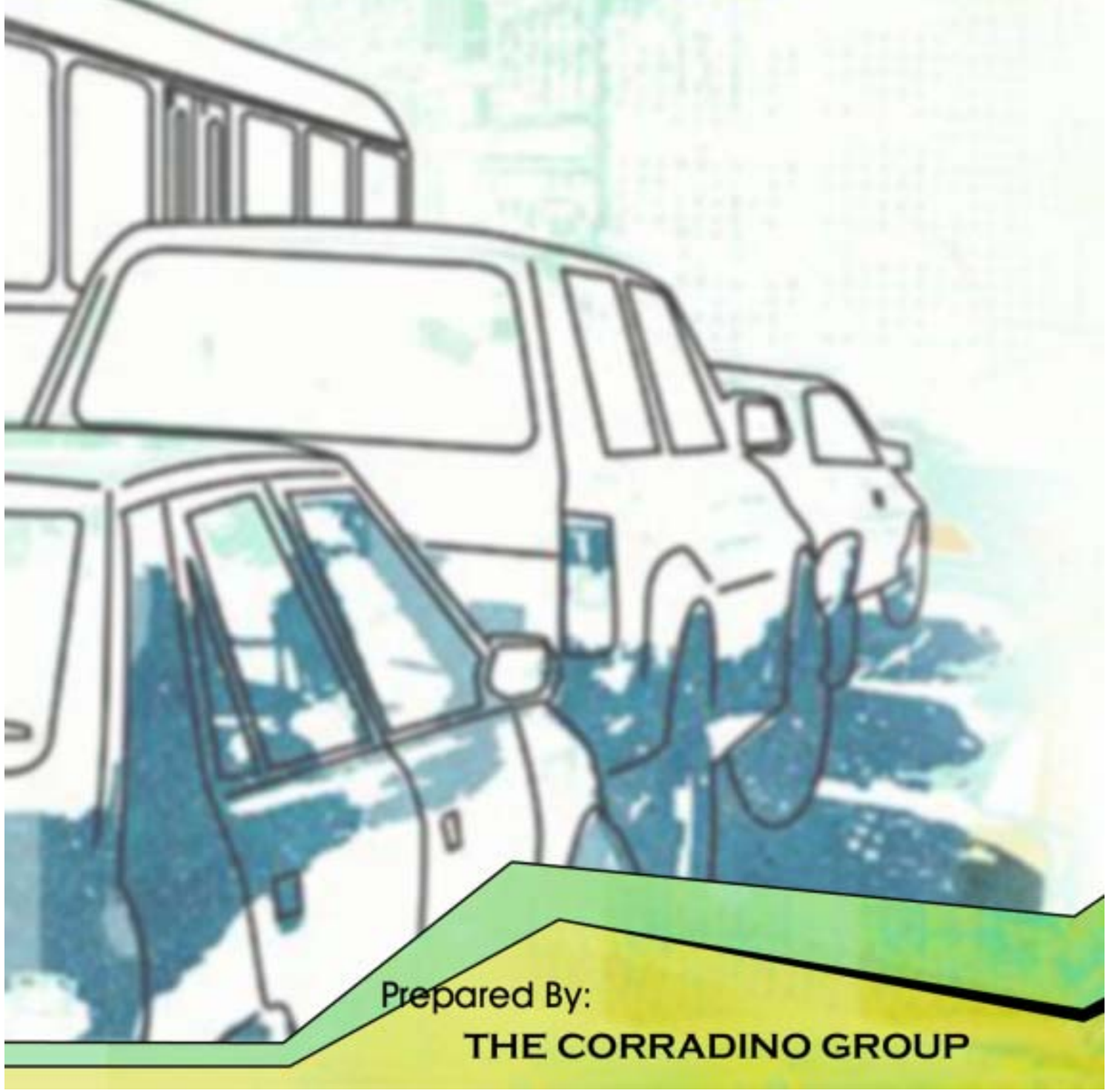
THE CORRADINO GROUP

Special Use Lane Study
Executive Summary

Prepared For:

The Miami-Dade Metropolitan Planning Organization



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INTRODUCTION

The Miami-Dade Metropolitan Planning Organization (MPO) has undertaken a quick examination of freeway facilities and major arterials that have the potential to accommodate special use lanes, which could be reversible or could be used by regular traffic, high-occupancy vehicles (HOV), bus rapid transit, or some mixture of the three.

This reversible lane project on Sepulveda Boulevard in Los Angeles uses overhead signals to control traffic in the specially marked lane

For the purpose of this report special use lanes can be defined as a lane or a system of lanes that are designed and operated to provide improved vehicle flow during peak periods, when the remainder of the freeway or arterial is heavily congested. Special use lanes generally manage who or what type of vehicle can use this lane. Management techniques include managing by eligibility, managing by access control, and managing by pricing. Special use lanes are generally created by providing a reversible flow lane, convertible contra-flow lanes, or by creating concurrent flow lanes.

MANAGEMENT TECHNIQUES

Management techniques range from concepts that limit access to the facility to methods that apply pricing techniques or other forms of authorization to limit demand within a congested corridor. Though they vary, the three basic techniques are: special use by eligibility definition, management by access control, and management by pricing.

SPECIAL USE BY ELIGIBILITY

Use by eligibility can be broken down into different types:

1. **Eligibility by vehicle occupancy (HOV Lanes)**-high-occupancy vehicle (HOV) lanes are priority lanes or facilities provided within congested freeway and arterial corridors. Their purpose is to encourage a shift from single occupancy vehicles (SOV) to HOVs and transit. This is achieved by providing a travel time advantage and by ensuring a greater measure of travel reliability for HOV users.

2. **Eligibility by Vehicle Type (Transit Only Facilities)** - Transit-only lanes/facilities are priority roadways designated specifically for use by transit vehicles in order to provide improved transit speed and reliability within congested corridors.

BUS ONLY SHOULDERS

- First bus-only shoulder opened in 1992
- There are over 80 shoulder segments totaling over 200 miles. 10-20 miles are added each year.
- All express buses use bus-only shoulders
- Until 1996 Metro Transit and MnDOT shared expenses
- Since 1996 MnDOT has paid all shoulder costs.
- MnDOT budgets $1.5 Mil per year for transit advantages

SHOULDER OPERATION RESTRICTIONS

- Shoulder must be authorized with official signs for bus use
- With traffic moving, bus speed is maximum of 35 mph on shoulder, and may not exceed 15 mph faster than traffic
- If traffic is moving along at 35 mph or faster, buses stay off shoulder
- Buses must yield to entering and exiting traffic

SHOULDER OPERATION ADVANTAGES

- Shoulders save significant time
- Shoulders greatly improve service reliability
- Customers very receptive to concept - perceive time savings 2 x greater than actual

SHOULDER OPERATION PROBLEMS

- 9 ft bus on a 10 ft wide shoulder
- Barriers along right curb make shoulders seem narrower
- "Jealous motorists" partially block shoulder
- Shoulder sometimes blocked by stalls, police stops, or debris

Ottawa, Canada

Photos by Dewi Williams

Quick Fact:
The OC-Transpo (Ottawa-Carleton) transitway (busway) opened in 1983. All OC-Transpo routes now travel on parts of the busway or connect to one of the busway stations. The main routes along the busway operate 22 hours a day.

SHORT TERM OPTIONS

SHOULDER TRANSIT LANES

3. **Eligibility by Vehicle Type (Truck Only Facilities)** - Truck lanes/facilities can be defined as any part of the highway system that is intended to:

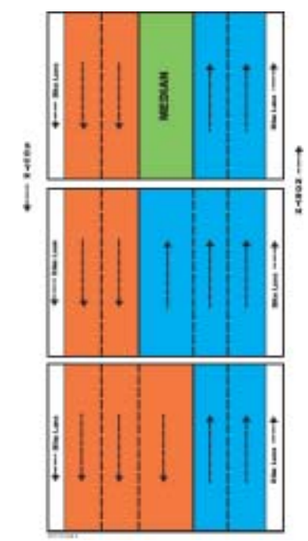
   a. Primarily or exclusively serve truck traffic
   b. Improve highway operation and safety by organizing heavy vehicles into a specifically designed/designated portion of the roadway

MANAGEMENT BY ACCESS CONTROL

Controlled Access (Express Lanes) – Access to express lane facilities is managed by limiting the number of entrance and exit point to the facility. Such facilities generally serve longer distance travel, excluding users making shorter local trips. Express lanes are compatible with other forms of management including management by eligibility, and management by pricing.

MANAGEMENT BY PRICING

Pricing – Several pricing concepts have been developed and may result in differing management characteristics. Pricing strategies include flat access fee, fee per distance traveled, and a fully dynamic fee approach. Dynamic fees can be based on time-of-day or by the amount of demand experienced.



TYPES OF SPECIAL USE LANES

Reversible flows an operational mode where a lane operates in one direction during the AM peak hours period. This type of operation is feasible when the existing and forecast peak period directional split is 35% or less in one direction during the design life of the project. Other factors that support the use of reversible flow operation are right-of-way constraints and physical constraints such as bridge columns, in retrofitting a reversible flow into the median.

HOV REVERSIBLE LANES

HOV is the most common use of reversible lane technology found almost exclusively on highways and expressways.

BUS LANES

Most bus lanes are covered under HOV, meaning that buses are classified as a High Occupancy Vehicle. However, there are some bus lanes that are classified as Exclusive Busways.

BUS RAPID TRANSIT

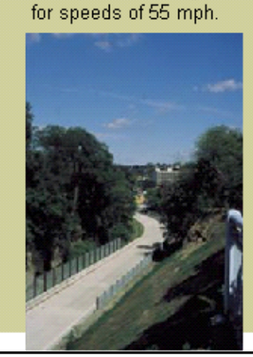
A hybrid of the Exclusive Busway is the Bus Rapid Transit or BRT. It generally operates on a managed lane facility where transit is given preferential treatment. BRT operates on either exclusive busways, share HOV lanes with other vehicles, or on modified city arterial streets. As noted above busways and HOV lanes can be totally separate facilities or are usually separated by barriers from other traffic within existing right-of-way.

In addition to the bus lanes and busways, BRT includes combinations of the following features:
Traffic signal priority, where buses receive an early or extended green light at intersections to reduce travel time. In Los Angeles the signal priority system has reduced travel time by as much as 10%.
Boarding and fare collection improvements include prepaid and electronic passes to increase the convenience and speed of fare collection. It also includes low-floor and wide-door features to save time in the boarding process.
Improved stations and shelters are important in BRT to differentiate it from regular line-haul bus service and provide passenger amenities on par with rail.
Intelligent transportation systems help by maintaining consistent distances between buses and informing passengers when the next bus arriving.
Improved diesel buses and buses using alternative fuel are cleaner than traditional buses.

Pittsburgh, Pennsylvania (USA)

Quick Fact:
The Martin Luther King Jr. East Busway in Pittsburgh has approximately 30,000 daily riders.

Quick Fact:
The West Busway in Pittsburgh replaced an abandoned railroad right of way and is designed for speeds of 55 mph.



Recommendations

LONG TERM OPTIONS

BRT

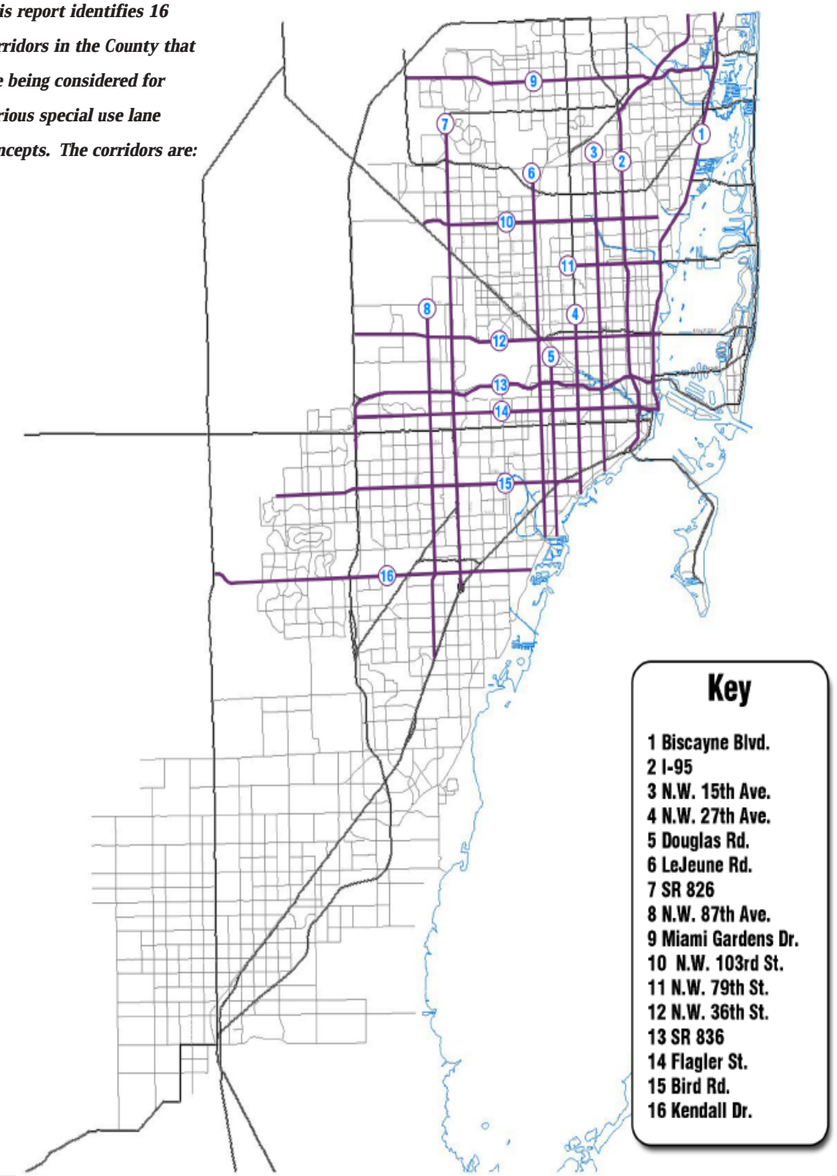
- Dedicated Runningway
- Signal Priority
- Train-like Boarding
- Limited Stops
- Low-floor Vehicle Design

Curitiba, Brazil

Quick Fact:
Curitiba's land use is tightly integrated with transit. As you can see in the illustration above, Curitiba implemented a trinary road system along the BRT corridor. The central corridor has high density commercial and residential (with first 2 levels being reserved for pedestrian friendly uses - shops, retail, etc). The density decreases as you move away from the corridor.

Candidates for Special Use Lane Conversion

This report identifies 16 corridors in the County that are being considered for various special use lane concepts. The corridors are:



Tier 1 Alternatives

TIER I EVALUATION

The facilities selected for this study were primarily major arterials that are section line roads that exhibited directionality or traffic flow that was heavily skewed in one direction at a particularly time of the day. Generally, the directional facilities in the County are those that directly link with downtown. Three freeways were considered for special use lanes (I-95, SR 826 and SR 836) which carry heavy volumes of peak period, peak directional trips.

A number of facilities were not included in the initial evaluation. Roadways that already incorporate a major transit facility was not included - US 1 Metrorail and Busway or NW 79th Street west of NW 27th Avenue. Roadways that already have a Locally Preferred Alternative selected for the corridor, such as NW 27th Avenue north of SR 112, and the Bay Link alignment along Washington, Alton and the MacArthur Causeway, were not included for consideration. Neither Coral Way nor SW 8th Street in the Little Havana area were considered for development of special use lanes because of the regional significance of the neighborhood they crossed.

Once the streets were selected for Tier I assessment data was collected and presented. Those included were:
Type of facility including presence of medians, overpasses and number of lanes
Traffic volumes and flow characteristics
Population and employment densities, land use, and activity centers served
Level of transit service including feeder service, and transit ridership

Tier I Evaluation criteria includes:

- Number of lanes
- Peak hour LOI in peak direction
- Peak hour directional split
- Functional classifications
- Ease of conversion
- Corridor density
- Origin/Destination
- Bus frequency

facilities that would be oriented toward serving local trips. This system includes north south facilities between Aventura and downtown Miami and east-west facilities serving the central part of the County and the Kendall area.

It is anticipated that the corridors included in this system would gradually evolve into a full Bus Rapid Transit system. These corridors have the potential to support heavy bus operations. Corridor evolution should begin with providing improved passenger amenities including stations with protected seating, real time bus arrival information, route planning capabilities, ticket vending and good pedestrian access. Stations would be located every 1/3 to ½ mile to reduce the number of stops and improve travel times. As special use lanes are created buses would operate on them in mixed flow with other authorized user with transit vehicles having signal priority to facilitate transit travel times and as transit volumes grow the special use lanes should become exclusive bus lanes. When the corridor is capable of supporting exclusive bus lanes then the special vehicles and bus guidance systems can be implemented.

BISCAYNE BOULEVARD

Biscayne Boulevard already has a high level of bus service. A near term study needs to be undertaken to examine the provision of express bus routes along Biscayne including roadway improvements to facilitate transit running times and to improve transit amenities in the corridor. Biscayne Boulevard is recommended for additional study for the development of appropriate special use lanes.

FLAGLER STREET

Flagler Street already has a high level of bus service. A near term study needs to be undertaken to examine the provision of express bus routes along Flagler including roadway improvements to facilitate transit running times and to improve transit amenities in the corridor. Flagler Street is recommended for additional study to determine the extent and type of special use lanes might be most appropriate for the corridor.

NORTH KENDALL

North Kendall Drive is recommended for further study to determine both the extent that improvements are needed and the type of special use lanes would most fit the needs of the corridor. This should be part of an Alternative Analysis process being considered for this corridor.

Special attention must be paid to the Intermodal transfer between Metrorail, the busway and future premium transit from Kendall Drive. A single point (like the MIC or Golden Glades) needs to be developed to facilitate transit connections in this half of the County.

CORRIDORS NOT RECOMMENDED FOR FURTHER STUDY

- NW 27th Avenue
- Le Jeune Road
- Douglas Road

need to be closely coordinated with FHWA, FDOT, MDX, the Turnpike Authority and the Florida Highway Patrol. The thought is that express bus service could operate in the SR 836 and the SR 826 corridor until a special use lane is opened for express bus service.

I-95

The 95X service is very successful. This service should be expanded throughout the day so that commuters could return to the Golden Glades area in the middle of the day if they needed. Additional bus should also be put on during the peak periods so that MDT can change its transfer policies between Tri-Rail and the 95X at Golden Glades.

In the long run the County should support FDOT efforts to implement the Master Plan for I-95.

SR-836

In the near term the County should begin to develop transit service in the SR 836 corridor and develop three park and ride facilities in these locations: Turnpike north of Kendall, SR 836 near NW 107th Avenue and SR 286 near Flagler. There is a great deal of interest in the Minneapolis experience with the use of transit operations freeway shoulders (as discussed in Chapter 1 of this report). The County could also immediately begin an investigation into what would need to be done to initiate transit service on the shoulders of SR 836. Theses investigations would need to involve the MPO, MDT, MDX, FDOT, the Turnpike Authority, FHWA, and the Highway Patrol. If the investigations prove fruitful then the County could proceed in the very near term with bus operations along SR 836.

A study needs to be undertaken immediately to locate and size park and ride lots, modify existing and develop new bus routes, and examine the potential for implementing transit-shoulder operations.

In the long run the County should support the efforts of MDX and the Turnpike Authority to develop a system of special use lanes from Kendall to the MIC.

SR 826

This corridor should be used to connect commuters from West Broward via I-75 to Metrorail and future east-west premium transit on SR 836. The portion of the Palmetto Expressway between Miami Lakes and Kendall has not been examined for it future potential for transit. The strong trip demand indicated by the Origin and Destination tables indicates a strong need for premium transit in this corridor. A full blown Alternative Analysis should be undertaken in this corridor. Special emphasis must be connecting the main line to major land uses outside the freeway right of way. On the south this corridor would need to tie into the major transfer facility discussed in the Kendall Drive recommendation above.

The corridor study should include a branch up I-75 to Miramar/Pembroke Pines in Broward County

LOCAL SERVICE SPECIAL USE LANE SYSTEM

The previous table also shows the recommended network of corridors that could support special use

The Tier I evaluation process will rank each of the facilities that have been described above for their potential for accommodating special use lanes. Evaluation criteria developed for Tier I represents major factors that indicate the potential success of project developed along a corridor.

TIER I EVALUATION CRITERIA	
Criteria	**Threshold**
Number of Lanes	At least 5 Lanes Total
Peak Hour of LOS Peak Direction	E or F
Peak Period Directional Split	65/35
Functional Classification	State Principal Arterial, State Minor Arterial
Ease of Conversion	Density of channelized turnbays, landscaped medians, overpasses, columns, capacity limitations, physical barriers
Corridor Density	Population ½ mile of corridor; Employment ½ mile of corridor; Number of bus routes
Origin-Destination	Person Trip Generation for 2025
Bus Frequency	Number of Peak Hour Buses

Peak hour level of service an important criterion in that if a corridor is not already operating at LOS E of F then the additional special use lane is probably not needed in that category because the roadway does not exhibit special problems requiring such measures.

- Peak period directional split is key, particularly if the special use lane would take a lane from the opposing direction or if one additional lane of capacity is going to be added in a peak direction only. The national standard for developing an additional lane or a reversible lane is a 65/35 split.
- Functional classification is a measure for the operation of a facility. All of the facilities are classified as state arterials, which indicates that they serve a primary transportation function in moving traffic.
- Ease of conversion is measure for cost and construction impacts.
- Corridor densities are important if the special use lane involves transit. If the special use lane is to be a bus lane with either express buses or Bus Rapid Transit (BRT) then the more people would be able to walk to or from their residence or place of work and would contribute to the success of transit in the corridor.
- The number of activity centers served along the corridor would indicate the potential for the proposed special use lanes to serve trips.
- Bus frequency is shown as the combined headways of the service that runs along the majority of a corridor.

Tier I Evaluation

Corridor	# Lanes	LOS	Directional Split	Functional Classification
I-95	6, 8, 10	D,E	60/40	Principal Arterial Interstate
SR 836	6 plus auxiliary lanes	F west of LeJeune C east of LeJeune	65/35	Principal Arterial Interstate
SR 826	6, 8 plus auxiliary lanes	F	60/40	Principal Arterial Interstate
Flagler St.	5 lanes	D,E	65/35	Principal arterial
Biscayne Blvd.	4,5,6	F	60/40	Principal Arterial
Kendall Dr.	6 lane	B west F@Dadeland	65/35	Principal Arterial
Bird Ave	4, 6 divided	F	80/20	Principal Arterial
NW 36th St	3, 4, 6	E, F	50/50	Principal Arterial
NW 79th St	6 lane divided	F	55/45	Principal Arterial
NW 103rd St.	4, 6 lanes	C @6 lane F@4 lane	63/37	Principal Arterial
Miami Gardens Dr	4, 6	E, F	50/50	Minor Arterial
NW 17th Av	3, 4, 6	D, E, F	75/25	Minor Arterial
NW 27th Ave	5, 6 lanes	C, D, F	55/45	Principal Arterial
Douglas Rd.	4, 5 lanes	D	51/49	Minor Arterial
LeJeune Rd.	4, 6 lane divided	F	55/45	Principal Arterial
NW 87th Av	4, 6 lane divided	F	72/28	Minor arterial

Note: Red squares indicate that a corridor does not meet the minimum requirements for a criteria.

Recommendations

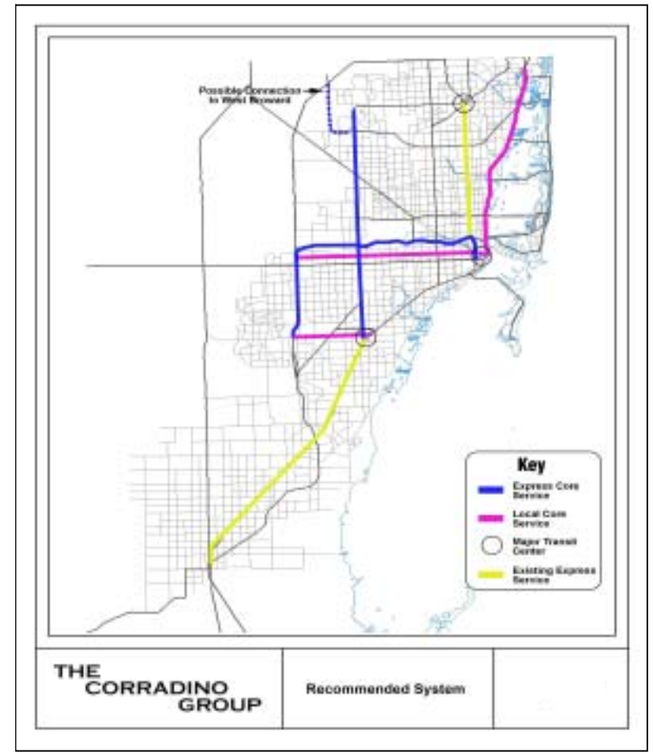
RECOMMENDED SYSTEM

Express System

- SR-826
- SR-836

Local System

- Biscayne Boulevard
- Flagler Street
- Kendall Drive



EXPRESS CORE SERVICE

A system of special use lanes oriented toward express trips within freeway right of way is shown in Figure 5-1. It serves trips between Broward County and Downtown Miami, north-south trips through central Miami-Dade and east-west trips to the Airport and to Downtown Miami. In order to move quickly on this concept the County could operate express transit service along the shoulder of the expressways as Minneapolis is currently doing. The shoulders along the freeways would need to be a minimum of 10 to 12 feet for this to occur. The opportunity for transit to operate on the shoulders of the freeway would

Recommendations

INTRODUCTION

The creation of special use lanes is recommended to enhance mobility and travel options across the County. The creation of a linked system of special use lanes could lead to stronger utilization of these facilities. What is proposed below is an interconnected system that includes facilities both on freeways and on arterials. Just like our street network special use facilities on freeways would provide for higher speed, longer length trips. Special use lanes on the freeways would have fewer points to enter and exit the system (no more frequent than every two miles). These facilities on freeways would provide a premium level of service at a premium price.

Special use lanes on arterials provide premium service that is somewhere between express service and local service. Access to the system is no more frequent than every four blocks but no less frequent than every half mile. These special use facilities would feed each other and are particularly oriented toward feeding the express service that would be provided on the freeways.

The Miami-Dade County MPO is currently sponsoring a study to develop an overall plan for a BRT system within the County. The BRT System Plan focuses on a more narrow aspect of this study. The results of this study have been provided to the consultants preparing a countywide BRT plan. While this study makes references to the feasibility of BRT in corridors it has refrained from making specific recommendations about actual BRT facilities.

Following this study, corridors that are recommended for further study will be analyzed in detail, as to their suitability for the development of special use lanes. Based upon the information collected during this effort the following corridors are recommended for additional study.

RESULTS

- Single reversible lane development is not recommended
- I-95, SR-826 and SR-836 could support concurrent flow express lanes
- SR-826 and SR-836 need express bus development for future BRT
- Flagler, Biscayne and Kendall could support development of BRT system

RECOMMENDATIONS

- Network of Special Use Lanes including:
  - Express Facilities (on freeways)
  - Local Feeder Facilities (on arterials)
  - Ties into South Dade Corridor and I-95
- Develop Intermodal Hub at Dadeland South

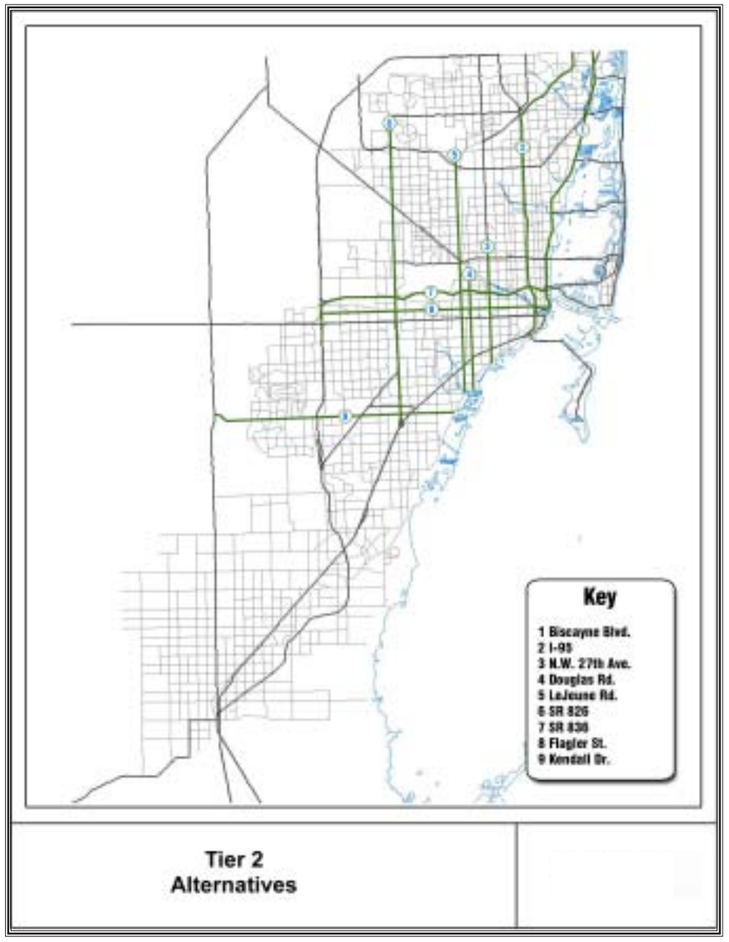
Ease of Conversion	Origin Destination	Employment Density (per sq. mile)	Population Density (per sq. mile)	Bus Frequency
Multiple Bottlenecks	Downtown Miami	5093	6272	5-minutes
West of SR 826 Easy. East of SR 826 Very Difficult	Dolphin Mall International Mall Airport Downtown	6986	6243	0
Multiple Overcrossings	Hialeah MIA Blue Lagoon Dadeland	4163	6402	0
Easy	Little Havana Downtown	9013	16028	6.6 minutes
Easy	Aventura 79th Street Design District Omni Downtown	7649	6113	2.3 minutes
Easy	Dadeland	3203	6816	7.5 minutes
Residential east of NW 57th Ave	Coconut Grove	2982	5585	12 minutes
Multiple Bottlenecks	Miami Int. Airport	4165	3372	12 minutes
Easy East of NW 27th Ave	-	2980	8680	6 minutes
Easy west of I-95	Hialeah	3378	8742	30 minutes
Easy west of Turnpike	Aventura	1367	6066	15 minutes
1 lane bottleneck at Miami River	Little Havana	3877	9931	30 minutes
Easy south of SR 836	Coconut Grove	3327	9130	15 minutes
Easy	Coral Gables	5484	2431	30 minutes
Easy south of SR 836	Hialeah MIA Coral Gables	7640	8656	12 minutres
Easy, except at SR 836	Fontainbleu Doral The Falls	5347	4125	30 minutes

INTRODUCTION

Tier I reduced the number of alternatives for further consideration as special use lanes. Tier II assessment looks in greater depth at each of the facilities that are still being considered. The Tier II assessment of alternative examines future plans for each facility and determines if those plans have an impact on the availability of right-of-way for special use lanes or if the plans have progressed far enough to have a recommended use for that corridor.

The following facilities are recommended for further study through Tier II:

- I-95
- SR 836
- SR 826
- Flagler Street
- Biscayne Boulevard
- NW 27th Avenue south of SR 112
- LeJeune Road
- Douglas Road



Corridor	Single Reversible Lane	Concurrent Special Use Lanes*	Bus Lanes/BRT Development
I-95	NO	Existing Support FDOT Master Plan	Possible
SR 836	NO	Support MDX plans	LPA exists for Heavy Rail
SR 826	NO	Possible	Long term development possible.
Biscayne Boulevard	Possible south of NE 79th Street	HOV possible, but need for local access would prevent toll or express lanes.	Recommended
Flagler Street	Possible	HOV possible, but need for local access would prevent toll or express lanes.	Recommended
Kendall Drive	Possible	HOV possible, but need for local access would prevent toll or express lanes.	Recommended
NW 27th Avenue	Possible	HOV possible, but need for local access would prevent toll or express lanes.	Possible
LeJeune Road	Possible	HOV possible, but need for local access would prevent toll or express lanes.	Possible
Douglas Road	NO	Will need additional ROW	Possible Will require additional ROW

* Special Use Lanes can include HOV lanes, toll facilities, or express lanes. It is assumed that express lanes and toll facilities would need to be barrier separated.