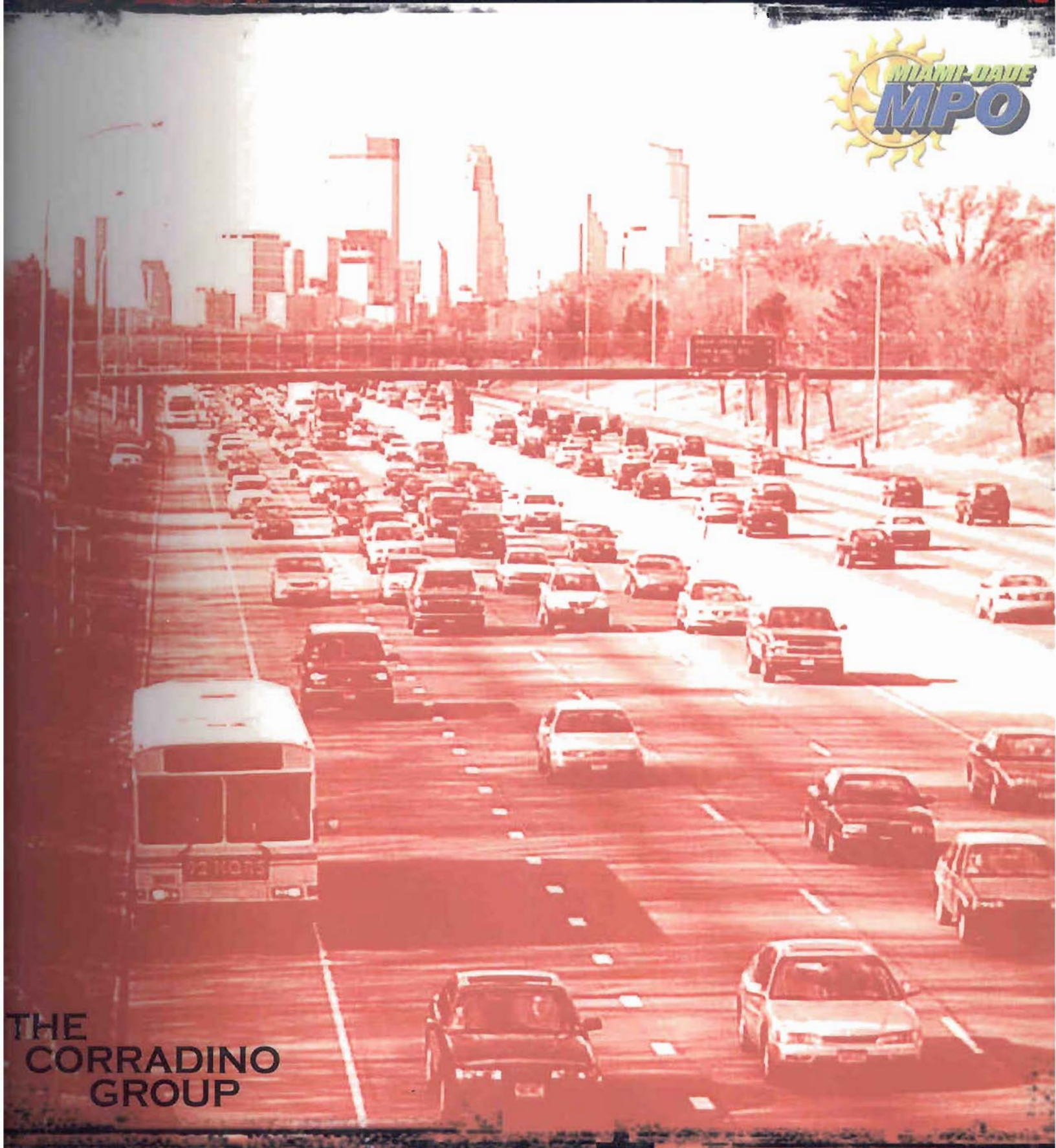
Special Use Lanes Study: Transit Use of Shoulder By-Pass Lanes



MIAMI-DADE MPO

THE CORRADINO GROUP

November 2005

SPECIAL USE LANES:
CONGESTION BY-PASS
SHOULDER LANES

Prepared for:
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November 2005

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EXECUTIVE SUMMARY

Background

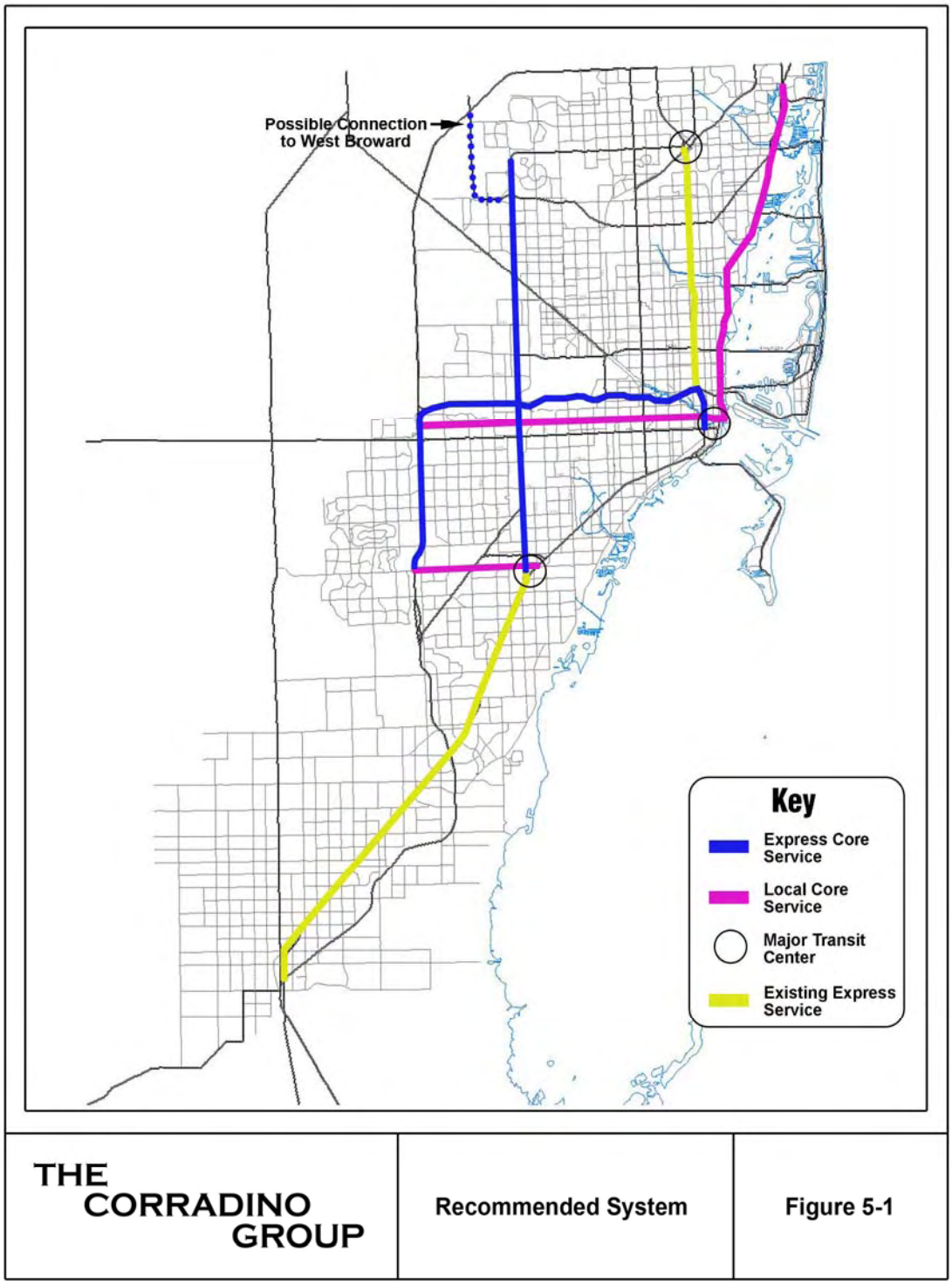
Phase II - The Special Use Lane Study is the second phase of a study that looked at implementing Special Use Lanes on high volumes arterials and freeways throughout Miami-Dade County. Special use lanes were defined in the study as special facilities designed to encourage high-occupancy use. The facilities suggested ranged from exclusive Bus Rapid Transit lanes, to special toll lanes, to reversible lanes, contra-flow lanes. The initial study did not determine which type of special use lane was appropriate to which facility; it attempted to determine which facilities could accommodate special use lanes.

Special Use Lane Study – Phase I

The first study involved two tier evaluations. Tier 1 involved examining major arterials that are also section line roads that exhibited directionality or traffic flow that was heavily skewed in one direction at a particular time of day. Three freeways that were considered for special use lanes were I-95, SR 826, and SR 836, all of which carry heavy volumes of peak period and peak directional trips. Tier 2 examined in greater depth at each of the above facilities for future plans of each facility. Tier 2 also determined if these plans have any impact on the availability of right-of-way for special use lanes or if the plans have progressed far enough to have recommended use for that corridor.

The result of the Tier 2 analysis was a recommendation for a bi-level set of transit improvements through out Miami-Dade County. The system would mirror the roadway network. Transit routes would be started on the freeways to provide higher speed express bus service. Local bus service would continue to be provided on the arterials feeding several major arterials with exclusive bus service. These arterials would offer a service with buses operated with signal prioritization, fewer stops and higher frequencies. The tiered bus system is shown in Figure 1.

Tier 2 Bus System



Phase II Study

Following the completion of the October 2004 Phase I Report – *Special Use Lane Study* a series of meetings were held to determine how to progress the recommendations. Miami-Dade Transit will implement the following express bus service:

- Florida Turnpike/Kendall Drive to SR 836 to the MIC and then on to downtown Miami.
- SR 826 from Dadeland to NW 154 Street (Miami Lakes Drive.)
- Pines Boulevard/I-75 to Miami Gardens Drive to SR 826 to the Palmetto Metrorail station.

Phase II of the project is to determine exactly what segments of the freeway shoulders can be used for congestions by-pass. The analysis examines shoulder width, accident rates, obstructions such as lighting, signs etc. The combination of all the factors are put together for each segment of shoulder to determine the suitability for use for congestion by-pass. The arterials under review for this phase of the project are I-95, I-75, SR 826, SR 836, and the Florida Turnpike HEFT to Kendall.

Concept

The project will improve travel times for transit routes operating on the freeways by allowing buses to by-pass congestion in the main freeway lanes by moving onto usable segments of the shoulders. Buses will only use the shoulders when mainline speeds drop below 25 MPH. While operating on the shoulders the buses cannot exceed 35 MPH nor operate more than 15 MPH above the speeds on the mainline of the freeway. Buses would move onto and off of the shoulder as necessary to maneuver across ramps, avoid vehicles and debris on the shoulder, and as traffic conditions warrant. Because of the large amount of constructions that is currently underway, and the construction programmed for the future the location of usable shoulder segments will change frequently and will need to be coordinated with the construction efforts. Flexibility will be the key to the success of this project.

SR 821/SR 836

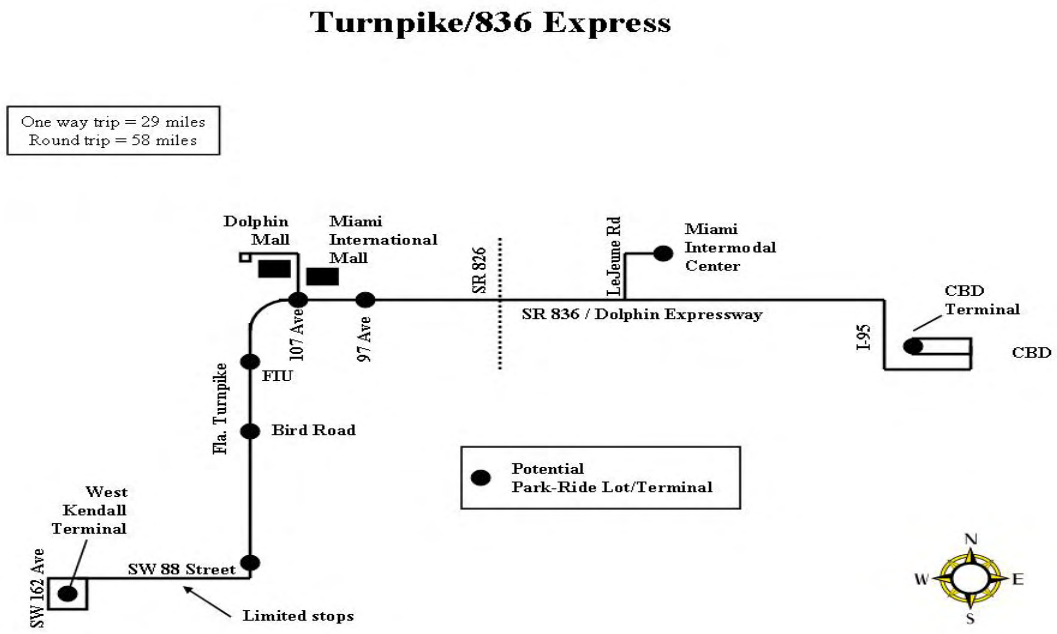
Express service would run every 10 minutes in the weekday peak for both West Kendall routes to downtown Miami with every other trip serving the Dolphin Mall/Miami International Mall. Service from West Kendall to the Miami International would be every 20 minutes in the peak. Service between the Malls and the MIC would be 20

minutes. Service in the reverse direction would operate less frequently. Off-peak express service would be provided on a route serving all destinations every 20 minutes.

. Construction along this route would require constant coordination between MDX and MDT so that the bus drivers know in advance what portion of the shoulders are available for congestion by-pass, and what portions will be unavailable due to new construction.

Using congestion by-pass, peak-hour, peak-direction express service could be made from Kendall to the Government Center in 50 minutes. Service between Kendall and the Government Center with stops at Dolphin Mall and the MIC would take 65 minutes. The route from West Kendall to the MIC would require about 43 minutes, and the route from the Dolphin Mall to the MIC would take about 35 minutes. This express service would operate 25 peak buses averaging 3,550 miles daily at a cost of $3,356,000 per year. An an illustration of the proposed express route is shown below in Figure 2:

Figure 2

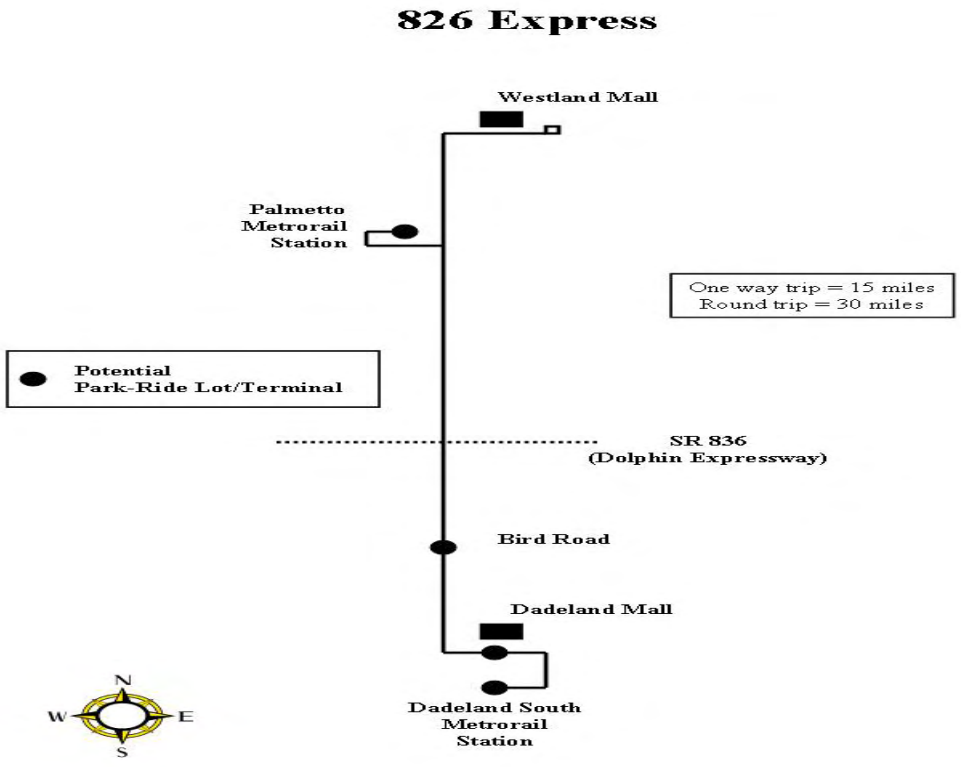


SR 826

A new express route would be developed from the Dadeland area to the Palmetto Metrorail Station and Westland Mall via the Palmetto Expressway. The route would serve the Dadeland Metrorail Station and Dadeland Mall. Although the end of the route is shown as Westland Mall, this may change with further evaluation. This express route would operate in both directions. Construction along this route would require constant coordination between FDOT and MDT so that the bus drivers know in advance what portion of the shoulders are available for congestion by-pass, and what portions will be unavailable due to new construction.

Using the shoulders as congestion by-pass the express bus should be able to maintain an average speed of 35 mph negotiating the distance from Dadeland Mall to Westland Mall in 30 minute. Because of the congestion at ramps and all of the arterials in the vicinity of SR 836 MDT should add approximately 10 minutes to the scheduled running time for each park and ride area served. This service will run at 20 minute headways during weekday peak hours. The new express route will also run five peak buses averaging 540 miles daily at a cost of $550,000 per year. An illustration of proposed express route is shown below in Figure 3.

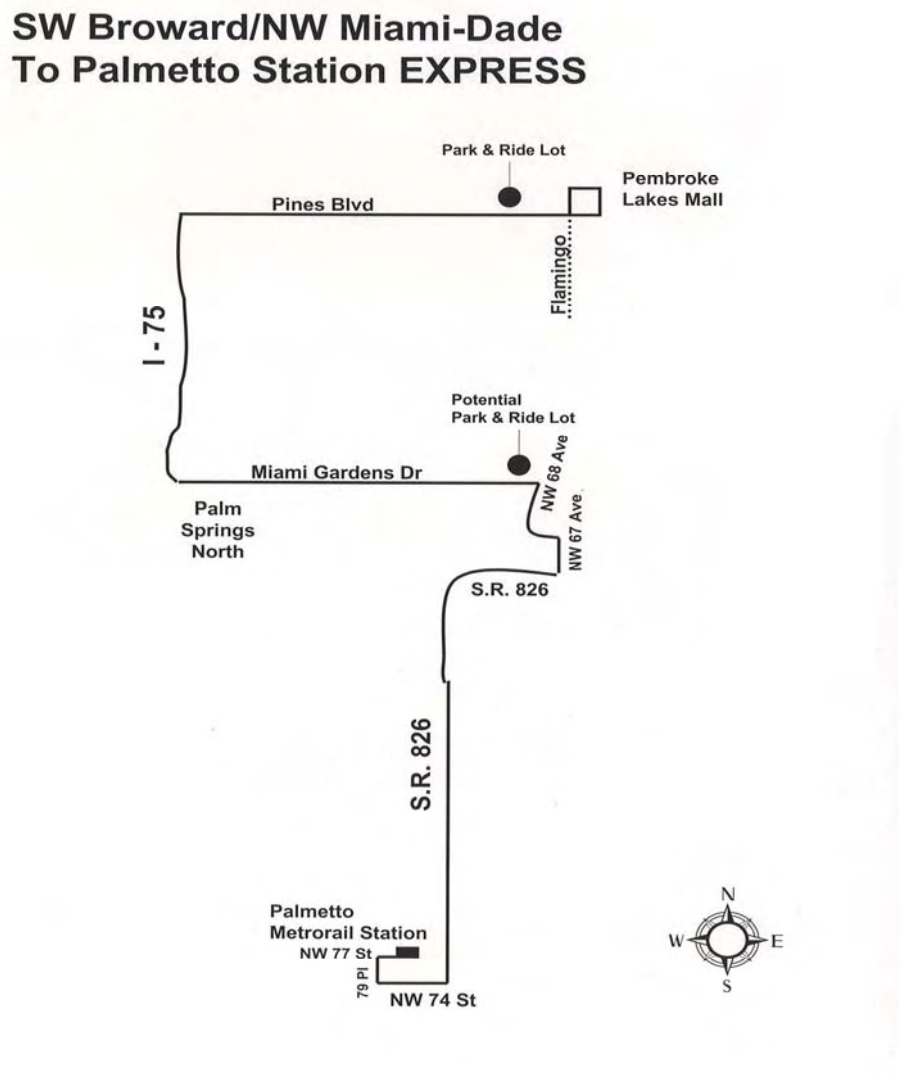
Figure 3



I-75/SR 826

This express route has started operations from Pembroke Pines to the Palmetto Metrorail Station in Medley via I-75 and the Palmetto Expressway. Potential park-ride lots would exist in the Pembroke Lakes Mall area and at Miami Gardens Drive. The express route could be diverted via Miami Gardens Drive and Ludlam Road to serve higher density residential areas in Northwest Miami-Dade. Two-way service would be provided allowing Miami-Dade residents access to jobs in Southwest Broward. This service will run at 20 minute headways at weekday peak hours. The express route will operate six peak buses averaging 510 miles daily at a cost of $530,000 per year. An illustration of the new express route is shown below in Figure 4. It would also be feasible for a second route to be established for the area of Pembroke Pines west of I-75. All of the shoulder area along I-75 is available for use as congestion by-pass. The shoulders on SR 826 along the portion utilized by the bus route is also suitable for congestion by-pass, since most of the construction has been completed.

Figure 4



SR 874/SR 878

The current bus routes utilizing SR 874 and 878 operate on SR 874 between Killian Parkway and Dadeland South via SR 878. The usable shoulder segments on SR 874 are west of Killian Parkway and east of SW 87th Avenue entirely outside of the current bus routing. On SR 878 which is fully utilized by the bus routes only the westbound shoulders are suitable for congestion bypass. It is recommended that the westbound shoulder of SR 878 be signed for bus use only. Other areas could be converted in the future should MDT implement additional bus routes that can utilize the shoulder lanes. An initial survey of the SR 874 corridor between Killian and the Snapper Creek Expressway did not reveal any locations close enough to alignment to serve as a park and ride lot for the freeway express service. The SR 878 alignment is too close to the end of the route to consider any park and ride locations.

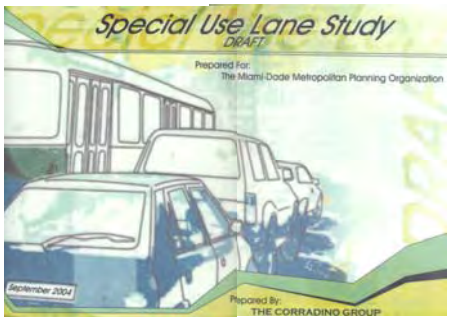
Implementation

During discussions of this project it was determined that the Florida Department of Transportation could initiate a demonstration project without legislation. However, if the demonstration project is successful then the legislation will be required to allow transit bus operation on the freeway shoulders on a long term basis. Miami-Dade Transit will enter into separate Interlocal Agreements with FDOT District 6, Miami-Dade Expressway Authority, and the Florida Turnpike to initiate a pilot project on the various facilities. The pilot project will have a duration of three years from the first day of operation. During that time Miami-Dade Transit will bear the cost of implementation, operation and maintenance, with the voluntary support of the supporting agencies. Miami-Dade Transit will also assume full liability for any incidences that occur related to operations of their buses on the shoulders of the expressways. At the end of the pilot project it will be decided whether to continue or to expand the project.

Chapter I - Background

This study is the second phase of a study that looked at implementing Special Use Lanes on high volumes arterials and freeways throughout Miami-Dade County. Special use lanes were defined in the study as special facilities designed to encourage high-occupancy use. The facilities suggested ranged from exclusive Bus Rapid Transit lanes, to special toll lanes, to reversible lanes, contra-flow lanes. The initial study did not determine which type of special use lane was appropriate to which facility**;** it attempted to determine which facilities could accommodate special use lanes.

Previous Study



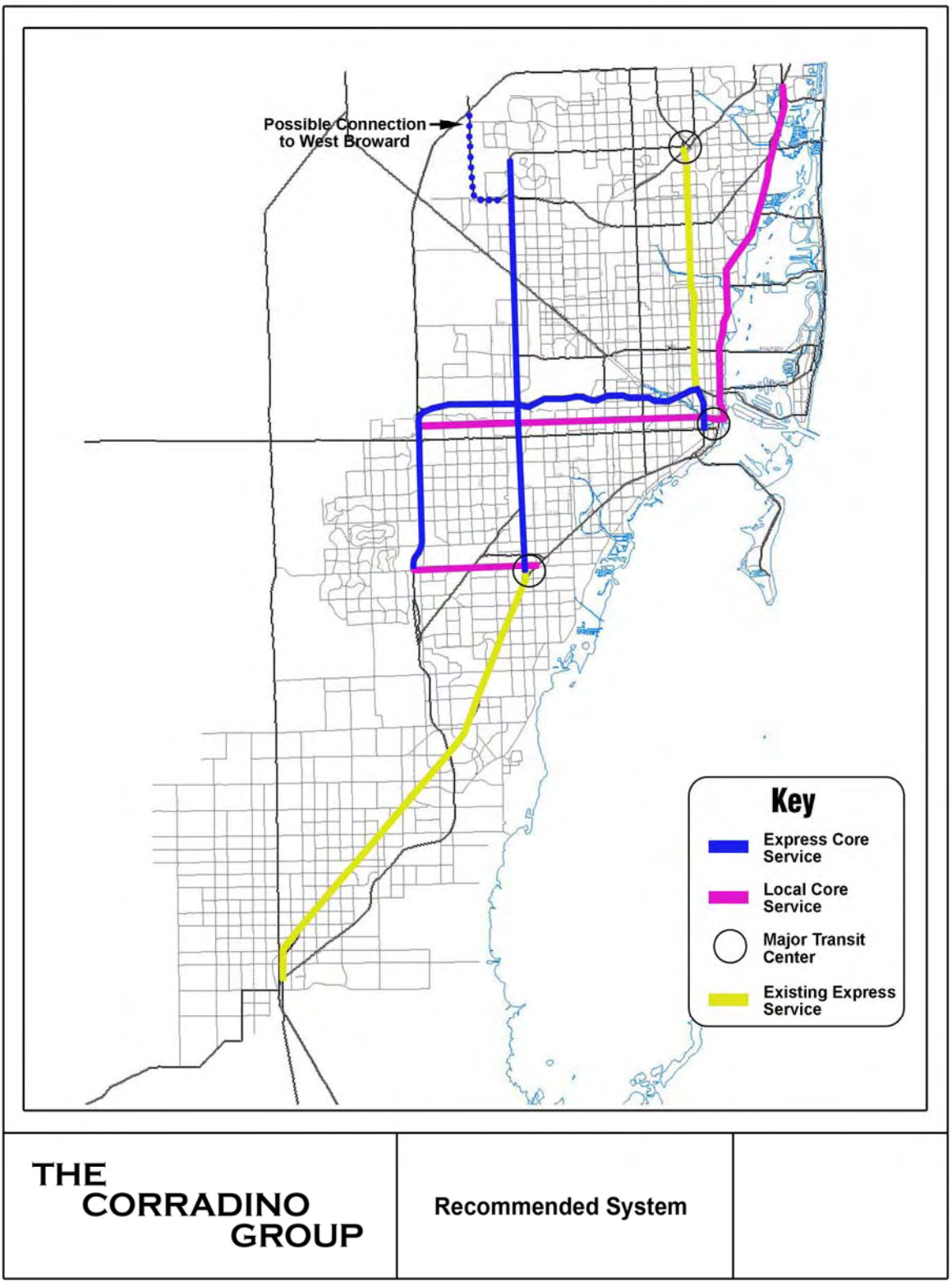
The first study involved two tier evaluations. Tier 1 involved examining major arterials that are also section line roads that exhibited directionality or traffic flow that was heavily skewed in one direction at a particular time of day. Three freeways that were considered for special use lanes were I-95, SR 826, and SR 836, all of which carry heavy volumes of peak period and peak directional trips. All of the data within Tier 1 was evaluated against a given set of criterion, (Tier 1 Evaluation Criteria) to reduce the number of alternatives for a more detailed evaluation within Tier 2. The following facilities were recommended for further study within Tier 2:

- I-95
- SR 836
- SR 826
- Flagler Street
- Biscayne Boulevard
- Kendall Drive

Tier 2 examined in greater depth at each of the above facilities for future plans of each facility. Tier 2 also determined if these plans have any impact on the availability of right-of-way for special use lanes or if the plans have progressed far enough to have recommended use for that corridor.

The result of the Tier 2 analysis was a recommendation for a bi-level set of transit improvements through out Miami-Dade County. The system would mirror the roadway network. Transit routes would be started on the freeways to provide higher speed express bus service. Local bus service would continue to be provided on the arterials feeding several major arterials with exclusive bus service. These arterials would offer a service with buses operated with signal prioritization, fewer stops and higher frequencies. The tiered bus system is shown in Figure 1-1.

Figure 1-1


Possible Connection to West Broward
Key
Express Core Service
Local Core Service
Major Transit Center
Existing Express Service
THE CORRADINO GROUP
Recommended System

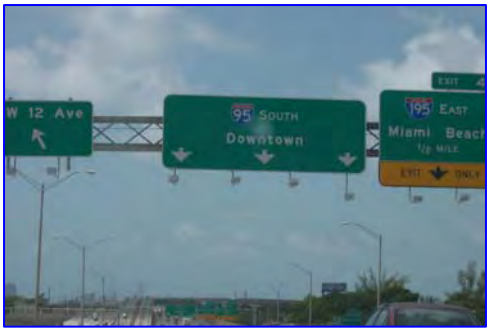
Highlights of the Special Use Lane Study Phase I

This study recommended the implementation of:

A. Express Core System

1. I-95 (Exhibit 1-1)

Exhibit 1-1



The 95X service should be expanded throughout the day so that commuters can return to the Golden Glades area in the middle of the day. Additional bus service should be put on during the peak periods so that MDT can change its transfer policies between Tri-Rail and the 95X at Golden Glades. This would save time for the Tri-Rail commuter.

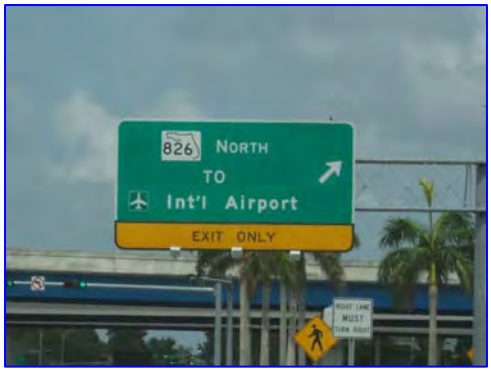
2. SR 836 (Exhibit 1-2)

Exhibit 1-2

Special use lanes in this corridor would extend along the Turnpike to SR 836, then along SR 836 to the MIC. Once the new lanes are completed by the Turnpike Authority and MDX, express transit should operate to the MIC. Miami-Dade 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. The County needs to examine the possibility of transit service along the shoulders of SR 836. In short, a study needs to be undertaken to locate and size park and ride lots, modify existing and develop new bus routes, and examine the potential for implementing transit-shoulder operations.

3. SR 826 (Exhibit 1-3)

Exhibit 1-3



Special use lanes should be used along SR 826 to connect commuters from West Broward via I-75 to Metrorail and future east-west transit on SR 836. On the south, this corridor would need to tie into the major transfer facility discussed in the Kendall Drive recommendation below.

B. Arterial Core System

1. Flagler Street

Flagler Street penetrates the densest residential areas in the County and serves the highest employment areas of downtown. Flagler Street needs a study to be undertaken to examine the provision of express routes along Flagler including roadway improvements to facilitate transit running times and to improve transit amenities in the corridor. This corridor is recommended for additional study to determine the extent and type of special use lanes that might be most appropriate.

2. Biscayne Boulevard

Biscayne Boulevard is also a very strong corridor with high residential and employment densities. This is a PTP corridor that is considered for premium transit. This corridor also needs a study to investigate possible express bus routes and roadway improvements to accommodate this service.

3. Kendall Drive

North Kendall Drive connects the huge suburban areas of the southern part of the County to the employment centers along Kendall and north via Metrorail. This corridor also has sufficient lanes to provide special use lanes. Kendall Drive needs further study to determine what improvements are needed and the type of special use lanes would be most needed for the corridor. The study needs to focus on the Intermodal transfer between Metrorail, the busway, and future premium transit from Kendall Drive. A single point (such as the MIC or Golden Glades) needs to be developed to facilitate transit connections in this part of Miami-Dade County.

Project History

The implementation of the Expressway Core System, as recommended in the First Phase, was based on the success of the use of shoulders along expressways in the city Minneapolis. One of the objectives of the study was to identify low cost projects that could be implemented in a short-term period. As a result, during the research of projects, the Minneapolis project was an excellent example that could be considered for Miami-Dade County.

The Minneapolis Experience

It was determined that the new express service would have a much better opportunity to succeed if the routes could gain a speed advantage over the general lanes of traffic. The Phase I report had examined the system used in Minneapolis, Minnesota to facilitate transit operations without major capital investment.

A. Operations

Exhibit 1-4

Exhibit 1-4 shows a bus using the shoulder for congestion by-pass in Minneapolis. Minnesota Statutes were amended to allow transit buses to use freeway shoulders only as a bypass of traffic congestion. Transit shoulders have been in operation since 1992. Shoulders must be authorized with official signage for bus use with a maximum speed of 35 miles per hour. Buses may not operate more than 15 MPH faster than adjacent traffic and may not use shoulders if general lane traffic is operating at 35 MPH. Approximately 108 bus routes use the 240 miles of shoulder by-pass areas through out the metropolitan area. About 40 additional miles of shoulder by-pass area will be added in 2005.

Over 1,700 express trips per day can use the shoulders, which represents 36,500 express trips per month. Buses use the shoulders during both recurrent and non-recurrent congestion and can use the shoulder at any time if highway speeds drop below 35 miles per hour. Vans and special transit vehicles for the disabled are not allowed on the shoulders, but are considering legislation to allow these vehicles to use the shoulders. Bus drivers can use their own judgment in determining when to use the shoulder; however, use of the shoulders is not mandatory for bus drivers.

B. Time Savings

The average time savings is 5 to 10 minutes over a five mile stretch of congestion but real savings are reflected in bus schedule reliability. The commuter's perception was that the time saving was as high as twice the real time.

C. Signage and Marking

Only the following signs have been used to warn drivers about the use of the shoulders.

1. Authorized Buses Only - Begin
2. Authorized Buses Only - End
3. Watch for buses on shoulders

Exhibit 1-5

Exhibit 1-5 shows that no special markings have been used. Diamonds have not been used so that vehicles would not mistake the lane for an HOV lane. Traditional marking for shoulders, gores, and ramps continue to be used.

D. Obstacles

Typical cross slopes on shoulder have not been an obstacle; however, catch basins cause a rough ride and are subject to some wear and tear. Catch basins need to be modified over the long run. Chatter and rumble strips and on the shoulders have been relocated to the center of the shoulders so that buses can drive on the shoulder and straddle the chatter strips.

Bus drivers have found it too difficult to drive in a ten foot lane adjacent to a jersey barrier. Because of this, the outside lane had been re-striped to allow an 11½' shoulder when adjacent to the jersey barrier.

Shoulders are still used as shoulders and are often blocked by emergency vehicles, stalled vehicles and debris. To avoid these obstacles, the bus driver pulls back into the travel lane to pass these blockages.

E. Cost

The average cost is $100,000 per mile for upgrades, signage etc. to implement the program. MnDOT budgets $1.5M per year for improvements and minor maintenance for the entire network.

F. Impact

Shoulders in the area are asphalt. An assessment of the impact of bus operations after 12 years showed no impact on the pavement, except for the corners of the catch basins. The shoulders assessed had an average of 50 bus operations per day.

G. Safety Record

There has not been a dramatic increase in violations for the public driving on the shoulders due to allowing buses to use the shoulders for congestion by-pass. There has never been an injury accident due to shoulder operations. There is an average of 15 - 20 sideswipe accidents per year, the majority of which are due to mirrors on the buses hitting mirrors on trucks.

There has never been an accident with the bus hitting a stopped vehicle on the shoulder. If there is a concern about emergency vehicle operation on the shoulders then the bus drivers need to be instructed to get out of the way of approaching emergency vehicles. The following Table 1-1 shows accidents records for 2002 and 2003.

Table 1-1

TOTAL ACCIDENTS		
	2002	2003
Collisions	18	21
Mirror Hits	12	19
Total Claims	$1,291	$7,680
Largest Loss	$873	$3000

Study Recommendations

Following the completion of the October 2004 Phase I report - Special Use Lane Study a series of meetings were held to determine how to implement the Expressway Core System. The following agencies were participating in these meetings:

A. Metropolitan Planning Organization (MPO)
B. Office of the County Manager (OCM)
C. Miami-Dade Transit (MDT)
D. Miami-Dade Expressway Authority (MDX)
E. Florida Department of Transportation (FDOT)
F. Turnpike Enterprise

As a result of these meetings, the following actions were recommended:

1. To initiate the second phase of the Special Use Lane Study for implementing the Expressway Core System.
2. To proceed with an amendment to the Florida Statutes to authorize the use of the shoulders along the expressways.
3. To coordinate a meeting with Minneapolis officials in Miami to discuss the pros and cons of the project.

4. To develop potential routes that can be implemented along the recommended corridors.

Proposed Legislation

Miami-Dade County authored the following legislation in the 2005 Florida legislative session.

Section 316.092, Florida Statutes, was created to read:

> *"316.092 Use of limited access facility shoulder by public transit buses - pilot project.-- The Florida Department of Transportation shall conduct a pilot project not to exceed 3 years to allow the use of shoulders of limited access facility by public transit buses in coordination with the appropriate entities that have jurisdiction of the roadway facility. Under the pilot project, public transit buses shall be authorized to operate on the shoulder of a limited access facility under circumstances prescribed by the Department and only when main line traffic speeds are less than 35 miles per hour. The provisions of this section do not apply when the application of such provisions would violate any covenant established in a resolution or trust indenture relating to the issuance of turnpike bonds, expressway authority bonds or other such bonds. Notwithstanding Section 316.0815 (1), F.S., drivers of buses being operated on the shoulder must yield to merging, entering and exiting traffic and must yield to other vehicles on the shoulder. Buses authorized to use the shoulders pursuant to this pilot project shall be operated solely by the local transit agency.*
>
> *The Department shall annually evaluate the pilot project in consultation with the transit agency."*

A Fact Sheet was prepared and included as part of the documentation submitted to the Legislation to provide a better understanding of the project (See Attachment A). This amendment was discussed in the Legislative Transportation Committee and it was determined that the Florida Department of Transportation could initiate a demonstration project without legislation. However, if the demonstration project is successful then the legislation will be required to allow transit bus operation on the freeway shoulders on a long term basis.

As recommended by the Florida Department of Transportation (FDOT), the County has forwarded a sample Letter of Agreement (LOA) (See Attachment B) to all involved parties to accommodate this project. This LOA provides for the necessary coordination among the agencies for developing the project. Once the project is ready for implementation, Miami-Dade Transit (MDT) will proceed to request final approval to those agencies that have jurisdiction in those facilities where the project will be in operation. The County is now in the process of obtaining the signature of the LOA and the final recommendations of this study.

Major Concerns

Major Concerns	Concerns Addressed
Engineering Issues • Shoulders are paved for 10 feet. • Shoulders are not considered travel lanes. • Approval from FDOT is required. • Shoulders are not designed to carry the load of a bus. • Bridges and other structures are a deterrent to through bus movements.	• Shoulders have to be minimum 10 ft. • Traffic along the shoulders is non-recurrent, 4 to 6 trips/hour. • Projects will be closed coordinated with FDOT, MDX and/or the Turnpike and prior approval to operation is required. • Load of the bus will be considered to avoid deterioration of pavement along the shoulders. • Segments are going to be defined for use of shoulders.
Safety Issues • Buses using the shoulder and encountering a parked vehicle would have to merge back into the travel lane reducing the level of service and increasing accident potential on a high speed facility. • Shoulders are also used by police, fire and emergency vehicles during incidents. Buses on the shoulder would again have to merge back into traffic during these periods.	• Buses will yield to any obstacle on the shoulders. Use of shoulders by buses will take place once speed at regular lanes is under congested conditions. Therefore LOS will not be affected along the regular traffic lanes. • No vehicles will be operating at high speed. Bus drivers will be appropriately trained.
Legal Issues • There may be liability issues by permitting buses to operate on a non-through lane structure. • State law in Florida has to be amended to allow buses to utilize shoulders.	• Liability issues will be fully addressed in the study underway. • Amendment to Florida Statute has been submitted.

Major Concerns	Concerns Addressed
Enforcement Issues • Permitting only buses to use shoulders for travel lanes while other vehicles are stopped or slowed may become an enforcement problem. If other drivers see a bus using the shoulder, what will prevent them from following the bus and compounding the problem? There are already occurrences of vehicles trying to use the shoulders to get around crash sites, which increase congestion.	• Enforcement as well as signage has to be part of the implementation plan. Marketing and educational campaigns will also be considered as part of the plan.

Meeting with Minneapolis Officials

Unfortunately, the Minneapolis officials responsible for the development and operation of this project were not able to come to Miami for meetings and presentations. However, a teleconference was held on March 10, 2005, where all agencies were represented.

Major concerns regarding the operation and implementation of the project in Minneapolis were discussed. Even though that this project has been successfully implemented in that city, still there are concerns that need to be clarified before this project can be implemented in Miami-Dade County.

Miami-Dade Transit (MDT) Proposed Routes

Miami-Dade Transit developed the following routes for implementing the express bus services:

A. Turnpike/836 Express Service

This route starts in Kendall Drive through the Florida Turnpike and the SR-836. Following are the alternatives considered in this alignment:

1. West Kendall to Downtown Miami
2. West Kendall to Miami Intermodal Center (MIC) close to the Miami International Airport
3. West Kendall to Downtown Miami via the Dolphin Mall and the International Mall
4. Dolphin Mall and Miami International Mall to the Miami Intermodal Center (MIC)

B. 826 Express Service
From Dadeland South Metrorail Station along the SR-826 to Palmetto Metrorail Station and Westland Mall.

C. Broward Express Service
From Pembroke Lakes Mall through I-75, Miami Gardens Drive, SR-826 to the Palmetto Metrorail Station.

These routes will be discussed in detail during the development of this study.

Other Related Studies and Actions

A. The Special Use Lane Study – Phase I also recommended the development of a Bus Rapid Transit (BRT) System, along Flagler Street and Biscayne Boulevard. Once completed the report and based on the merits of the recommendations, the MPO awarded a contract to the Center for Urban Transportation Research (CUTR) at the University of South Florida to develop the Arterial Core System as recommended in the First Phase of this study. Copy of the Executive Summary of this study is attached as Attachment C.


Overview of Bus Rapid Transit Opportunities as Part of an Integrated Multi-Modal Strategy to Improve Travel Time in Miami-Dade County
(BRT OPPORTUNITIES STUDY)

Executive Summary

Prepared for:
Miami-Dade Metropolitan Planning Organization

Prepared by:
Center for Urban Transportation Research
National Bus Rapid Transit Institute
College of Engineering, University of South Florida
4202 E. Fowler Avenue CUT 100
Tampa, Florida 33620-5375

CUTR

Final – June 2005

As a result of this study, CUTR coincides with the original recommendation for implementing BRT services along Biscayne Boulevard and Flagler Street.

B. Phase II of the project is to determine exactly what segments of the freeway shoulders can be used for congestions by-pass. The analysis will examines shoulder width, accident rates, obstructions such as lighting, signs etc. The combination of all the factors will be put together for each segment of shoulder to determine the suitability for use for congestion by-pass. The arterials under review for this phase of the project are I-95, I-75, SR 826, SR 836, and the Florida Turnpike HEFT to Kendall.

C. Miami-Dade Transit has ordered a number of over-the-road coaches for the use on the express routes. The coaches are scheduled for delivery in December 2005. The new express routes could be implemented in early 2006.

D. Finally, the PTP action plan has scheduled the implementation of 2.5 million additional miles of service to be implemented in November 2005. Part of this new service could be express routes. The new service could start with traditional buses in November then switch to the over-the-road coaches in 2006.

Chapter II - SR 821/SR 836 Corridor

Roadway Characteristics

SR 821 is a portion of the Florida Turnpike System. The far western leg of the Turnpike running north south through Miami-Dade County is referred to as the Homestead Extension of Florida's Turnpike (HEFT). The portion of the Turnpike under consideration here is a very short segment from North Kendall Drive to SR 836. As a property of the turnpike this facility is tolled in each direction. The toll plaza is located south of Bird Road.

Exhibit 2-1

SR 836 or the Dolphin Expressway currently lies between the Florida Turnpike and the I-95. The ramps to the Turnpike have been reconstructed to accommodate a western extension to W 137th Avenue. SR 836 is operated by the Miami-Dade Expressway Authority and, as such, is a tolled facility. The toll plaza shown in Exhibit 2-1 is located between NW 27th Avenue and NW 17th Avenue. As shown in Table 2-1, this corridor has the following interchanges all of which have under a two-mile spacing:

Table 2-1
Interchange Spacing

Interchange	Mile Post	Distance (Miles)
SW 88 Street	20.4	
Bird Rd.	23.65	3.25
US 41 (SW 8 Street)	25.5	1.85
SR 836	27	1.5
SR 821 (Turnpike)	0	0
SR 985 (NW 107 Avenue)	1.25	1.25
SR 973 (NW 87 Avenue)	3.25	2
SR 826 (Palmetto Expressway)	4.22	.97
SR 969 (NW 72nd Avenue)	4.8	.58
SR 959 (NW 57th Avenue)	6.3	1.5
SR 953 (LeJeune)	7.9	1.6
NW 37th Avenue	8.5	.6
SR 9 (NW 27 Avenue)	9.4	.9
NW 17th Avenue	10.4	1.0
I-95	11.6	1.1
Total Distance		**18.1**
The average distance between interchanges is 1.4 miles		

Both the Turnpike and SR 836 have a minimum of three through-lanes in each direction. (there is a short section of the southbound Turnpike From SR 836 and the SW 1st Street crossing that is only 2 through lanes.) There are a number of sections where lengthy auxiliary lanes exist providing a four-lane cross section. The lanes are generally 12 feet wide. The Average Annual Daily Traffic (AADT) on SR 836 ranges from 135,000 vehicles (near NW 107 Avenue) to over 207,000 vehicles (near NW 57th Avenue.) The following Table 2-2 provides the 2004 AADT as maintained by FDOT for both the Turnpike and SR 836.

Table 2-2
Traffic Volumes

Roadway Segment	AADT	AVG.	AVG.
SR 821 at Kendall Dr.	105,700	134,650	155,844
SR 821 at SW 8 Street	163,600		
SR 836 at NW 107 Ave.	135,300	161,900	
SR 836 at NW 87 Ave	113,500		
SR 836 at SR 826	203,000		
SR 836 at NW 57 Ave	207,000		
SR 836 at NW 47 Ave	155,000		
SR 836 at NW 27 Ave	183,000		
SR 836 at NW 12 Ave	136, 500		

Recurrent congestion is a major problem along SR 836 in both directions during most of the day. In the eastbound direction the first backup occurs due to traffic entering from the Turnpike then trying to exit onto NW 107th Avenue. The backup from NW 107th Avenue blocks a lane and causes congestion back on to the Turnpike. Exiting traffic on NW 87th Avenue causes the same phenomenon along the mainline of SR 836. The conflicting merges through the Palmetto Interchange cause the next congestion followed immediately by the left hand and right hand merge from the Palmetto and the off ramp for Milam Dairy. Congestion again occurs due to the lane drop at NW 57th Avenue then again with the very heavy volume of traffic at the left hand exit for NW 42nd Avenue.

Westbound congestion is severe due to the conflicting left and right hand ramps for NW 42nd Avenue. The congestion at this location often backs up to the Miami River Bridge. The congestion continues through the lane drop at NW 57th Avenue and the left and right hand exits for the Palmetto Interchange. Immediately west of the Palmetto traffic opens up until you get to the conflicting weaving movements between the NW 87th on ramp, through the NW 107th Avenue ramps and the exit ramps to the Turnpike.

Congestion on the Turnpike is much more peak hour peak direction. During the morning peak period congestion occurs north bound from Kendall Drive to SR 836. Congestion is not related to merges or interchange spacing, but rather seems to be related to the volume of traffic trying to funnel into SR 836. In the evening peak the congestion is southbound between SR 836 and SW 8th Street. Again this congestion is not related to design as much as it is to high volumes of vehicles from SR 836 trying to get onto the Turnpike.

Both the Turnpike and SR 836 provide standard lighting, signing and pavement markings. The inside shoulder of SR 836 is 4 feet wide; the outside shoulder is 10 feet wide. The shoulders in both directions are constructed of Type S-1 Asphaltic-Concrete with a spread rate of 200 pounds per square yard (equivalent to 2 inches).

The Turnpike also has a minimum of 10 foot outside shoulders. Inside shoulders vary from 6 feet to 16 feet. There is good continuity of shoulders except at the interchanges.

The southbound shoulder between the Bird Road off-ramp and the SW 56 Street crossing has rumble strips that would need to be resurfaced or removed. The northbound shoulder also has rumble strips between the Bird Road off-ramp and the Bird Road on-ramp. (See Exhibits 2-2 and 2-3).

Exhibit 2-2

Exhibit 2-3

One of the major causes of non-recurrent congestion is accidents. During the previous 3-years of records on SR 836 there was an average of 687 accidents per year, which equates to 1.9 accidents per day. These accidents can cause severe delays that back up traffic for miles. Allowing the buses to bypass much of the back up would be a tremendous benefit to the transit riders. However**,** the transit driver would of course always have to yield to emergency vehicles either parked on the shoulder or using the shoulder to access the accident.

One issue for shoulder operation is by-passing the on and off ramps. A high rate of accidents on the ramps could be a potential problem for transit operations. However**,** over the course of the three year reporting period there was only an average of 79 ramp crashes per year. Ramp crashes made up only 11% of the total crashes on SR 836**,** as shown in Table 2-3.

Table 2-3
SR 836
3-Year Accident History

Year	# Crashes	# Fatalities	# Injuries	# Ramp Crashes	%
2001	817	5	801	86	11%
2002	578	3	652	61	11%
2003	665	1	683	82	12%
	2060	9	2136	230	11%
Avg./Year	687	3	712	77	
According to this data, there is an average of 1.9 accidents per day along this corridor. In average, at each accident there is one person injured, but a fatality only occurs one per 229 accidents.					

Regarding the Turnpike segment, there are far fewer accidents, averaging only 211 crashes per year or only .58 accidents per day. Table 2-4 also shown that ramp crashes made up 14% of all the crashes.

Table 2-4
Turnpike
3-Year Accident History

Year	# Crashes	# Fatalities	# Injuries	# Ramp Crashes	%
2001	193	3	172	31	16
2002	210	4	191	31	15
2003	231	4	193	26	11
	634	11	556	88	14
Avg./Year	211	4	185	29	
Based on this data, there is one fatality every 53 accidents and 88% of the accidents involved an injured person.					

Merging space between ramps is an important factor in how the freeways operate. Table 2-5 presents the merge distances, measured from gore to gore, for the expressway segment from the Turnpike at North Kendall Drive to the interchange at the Turnpike and SR 836 to downtown Miami.

Table 2-5
Merge Distances

Merge Segment	Distance (feet)	
	North/East Bound	West/South Bound
SW 88 St and Bird Rd.	14,272’	16,120’
Bird Rd on and off	2,608’	829’
Bird Rd and SW 8 St	7,640’	5,613’
SW 8 St on and off	1,225’	3,068’
SW 8 St to SR 836	4,345’	3,712’
NW 107 Ave on and off	1,827’ 1,753’	2,265’ 908’
NW 107 Ave and NW 87 Ave	7,624’	7,265’
NW 87 Ave on and off	3,263’	5,513’
NW 87 Ave and SR 826	1,917’	1,404’
SR 826 on and off	2,075’ 776’	1,690’
SR 826 and NW 72 Ave	1,969’	2,086
NW 72 Ave on and off	565’	422’
NW 72 Ave and NW 57 Ave	6,420’	6,611’
NW 57 Ave on and off	2,064’	570’
NW 57 Ave and LeJeune Rd	6,610’	6,347’
LeJeune on and off	1,811’ 639’	1,014’ 750’
LeJeune and NW 37 Ave	2,944	

Exhibit 2-4

One of the concerns about transit using the shoulders for congestion by-pass is operation of emergency services along the freeways. Miami-Dade Expressway Authority provides the services of Road Rangers along SR 836. In 2004 there was an average of 37 incidents per day in which the Road Rangers performed some service along the shoulders of SR 836. Exhibit 2-4 shows a Road Ranger in action along this corridor.

Following is a summary of their activity:

- 2004 Total assists in any category on SR 836 = 13,910
- Debris clean-up = 305
- 2004 Shoulder assists = 13,605

Programmed Corridor Improvement

The County's five-year Transportation Improvement Program (TIP) and the twenty-year Long Range Transportation Plan (LRTP) includes a number of projects that will impact the operation and performance of this. TIP projects are funded in the work program and will be built in the next five-years and LRTP projects are only listed if they are in the cost feasible program. Those projects include:

- TIP - New toll plazas in both directions near 97th Avenue along SR 836
- TIP – Widening of the HEFT from Kendall Dr. to SR 836.
- LRTP – Extend SR 836 to NW 137th Avenue
- LRTP – Construct express lanes in the median of SR 836 from the HEFT to SR 826.
- LRTP - Construct a westbound auxiliary lane from NW 57th Avenue to SR 826.
- LRTP - East-West premium transit from FIU to the MIC.
- LRTP- Reconstruct the SR 826/SR 836 Interchange
- LRTP – East-West premium transit from the MIC to Government Center.
- LRTP – Reconstruct SR 836 from NW 27th Avenue to NW 17th Avenue.
- LRTP- Construct collector/distributor roads along SR 836 from NW 17th Avenue to I-95.
- LRTP – Widen the Turnpike to 8 lanes from Kendall to SW 8th Street.

Proposed Express Transit Route

The premium transit service for this corridor is shown in Figure 2-1. It would be a combination of several express routes as follows.

- West Kendall to downtown Miami
- West Kendall to the Miami Intermodal Center (MIC)
- West Kendall to downtown Miami via Dolphin Mall/Miami International Mall
- Dolphin Mall/Miami International Mall to the Miami Intermodal Center (MIC)

The West Kendall to downtown Miami route is 29 miles one-way. The West Kendall to the MIC is approximately 14 miles, and the Dolphin Mall to the MIC route is 8 miles long.

Express service would run every 10 minutes in the weekday peak for both West Kendall routes to downtown Miami with every other trip serving the Dolphin Mall/Miami International Mall. Service from West Kendall to the Miami International would be every 20 minutes in the peak. Service between the Malls and the MIC would be 20 minutes. Service in the reverse direction would operate less frequently.

Off-peak express service would be provided on a route serving all destinations every 20 minutes.

Turnpike/836 Express

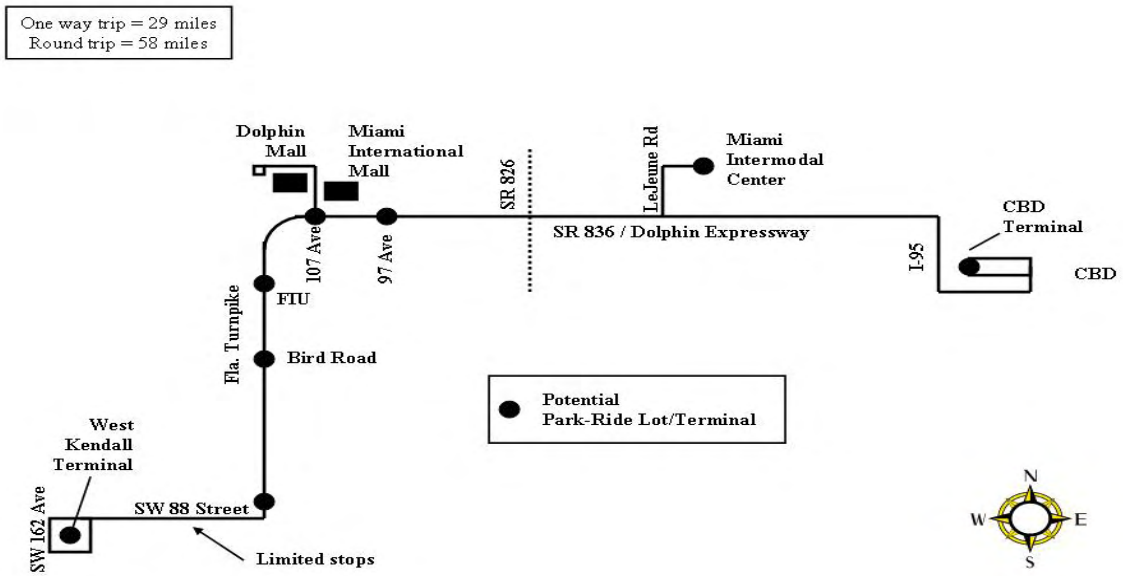


Figure 2-1

Using congestion by-pass, peak-hour, peak-direction express service could be made from Kendall to the Government Center in 50 minutes. Service between Kendall and the Government Center with stops at Dolphin Mall and the MIC would take 65 minutes. The route from West Kendall to the MIC would require about 43 minutes, and the route from the Dolphin Mall to the MIC would take about 35 minutes.

Est. Operating Cost: 25 peak buses
3,550 miles/day
$3,356,000 per year

Potential Park and Ride Locations

Within the Turnpike/SR 836 Corridor there are six potential sites for park and ride facilities to serve the new express bus service. These six sites are shown on aerial photographs in Figures 2-2, 2-3 and 2-4.

1. SW 83rd Street and SW 123rd Avenue behind the shopping center at Kendall and the Turnpike is a large vacant parking lot that could accommodate 800 to a 1000 spaces.
2. At Bird Road east of the Turnpike is the Concord Shopping Plaza. There are a number of vacant stores and any number of spaces should be able to be leased from the owners.
3. At SW 14th Street and SW 117th Avenue there is a strip of vacant land on FIU property. If this land could be used 400 to 500 spaces could be accommodated.
4. On the southwest corner of NW 107th Avenue and 12th Street there is a vacant parcel that could accommodate about 600 spaces.
5. On the northwest corner of NW 97th Avenue and 12th Street that is a very large vacant parcel that could accommodate over 1200 spaces.
6. At NW 87th Avenue all quadrants of the interchange could accommodate parking.

Usable Shoulder Segments

Along the Turnpike the outside shoulders are universally ten feet wide and are continuous except for the on and off ramps and the toll plazas. For time savings it would be desirable for buses to go through the express Sun Pass lanes, which are on the inside lanes. The bus driver would need to use his judgment about when to exit the shoulder, cross the lanes to get into the Sun Pass lanes.

The shoulders in both directions are constructed with rumble strips in the vicinity of Bird Road. The shoulders are also constructed with drainage structures. Both of these features would affect the ride on a transit vehicle and would require some reconstruction to the shoulders.

Exhibit 2-5

Exhibit 2-6

The shoulders along SR 836 for the full length except through the interchanges were usable. However, in Summer 2005 construction started along westbound SR 836 between NW 57th

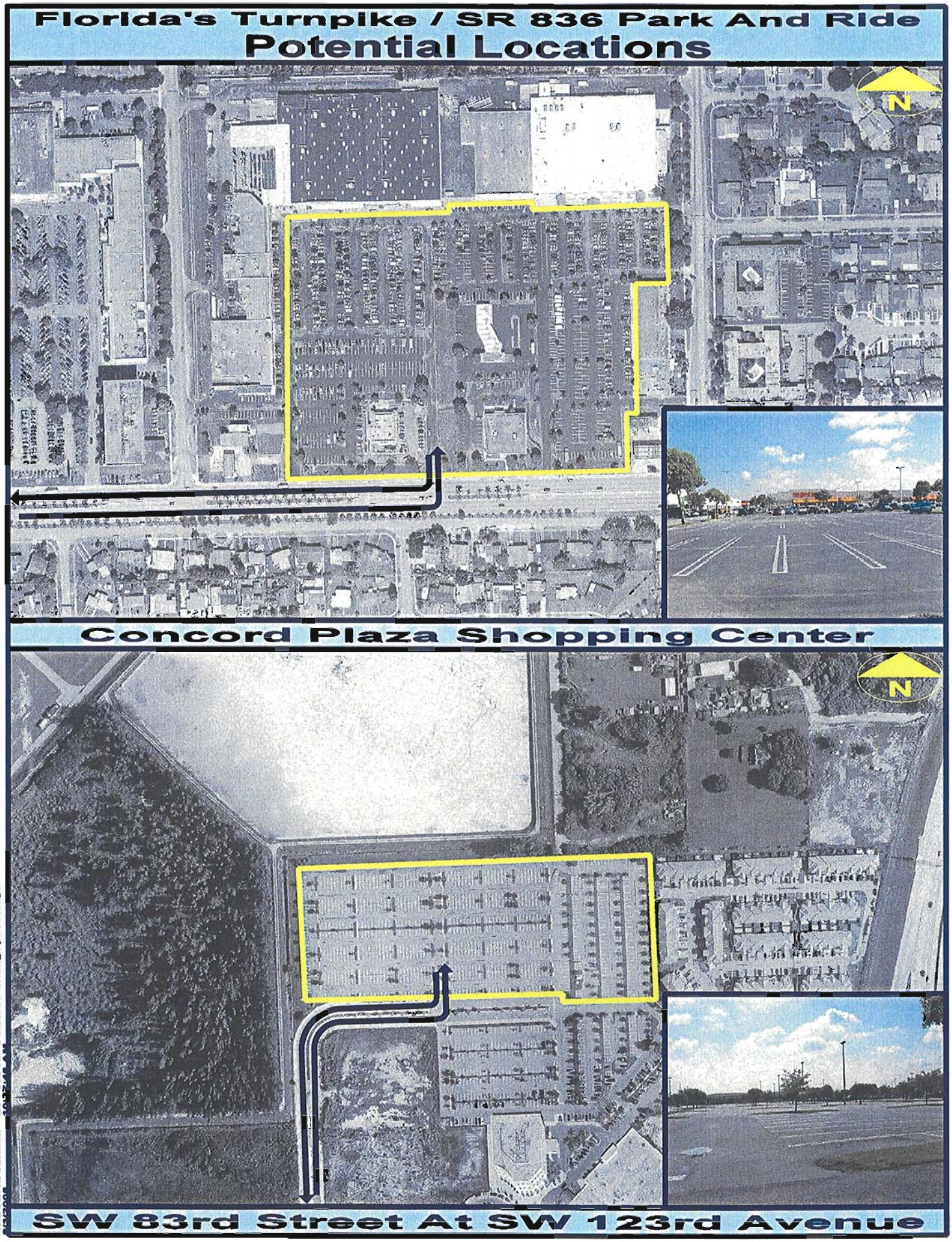

Florida's Turnpike / SR 836 Park And Ride
Potential Locations
N
Concord Plaza Shopping Center
N
SW 83rd Street At SW 123rd Avenue

Figure No.
2-2

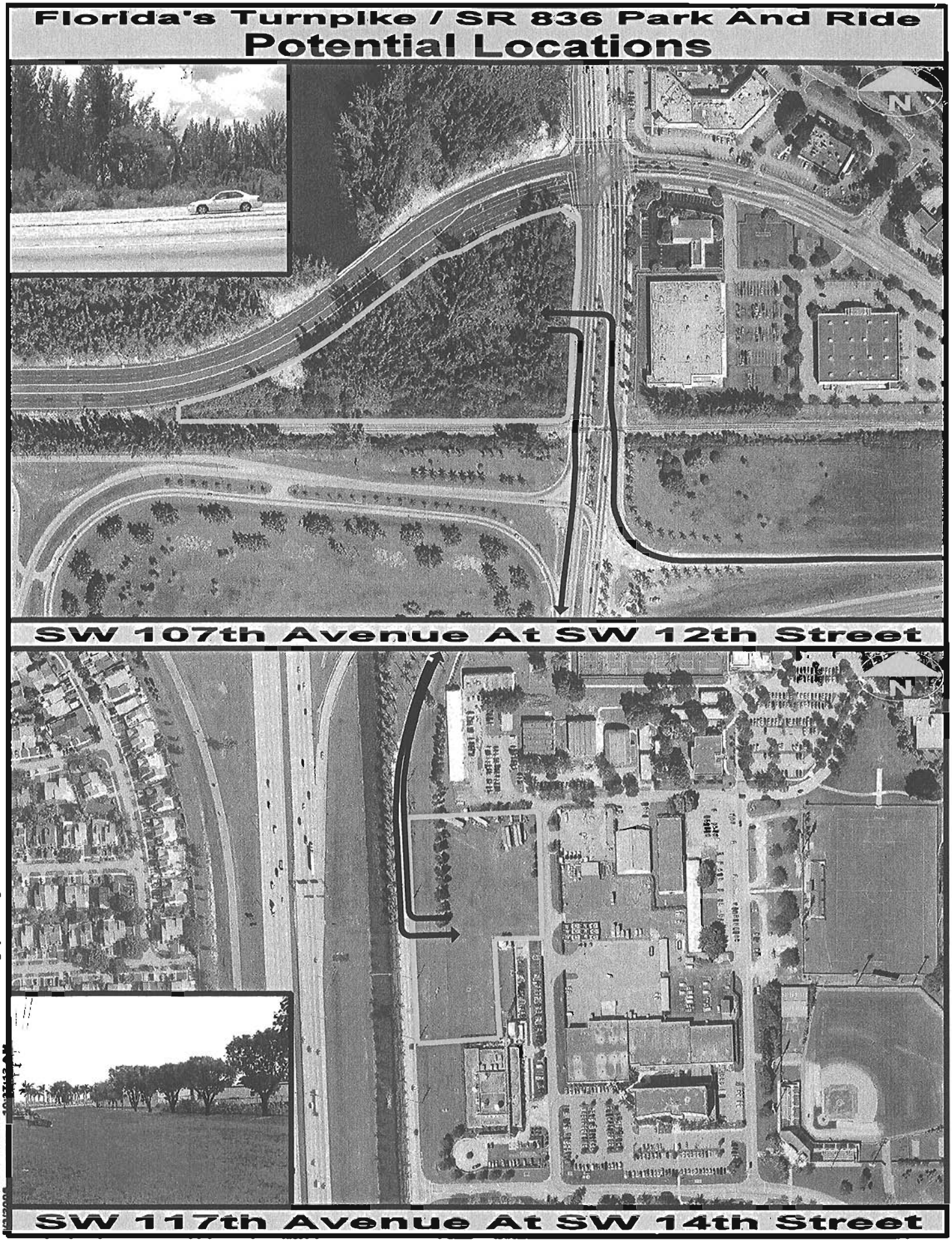

Florida's Turnpike / SR 836 Park And Ride
Potential Locations
N
SW 107th Avenue At SW 12th Street
N
SW 117th Avenue At SW 14th Street

Figure No.
2-3

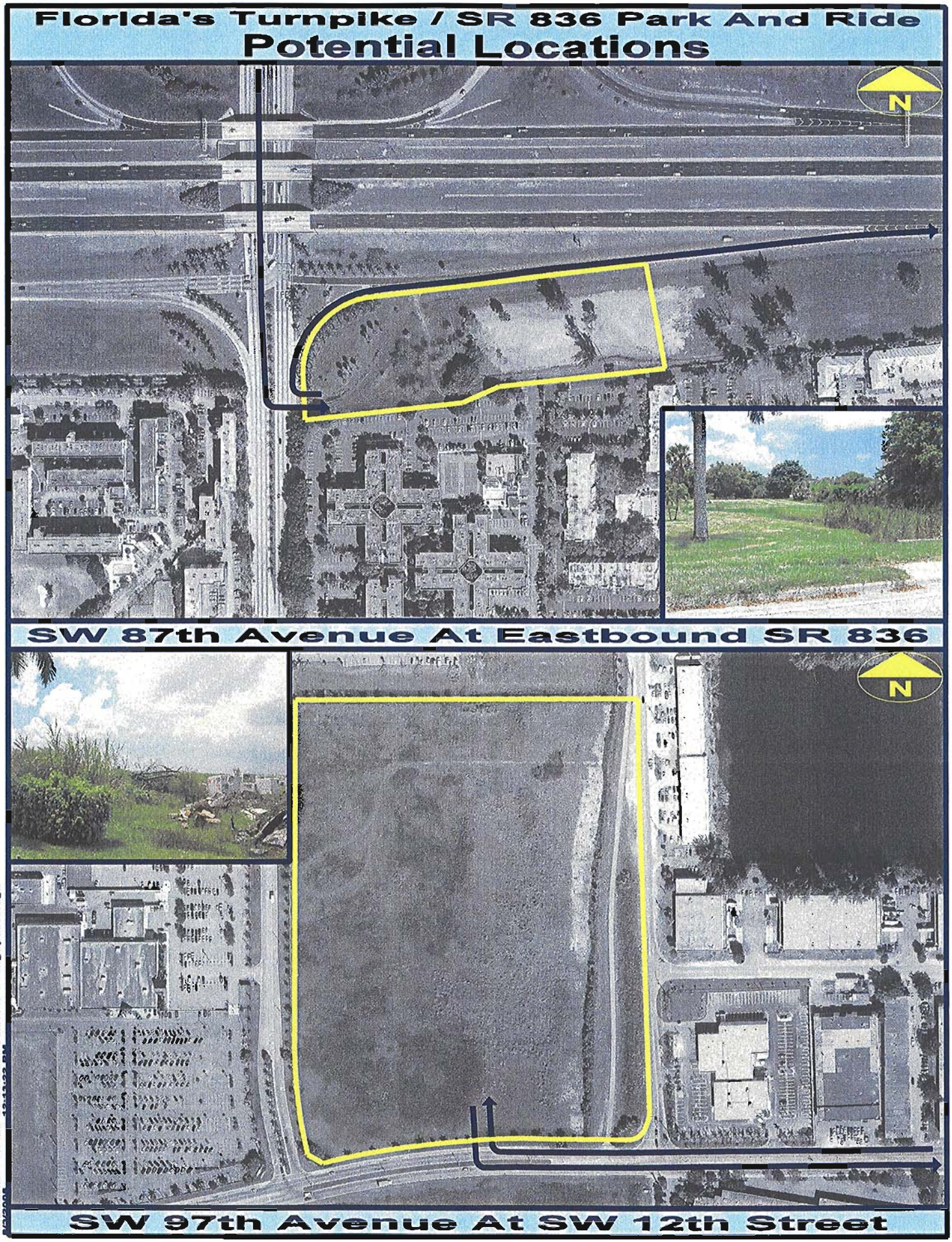

Florida's Turnpike / SR 836 Park And Ride
Potential Locations
N
SW 87th Avenue At Eastbound SR 836
N
SW 97th Avenue At SW 12th Street

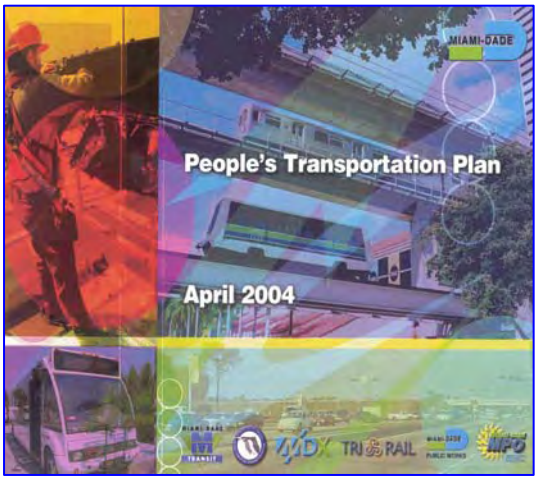
Figure No.
2-4

Avenue and NW 72nd Avenue closing the shoulder (shown in Figures 2-5 and 2-6). For the last several years the ramps from westbound SR 836 to the Turnpike have been under construction affecting the availability of the shoulder. Additionally, in the general vicinity of NW 97th Avenue MDX will be starting construction of a new bi-directional toll plaza. Construction of the toll plaza will impact the availability of the shoulders in both directions between NW 107th Avenue and NW 87th Avenue.

Exhibit 2-7

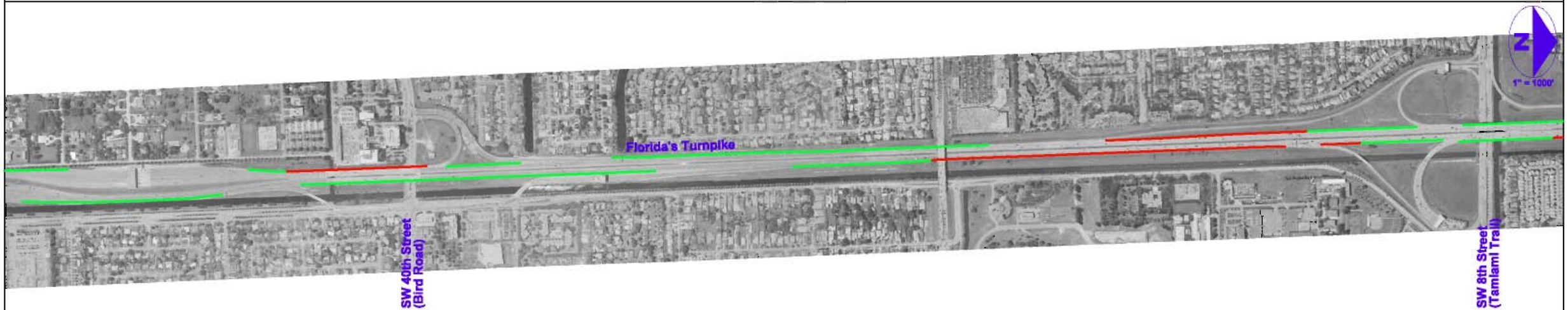
Exhibit 2-7 shows a good example about what non-recurrent congestion may cause. An accident has created miles of congestion. This picture also shows the empty shoulder that could be used by transit buses to by-pass the congestion along this corridor. Definitively, in situations like this, the implementation of this project will save a lot of time to riders on the bus. Figures 2-5, 2-6, and 2-7 illustrate the usable shoulders along Florida's Turnpike and SR 836.

Recommendations



This route suffers severe congestion throughout most of the day. The corridor has a number of destinations along the corridor and has fairly high densities. The corridor is slated for a People's Transportation Plans (PTP) major transit investment. The expressway was recently reconstructed and has shoulders that meet current design standards. Starting in the summer of 2005, Miami-Dade Expressway Authority (MDX) has initiated a major construction program along segments of SR 836. The Maintenance of Traffic plans for these projects will limit the availability of shoulders for transit in the corridor. If this concept is to be useful along the majority of the route the shoulders should be made available for transit vehicles for congestion by-pass, as shown in the following aerial photographs of the alignment. This route is highly recommended for the implementation of the program.

A new peak period express route is planned to be implemented, effective November 21, between the Tamiami Park and Ride Lot and downtown Miami via Sweetwater and the SR 836 (Dolphin) Expressway. The route would operate every 20 minutes during the weekend peak period (6:00 to 9:00 am and 3:30 to 6:30 pm). Passengers in west Miami-Dade could leave their cars in the Tamiami Park and Ride Lot near Coral Way and SW 117 Avenue.



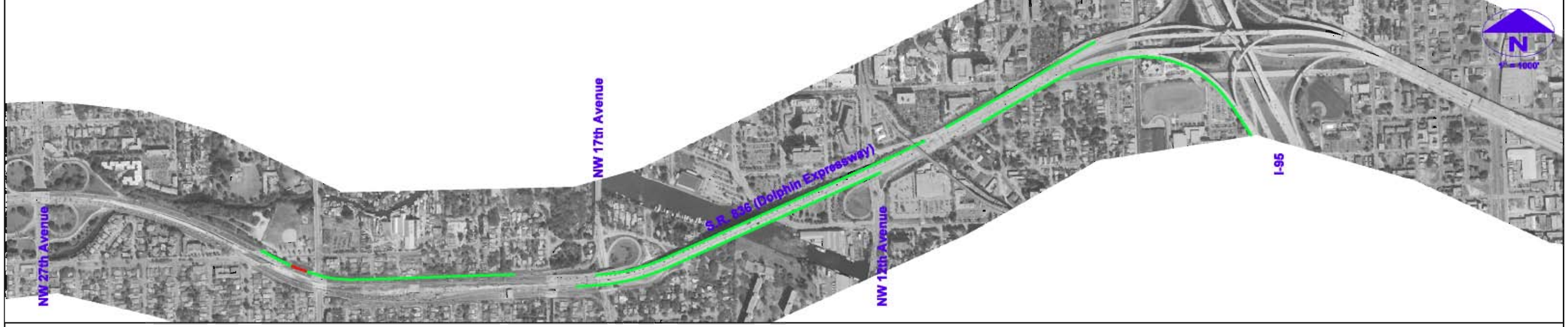
N
1" = 1000'

Legend

- Usable Shoulder
- 10' Shoulder / Barrier Wall
- Under 10' Shoulder
- Under Construction

Special Use Lane Study Phase II	**Miami Dade MPO**	**Florida's Turnpike - Shoulders Usage**	Figure No. **2-5**

Special Use Lane Study Phase II	Miami Dade MPO	S.R. 836 - Shoulders Usage	Figure No. 2-6



Legend

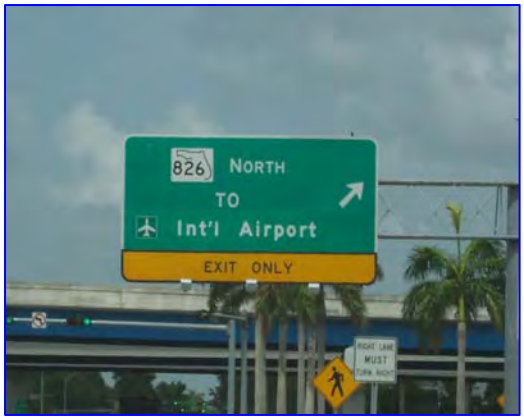
- Usable Shoulder
- 10' Shoulder / Barrier Wall
- Under 10' Shoulder
- Under Construction

Special Use Lane Study Phase II	Miami Dade MPO	S.R. 836 - Shoulders Usage	Figure No. 2-7

Chapter III - SR 826 North/South Portion

Roadway Characteristics

Exhibit 3-1



SR 826 or the Palmetto Expressway currently lies between I-95 on the north and US 1(South Dixie Highway) on the south. SR 826 begins at Dadeland and runs north for a short distance before SR 874 merges into the alignment. A short distance further north SR 826 crosses the Dolphin Expressway, runs past the Airport, Exhibit 3-1, then through Hialeah then Miami Lakes. The expressway turns to the east at Miami Lakes and runs east until it terminates in the Golden Glades Interchange. Long sections of SR 826 are under construction between NW 36th Street and NW 103rd Street. SR 826 is one of the few non-tolled facilities in Miami-Dade County.

The interchange spacing on SR 826 is shown in Table 3-1.

Table 3-1
Interchange Spacing

Interchange	Mile Post	Distance (Miles)
SR 94 (N. Kendall Drive)	0.85	.85
SR 986 (SW 72nd Street)	1.85	1
Miller Dr.	2.85	1
SR 976 (Bird Rd.)	3.91	1.06
SR 90 (SW 8th Street)	5.98	2.07
SR 968 (W. Flagler)	6.45	.47
SR 836 (Dolphin Expressway)	7.2	.75
NW 25 St	8.32	1.12
SR 948 (NW 36th Street)	9.1	.78
NW 58 St	10.3	1.2
SR 934 (NW 79th Street)	11.3	1
SR 25 (Okeechobee Rd.)	12.2	.9
SR 932 (NW 103rd Street)	13.1	.9
NW 122 St	14.3	1.2
I-75	15.4	1.1
NW 154 St	16.3	.9
Total Distance		**16.3**
The average distance between interchanges is 1.1 miles		

Exhibit 3-2

South of Bird Road, SR 826 has only two through-lanes in each direction (there is a short section between Snapper Creek and Sunset Drive that has 6 through lanes.) From Bird Road north there are generally eight through lanes, as shown in Exhibit 3-2. Major portions of the freeway are under construction from NW 25 Street to NW 103 Street. The lanes vary between 12 feet and 11.5 feet wide. The Average Annual Daily Traffic (AADT) on SR 826 ranges from 109,000 vehicles (at the southern terminus near N. Kendall Dr.) to over 216,000 vehicles (near SW 8th Street.)

Table 3-2 provides the 2004 AADT as maintained by FDOT for SR 826.

Table 3-2
2004 Traffic Volumes

Roadway Segment	AADT	AVG.
N of SW 72 St	109,500	
N of SW 56 St	112,500	
N of Bird Rd	197,000	
N of SW 24 St	200,000	
N of SW 8 St	216,000	
N of Flagler	237,000	183,636
N of NW 36 St	213,000	
N of NW 58 St	181,000	
N of NW 74 St	206, 000	
N of NW 103 St	201,000	
N of NW 122 St	147,000	

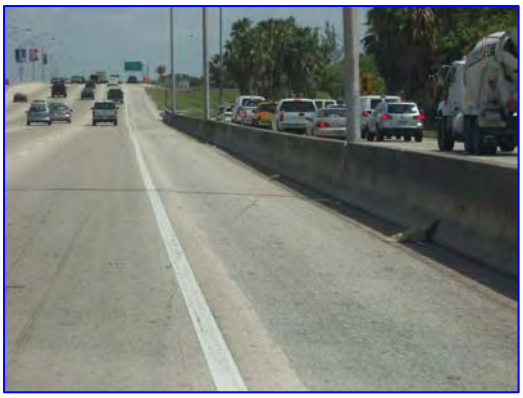
Exhibit 3-3

Recurrent congestion on the Palmetto is a major problem in both directions through out most of the day. As shown in Exhibit 3-3 traffic is severely congested in the northbound direction from SW 24th Street on the south to I-75 on the north. There is almost no break in the congestion between those two points.

In the southbound direction the heavy volume of traffic merging from I-75 onto SR 826 causes long back-ups on I-75 and through the area of SR 836 generally known as the "big curve." The next southbound congestion occurs in the series of conflicting merge movements between Okeechobee Drive and NW 79th Street. Around the NW 36th Street exit traffic backs up for the construction, the NW 25th Street ramp and the SR 836 Freeway ramps. South of the SR 836 interchange congestion occurs at all of the off ramps but the most predominant congestion occurs at the Bird Road off-ramp with traffic generally backed up to SW 24th Street.

SR 826 provides standard lighting, signing and pavement markings. Exhibit 3-4 shows an area with an adequate shoulder, but Jersey barriers and drainage structures make it difficult for bus operations.

Exhibit 3-4



The inside shoulder of SR 826 varies between 6 and 10 feet wide; the outside shoulder is varies as shown in Table 3-3

Table 3-3
Shoulder Width

Location	Shoulder Width
SR 94 to SR 976	10'
SR 976 to NW 25th Street	6'
NW 25 St. to SR 948	12'
SR 948 to NW 58 St	8'
NW 58 St to SR 934	12'
SR 934 to SR 25	10'
SR 25 to SR 932	10'
SR 932 to NW 154 St.	12'

During the previous 3-years of records on SR 826 there was an average of 1406 accidents per year, which equates to 3.8 accidents per day, as shown in Table 3-4. This is the higher average number of accidents of the corridors studied in this report. We have to take into consideration that during this period, SR-826 has been under construction which increase the risk for having an accident. Definitively, these accidents are causing severe delays that back up traffic for miles.

Allowing the buses to bypass much of the back up would be a tremendous benefit to the transit rider. But, based on the number of accidents and the fact that this corridor is still under construction, the possibility of implementing the use of shoulders by transit buses are not recommendable at this time.

Another factor to consider during this shoulder operation is by-passing the on and off ramps. A high rate of accidents on the ramps could be a potential problem for transit operations. However, over the course of the three year reporting period there was only an average of 222 ramp crashes per year. Ramp crashes made up 16% of the total crashes on SR 826.

Table 3-4
3-Year Accident History

Year	# Crashes	# Fatalities	# Injuries	# Ramp Crashes	%
2001	1532	3	1354	243	16%
2002	1275	7	1331	213	17%
2003	1412	7	1426	209	15%
Totals	4219	17	4111	665	16%
AVG./Year	1,406	6	1,370	222	
For the 3-year period, the data shown an average of one fatality every 248 accidents, but 97% of the accidents involved an injured person.					

Table 3-5 presents the merge distances, measured from gore to gore, for the expressway segment from North Kendall Drive to the interchange at NW 154th Street in Miami Lakes.

Table 3-5
Merge Distances

Merge Segment	Distance (feet)	
	North Bound	South Bound
Kendall and Sunset	2,460’	2,994’
Sunset on and off	1,774’	1,394’
Sunset and SW 55 St	3,733’	3,839’
SW 55 St on and off	1,536’	1,700’
SW 55 St to SR 874	1,927’	2,693’
SR 874 and Bird Rd	2,334’	2,740’
Bird Rd on and off	1,415’	
Bird Rd and SW 24 St	4,108’	5,222’
SW 24 St on and off	327’	444’
SW 24 St and SW 8 St	3,886’	2,830’
SW 8 St on and off	776’ 1,288’	454’ 1,167’

	739’	1,077’
SW 8 St and W Flagler	2,086’	2,160’
W Flagler on and off	417’	359’
W Flagler and SR 836	2,038’	2,138’
SR 836 on and off	533’ 729’	982’ 1,246’
SR 836 and NW 25 St	4,752’	3,675’
NW 25 on and off	1,653’	1,658’
NW 25 St and NW 36 St	2,820’	2,915’
NW 36 St on and off	470’ 591’ 428’	428’ 597’ 433’
NW 36 St and NW 58 St	4,615’	4,810’
NW 58 St on and off	1,684’	1,394’
NW 58 St and NW 74 St	3,738’	3,849’
NW 74 St on and off	1,230’	1,209’
NW 74 St and US 27	3,084’	3,152’
US 27 on and off	364’ 1,251’ 354’	333’ 1,230’ 412’
US 27 to NW 103 St	2,904’	2,360’
NW 103 St on and off	2,038’	1,383’ 1,056’
NW 103 St and NW 122 St	4,224’	4,155’
NW 122 St on and off	491’	1,959’
NW 122 St and I-75	3,078’	2,693’
I-75 on and off	2,730’ 1,320’ 3,152’	1,748’ 1,806’
1-75 and NW 154 St		2,202’

Road Rangers provide emergency services along the SR-826. Data showed that in 2004 there was an average of 89 incidents per day in which the Road Rangers performed some service along the shoulders of SR 826. Following is a summary of their activity:

- 2004 Total assists in any category on SR 836= 33,868
- Debris clean-up = 1,109
- 2004 Shoulder assists = 32,759

Programmed Projects

The County's TIP and LRTP propose a number of projects in the SR 826 corridor. The construction of these projects will likely impact the future operation of congestion by-pass lanes operated on the shoulders. The follow projects are programmed in the corridor:

- TIP - Reconstruct the Miller, Bird and SR 874 interchanges along SR 826.
- TIP - Reconstruct the SR 826/SR 836 Interchange
- TIP - Widen and reconstruct SR 826 from SW 32nd Street to NW 47th Street.
- LRTP – Reconstruct SR 836 from Sunset to SW 32nd Street.

Proposed Express Transit Route

A new express route would be developed from the Dadeland area to the Palmetto Metrorail Station and Westland Mall via the Palmetto Expressway, as shown in Figure 3-1. The route would serve the Dadeland Metrorail Station and Dadeland Mall. Although the end of the route is shown as Westland Mall, this may change with further evaluation. This express route would operate in both directions.

Using the shoulders as congestion by-pass the express bus should be able to maintain an average speed of 35 mph negotiating the distance from Dadeland Mall to Westland Mall in 30 minute. Because of the congestion at ramps and all of the arterials in the vicinity of SR 836 MDT should add approximately 10 minutes to the scheduled running time for each park and ride area served.

Service Characteristics:	20 minute headway Weekday peak hours
Estimated Operating Cost:	Five peak buses 540 miles/day $550,000 per year

Currently, there are some sections of the SR 826 that are being used by transit, as shown in Exhibit 3-5. Buses have to compete with regular traffic making it difficult when traffic is bumper to bumper. Additionally, this congestion may take miles of the highway, as shown in Exhibit 3-6.

Exhibit 3-5

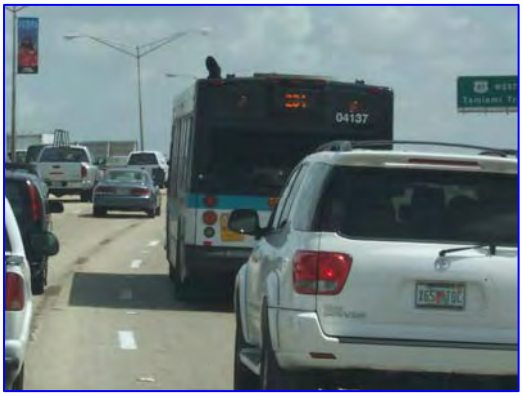


Exhibit 3-6

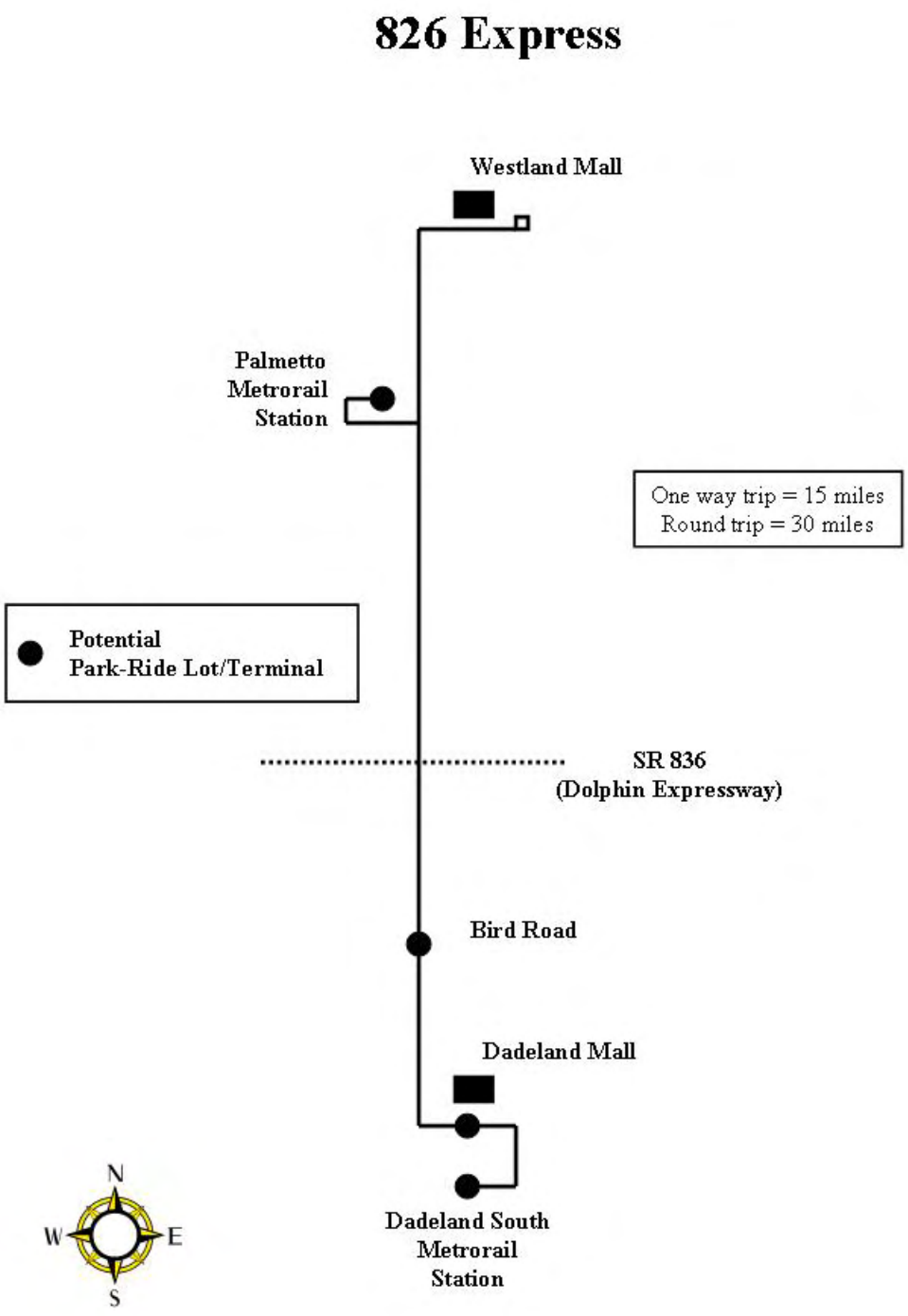

826 Express
Westland Mall
Palmetto
Metrorail
Station
One way trip = 15 miles
Round trip = 30 miles
Potential
Park-Ride Lot/Terminal
SR 836
(Dolphin Expressway)
Bird Road
Dadeland Mall
Dadeland South
Metrorail
Station
N
W
E
S

Figure 3-1

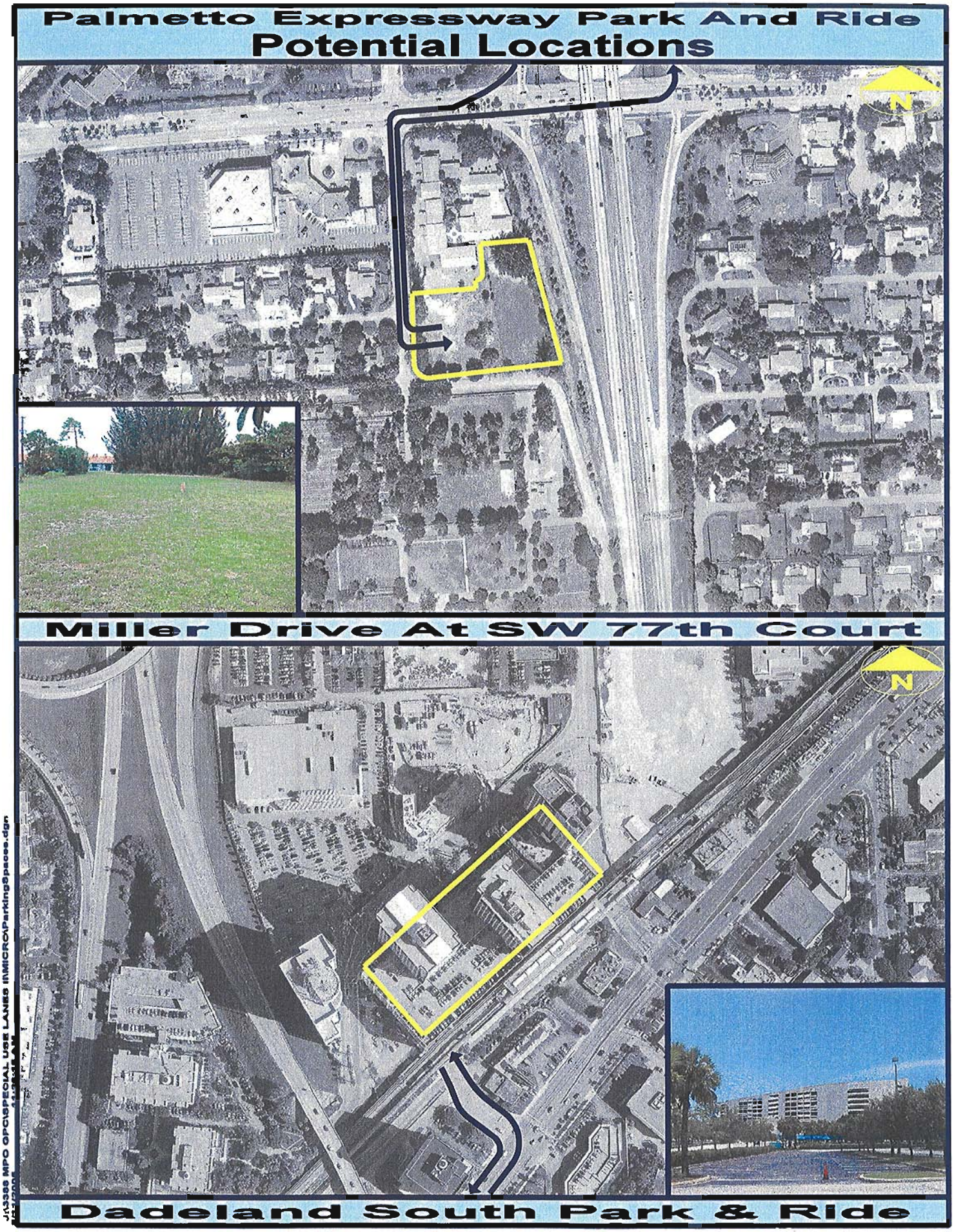

Palmetto Expressway Park And Ride
Potential Locations
N
Miller Drive At SW 77th Court
N
Dadeland South Park & Ride

Figure No.
3-2

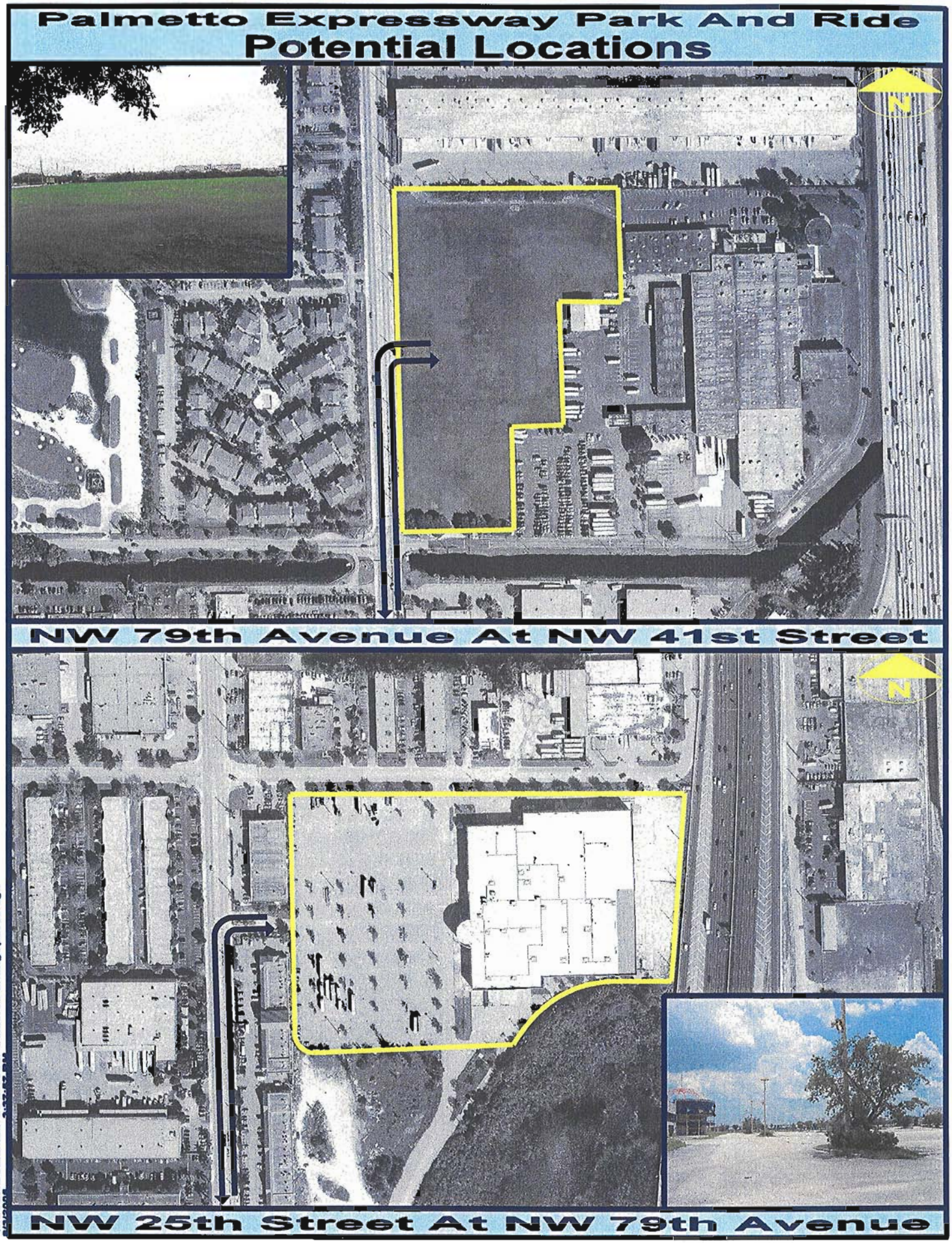

Palmetto Expressway Park And Ride
Potential Locations
N
NW 79th Avenue At NW 41st Street
N
NW 25th Street At NW 79th Avenue

Figure No.
3-3

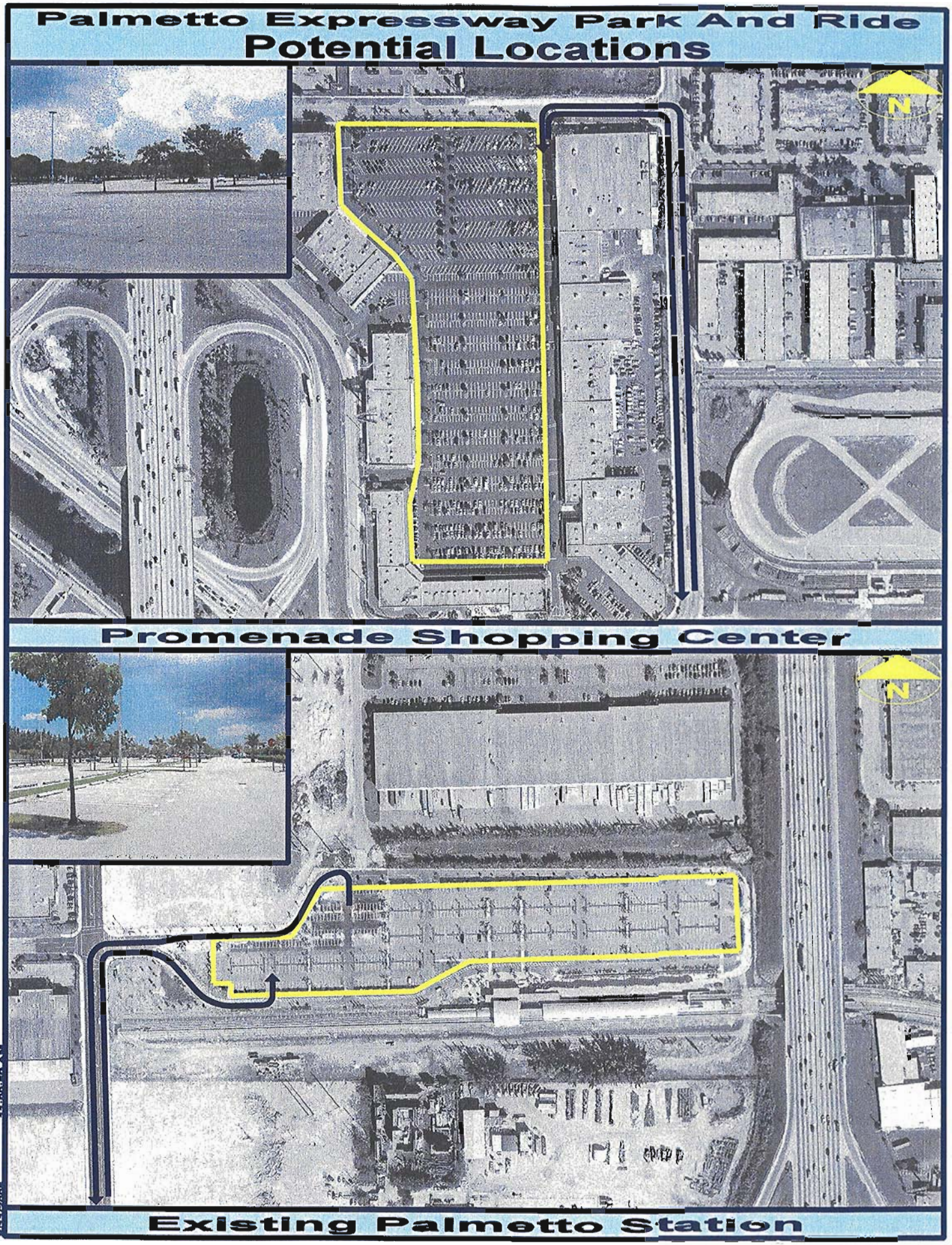

Palmetto Expressway Park And Ride
Potential Locations
N
Promenade Shopping Center
N
Existing Palmetto Station

Figure No.
3-4

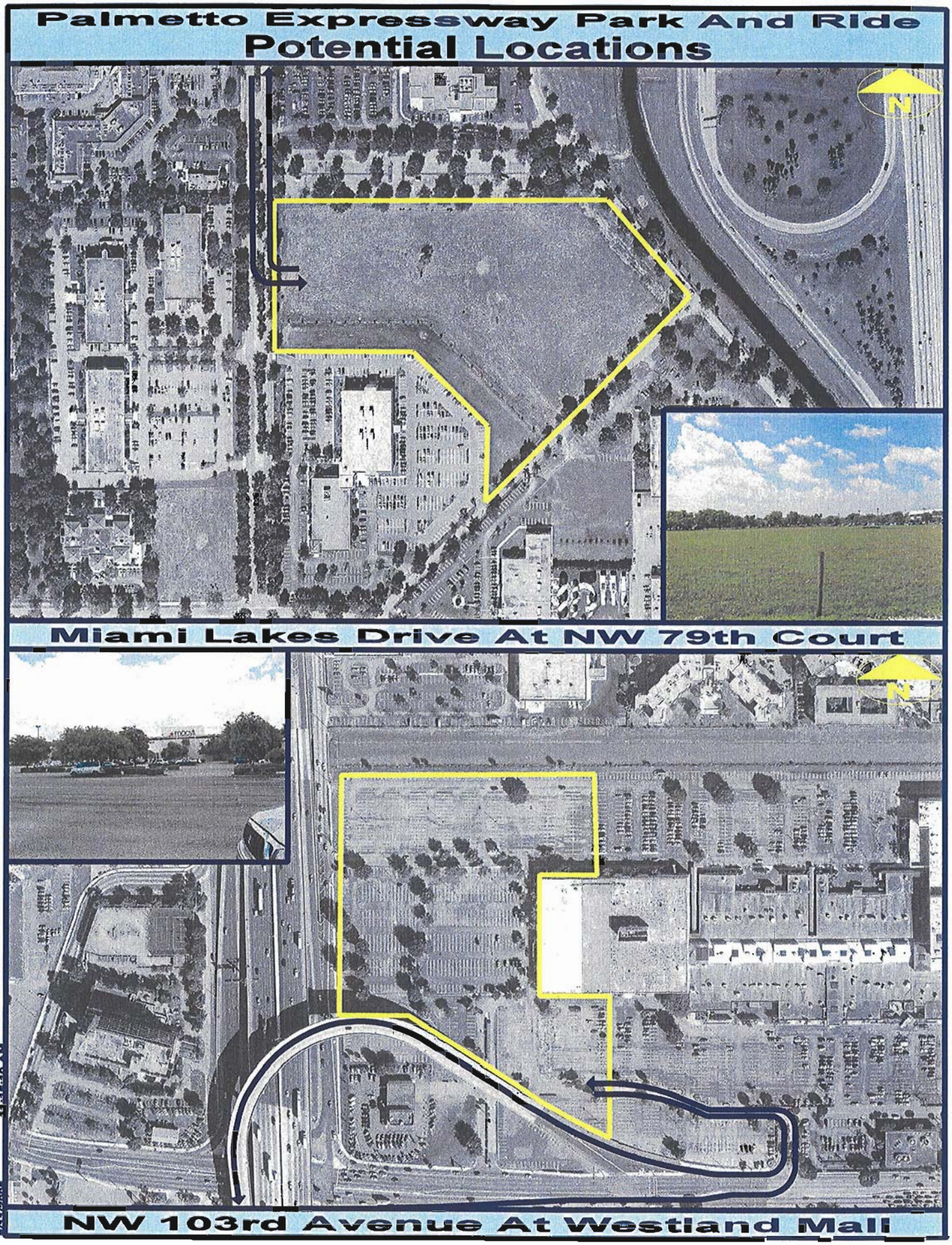

Palmetto Expressway Park And Ride
Potential Locations
N
Miami Lakes Drive At NW 79th Court
N
NW 103rd Avenue At Westland Mall

Figure No.
3-5

Potential Park and Ride Locations

Within the SR 826 Corridor there are a number of opportunities for large park and ride lots. The list below is much longer than initially needed for this project. Figures 3-2 through 3-5 provide aerial photographs of the possible park and ride locations. The description of locations begins in the south.

1. The most important park and ride lots are at the termini of the project. There are large lots at both Dadeland North and Dadeland South for Metrorail. These lots would be shared with the express service on the SR-826; unfortunately these lots are already heavily used by Metrorail patrons.
2. SW 77th Court and SW 56th Street. This lot is large enough to support 200 spaces.
3. NW 25th Street and SW 79th Avenue. The old Incredible Universe Warehouse site is very large and could contain as many park and ride spaces as desired.
4. NW 79th Avenue and 41st Street is a vacant site that could accommodate up to 1000 spaces.
5. There is a potential to lease spcesPromenade Shopping Center
6. The existing park and ride lot at the Palmetto Metrorail Station has sufficient space to accommodate this option as well.
7. There is the potential to lease spaces from the Westland Mall.
8. Miami-Lakes Dr. and NW 79th Court. There is a vacant parcel in an industrial park that is large enough to support 1,000 park and ride spaces.

Useable Shoulder Segment

Exhibit 3-7

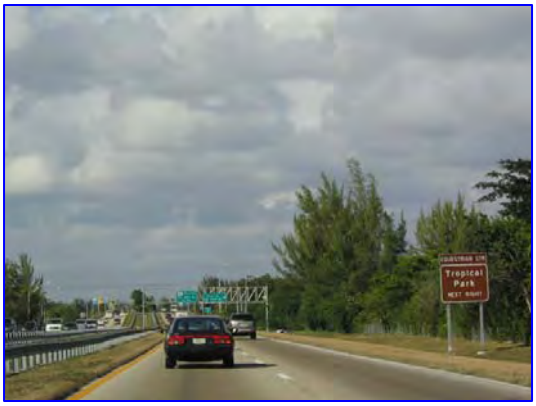
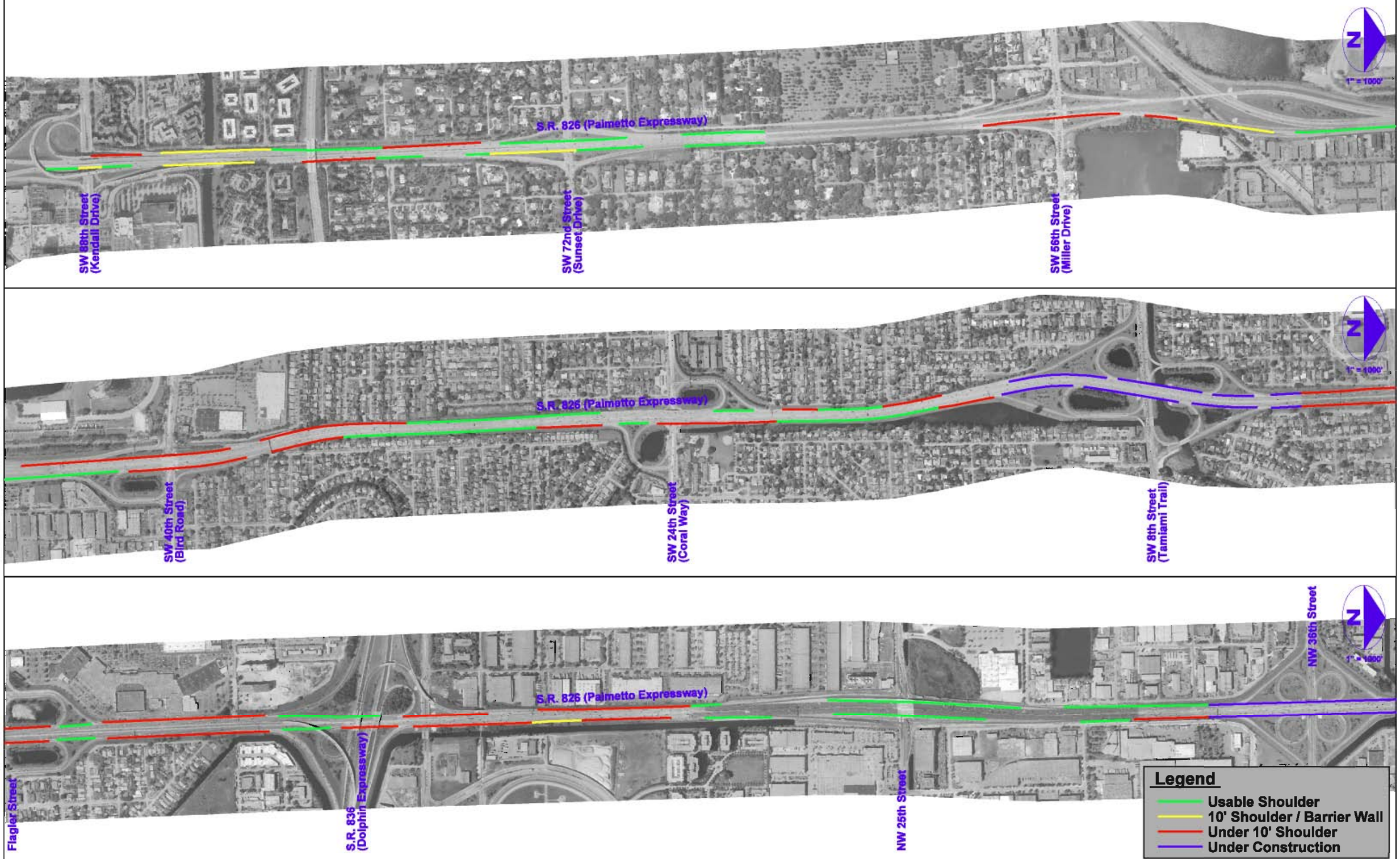


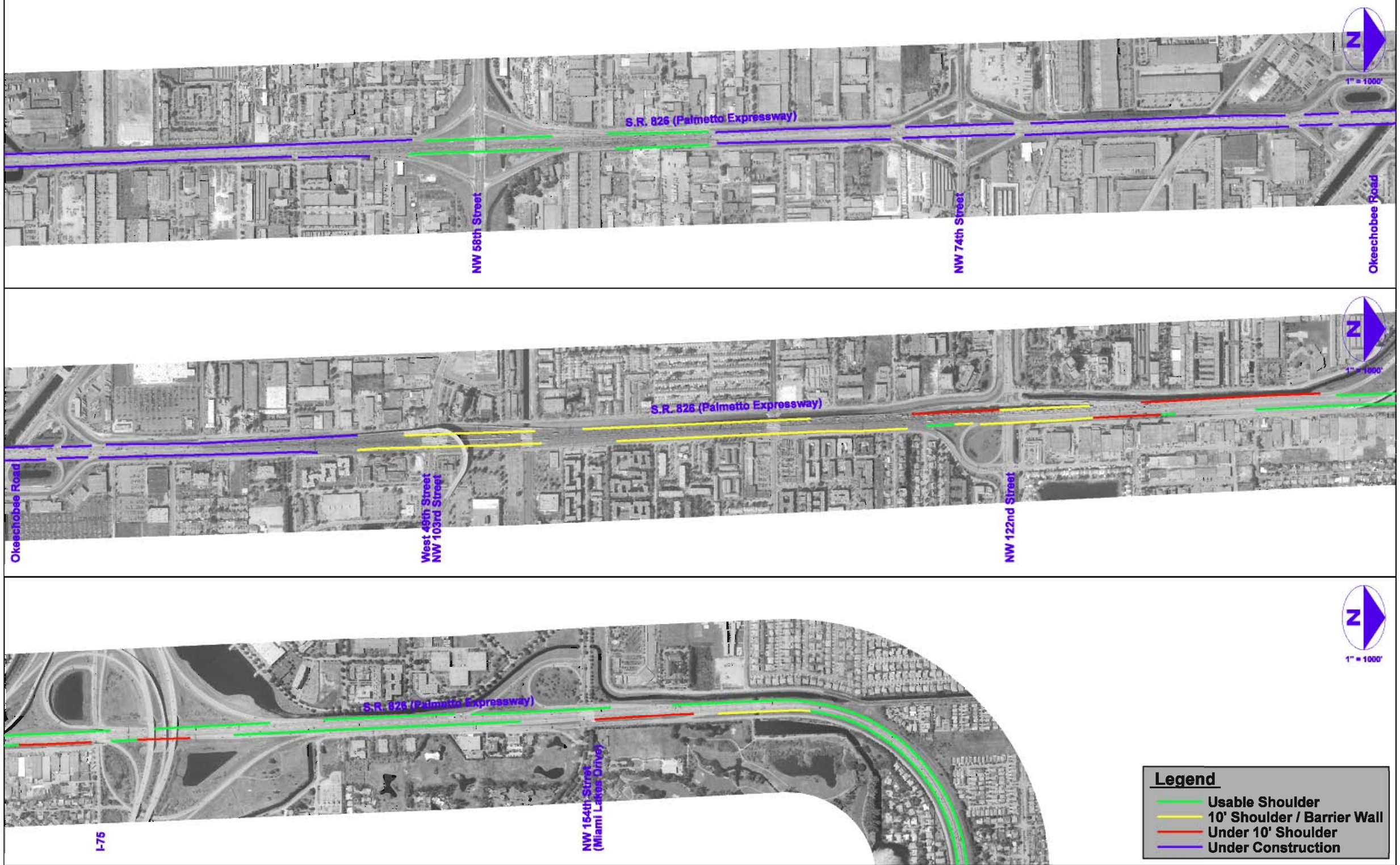
Exhibit 3-7 illustrates the usable shoulder segment along SR 826. South of the Snapper Creek over crossing there are no shoulders along SR 826. Between Snapper Creek and Sunset Drive there is a 10 foot shoulder with an adjacent barrier wall. The 10 foot shoulder with a barrier wall is unacceptable for use of the shoulder by transit. Between Sunset and Miller there are outside shoulders. From Miller to Bird Road the density of ramps makes the shoulder difficult to follow or use. Figures 3-6, 3-7, and 3-8 show the locations of usable shoulders along SR 826.

From Bird Road to SR 836 the shoulder is only 6 feet wide and cannot be used. The shoulder south of SR 836 is basically unusable for this concept.

North of SR 836 the area from NW 25th Street to NW 103rd Street is under construction and should not be considered for use. The area from NW 103rd Street to NW 154th Street has usable shoulders.



Special Use Lane Study Phase II	Miami Dade MPO	S.R. 826 - Shoulders Usage	Figure No. 3-6



Special Use Lane Study Phase II	Miami Dade MPO	S.R. 826 - Shoulders Usage	Figure No. 3-7

N

1" = 1000'

Legend

- Usable Shoulder
- 10' Shoulder / Barrier Wall
- Under 10' Shoulder
- Under Construction

Special Use Lane Study Phase II	Miami Dade MPO	S.R. 826 - Shoulders Usage	Figure No. 3-8

In the southbound direction the shoulder is unusable between Okeechobee Boulevard and NW 74th Street. During any given time the shoulder is also unavailable between NW 36th Street and NW 25th Street,

In both directions south of the SR 836 the Coral Way interchange is being set up for construction.

Recommendation

There are a large number of trip attractors along the SR 826 corridor that would justify express bus service on the facility. However, the very high traffic volumes coupled with the construction result in very low peak period travel speeds. As can be seen above there are almost no segments of SR 826 that can currently be used for shoulder congestion by-pass areas, due to existing construction. It is recommended that this concept be strongly considered for the corridor wherever possible. The program needs to remain extremely flexible because of the construction along this corridor. Exhibits 3-8 and 3-9 show how construction along the Palmetto closes the shoulder area making it unavailable for bus operation.

As soon as construction is complete along the corridor north of Flagler Street, MDT should initiate the coordination with FDOT for using the shoulders. The express route already implemented from Broward should be benefited by fast access to the Palmetto Metrorail station.

Exhibit 3-8

Exhibit 3-9

Chapter IV - I-75/SR 826

Roadway Characteristics

I-75 runs between SR 826 or the Palmetto Expressway and the west coast of Florida. I-75 begins at the Palmetto and runs northwest for a short distance before SR 860 merges into the alignment. I-75 then runs through the western suburbs of Broward County prior to turning to the west and crossing the State as Alligator Alley. The portion of I-75 under consideration is a non-tolled facility. I-75 is one of the newer highway facilities in south east Florida and has interchange spacing in excess of 2 miles. The interchange spacing for SR 826 (discussed in the previous chapter) is also shown in the following Table 4-1.

Table 4-1
Interchange Spacing

Interchange	Mile Post	Distance (Miles)
I-75 @ SR 826	0	
I-75 @ NW 87th Avenue	1.5	1.5
I-75 @ SR 860 (HEFT)	4.5	3
I-75 @ Miramar Parkway	1.5	2.44
I-75 @ Pines Boulevard	3.75	2.25
SR 826 @ SR 934 (NW 74th Street)	11.3	1
SR 826 @ SR 25 (Okeechobee Rd.)	12.2	.9
SR 826 @ SR 932 (NW 103rd Street)	13.1	.9
SR 826 @ NW 122 St	14.3	1.2
SR 826 @ I-75	15.4	1.1
SR 826 @ NW 154 St	16.3	.9
Total Distance		**15.19**
The average distance between interchanges is 1.5 miles		

I-75 has four through-lanes in each direction. The lanes are12 feet wide. The Average Annual Daily Traffic (AADT) on I-75 ranges from 104,000 vehicles (at Pines Boulevard.) to over 157,000 vehicles (near Miramar Parkway**).** Table 4-2 provides the 2004 AADT as maintained by FDOT for I-75.

Table 4-2
2004 Traffic Volumes

Roadway Segment	AADT	AVG.
I-75 S of Pines	104,500	149,688
I-75 S of Miramar	157,500	
I-75 N of HEFT	146,500	
I-75 S of HEFT	116,500	
I-75 S of Miami Gardens	118,500	
SR 826 N of NW 74 St	206, 000	
SR 826 N of NW 103 St	201,000	
SR 826 N of NW 122 St	147,000	

Congestion along SR 826 is discussed in Chapter 3. Northbound traffic along most of the length of I-75 is heavy but for the most part travels at posted speeds. In the southbound direction congestion occurs from the split to the Turnpike and can back up as far as Miramar Parkway during the morning rush hour. The entrance to SR 826 can be severely congested back to NW 85th Street. Although the backup may not be long in distance the amount of time necessary to traverse that mile can be significant.

I-75 provides standard lighting, signing and pavement markings. This roadway section has excellent shoulders meeting the minimum of 10 foot width at the inside and the outside with a clear path of obstructions, except at the interchanges. The shoulder on the section of SR 826 under consideration is all 10 feet for greater.

The records show in Table 4-3 that in the last 3-years on I-75, between Pines Boulevard and SR 826, there was an average 214 accidents per year, which equates to 0.58 accidents per day. Based on the available data, field inspections and the proposed segments to be used along I-75, transit buses are not required to use the shoulders to by-pass traffic congestion at this stage. The only condition to justify this action is if an accident occurs at that segment. However, future considerations should be given to this corridor if the proposed service continues south to access the SR-826. If so, use of the shoulder in the access ramp need to be evaluated.

One issue for shoulder operation is by-passing the on and off ramps. A high rate of accidents on the ramps could be a potential problem for transit operations. However, over the course of the three year reporting period there was only an average of 44 ramp crashes per year. Ramp crashes made up 20% of the total crashes on I-75.

Table 4-3
3-Year Accident History

Year	# Crashes	# Fatalities	# Injuries	# Ramp Crashes	%
2001	185	6	184	32	17%
2002	219	4	230	54	24%
2003	239	9	224	47	19%
Totals	643	19	638	133	20%
Avg./Year	214	6	213	44	
The data indicates that there is a fatality every 36 accidents and basically, all accidents involved an injured person.					

Table 4-4 presents the merge distances, measured from gore to gore, for the expressway segment from Pines Boulevard to the interchange at SR 826 in Miami Lakes.

Table 4-4
Merge Distances

Merge Segment	Distance (feet)	
	North Bound	South Bound
SR 826 on and off ramps	1,705’	612’
SR 826 and NW 84 St	2,994’	1,668’ 3,765’
NW 84 St on and off ramps	4,916’	2,656
NW 84 St and NW 186 St	10,597’	14,541’
NW 186 St on and off ramps	3,490’	1,315’
NW 186 St and Turnpike	5,442’	2,249’
Turnpike and Miramar	6,067’	7,212’
Miramar on and off ramps	3,736’	4,218
Miramar and Pines Blvd.	8,780	8,004
NW 74 St on and off	1,230’	1,209’
NW 74 St and US 27	3,084’	3,152’
US 27 on and off	364’ 1,251’ 354’	333’ 1,230’ 412’
US 27 to NW 103 St	2,904’	2,360’
NW 103 St on and off	2,038’	1,383’ 1,056’
NW 103 St and NW 122 St	4,224’	4,155’
NW 122 St on and off	491’	1,959’
NW 122 St and I-75	3,078’	2,693’
I-75 on and off	2,730’	1,748’

	1,320' 3,152'	1,806'
1-75 and NW 154 St		2,202'

Programmed Projects

There are no projects programmed in either the TIP , but there is one project listed in the LRTP for this corridor – Improvements to the I-75/Miami Gardens Drive interchange.

New Express Bus Route

During the summer of 2005 a new express route began operation from Pembroke Pines to the Palmetto Metrorail Station in Medley via I-75 and the Palmetto Expressway, as shown in Figure 4-1.

Potential park-ride lots would exist in the Pembroke Lakes Mall area and at Miami Gardens Drive. The express route could be diverted via Miami Gardens Drive and Ludlam Road to serve higher density residential areas in Northwest Miami-Dade. Two-way service would be provided allowing Miami-Dade residents access to jobs in Southwest Broward.

Service Characteristics: 20 minute headway
Weekday peak hours

Estimated Operating Cost: Six peak buses
510 miles/day
$530,000 per year

Potential Park and Ride Facilities

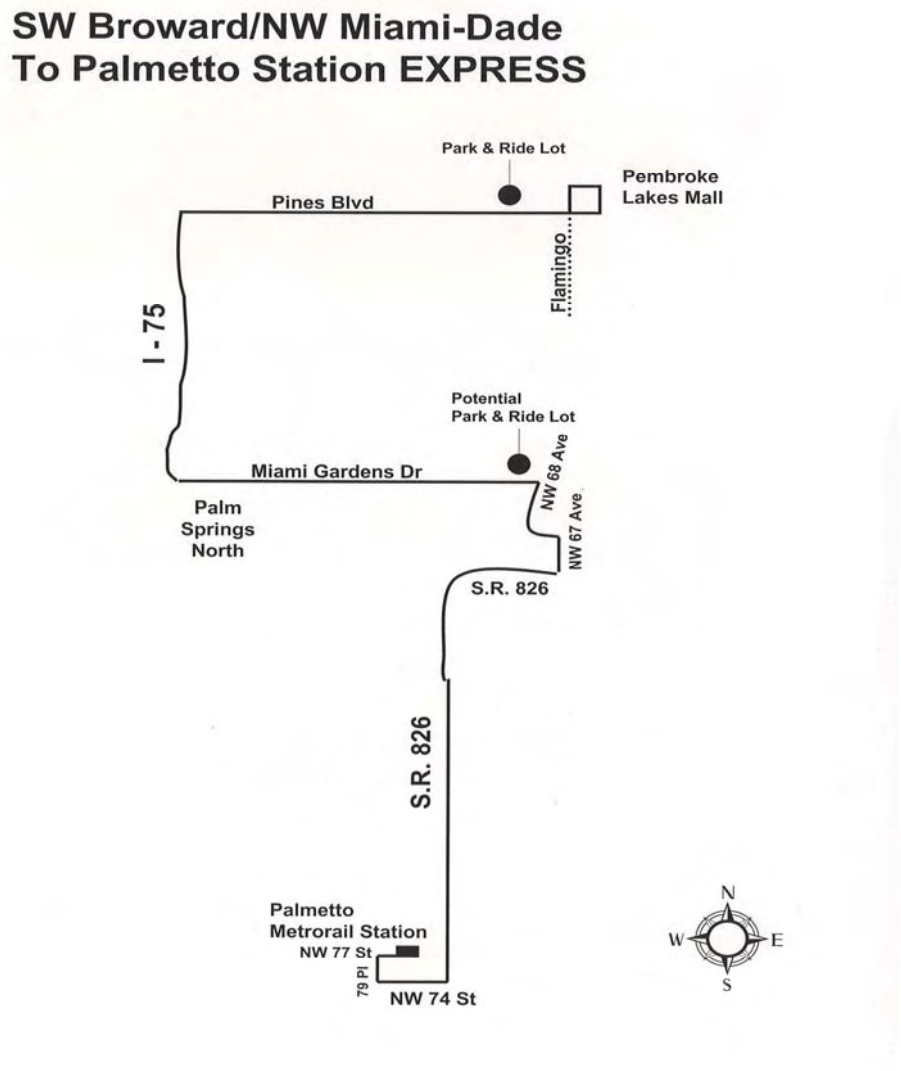
Within the SR 826 Corridor there are a number of opportunities for large park and ride lots. The list below is much longer than initially needed for this project.

The description of locations begins in the south.

1. The existing park and ride lot at the Palmetto Metrorail Station has sufficient space to accommodate this option as well. (figure 3-11)
2. There is the potential to lease spaces from the Hialeah Promenade Shopping Center. (figure 3-11)
3. Miami Lakes Dr. and NW 79th Court. There is a vacant parcel in an industrial park that is large enough to support 1,000 park and ride spaces. (figure 3-5)
4. There is an existing park and ride lot on the northwest corner of Pines Boulevard and Flamingo at C.B. Smith Park.

5. There is a potential to lease space from the Pembroke Falls Shopping Center.

Figure 4-1



Usable Shoulder Segments

On I-75 the 10-foot shoulders are entirely usable between the ramps for Pines Boulevard and the ramps of Miami Gardens Drive. The bus would be required to merge across the Miramar Parkway ramps and the Florida Turnpike ramps.

On SR 826 the 10 and 12 foot shoulders are usable from NW 67th Avenue to NW 103rd Street where the construction starts. The outside shoulders are frequently accompanied by jersey barriers and drainage is accommodated along the shoulder. The jersey barrier

adjacent to a 10 foot lane creates an undesirable condition. The minimum shoulder width adjacent to a barrier, to accommodate the use by a transit vehicle, is 11.5 feet.

The presence of drainage structures in the shoulders has been indicated to impact the ride of vehicles on the shoulder. Transit use over a long period of time has been shown to damage the edges of the drainage structure. Reconstructions of the drainage structure has been shown to be needed to improve the transit ride and to extend the life of the structure. Figure 4-2 shows the availability of shoulder usage along I-75.

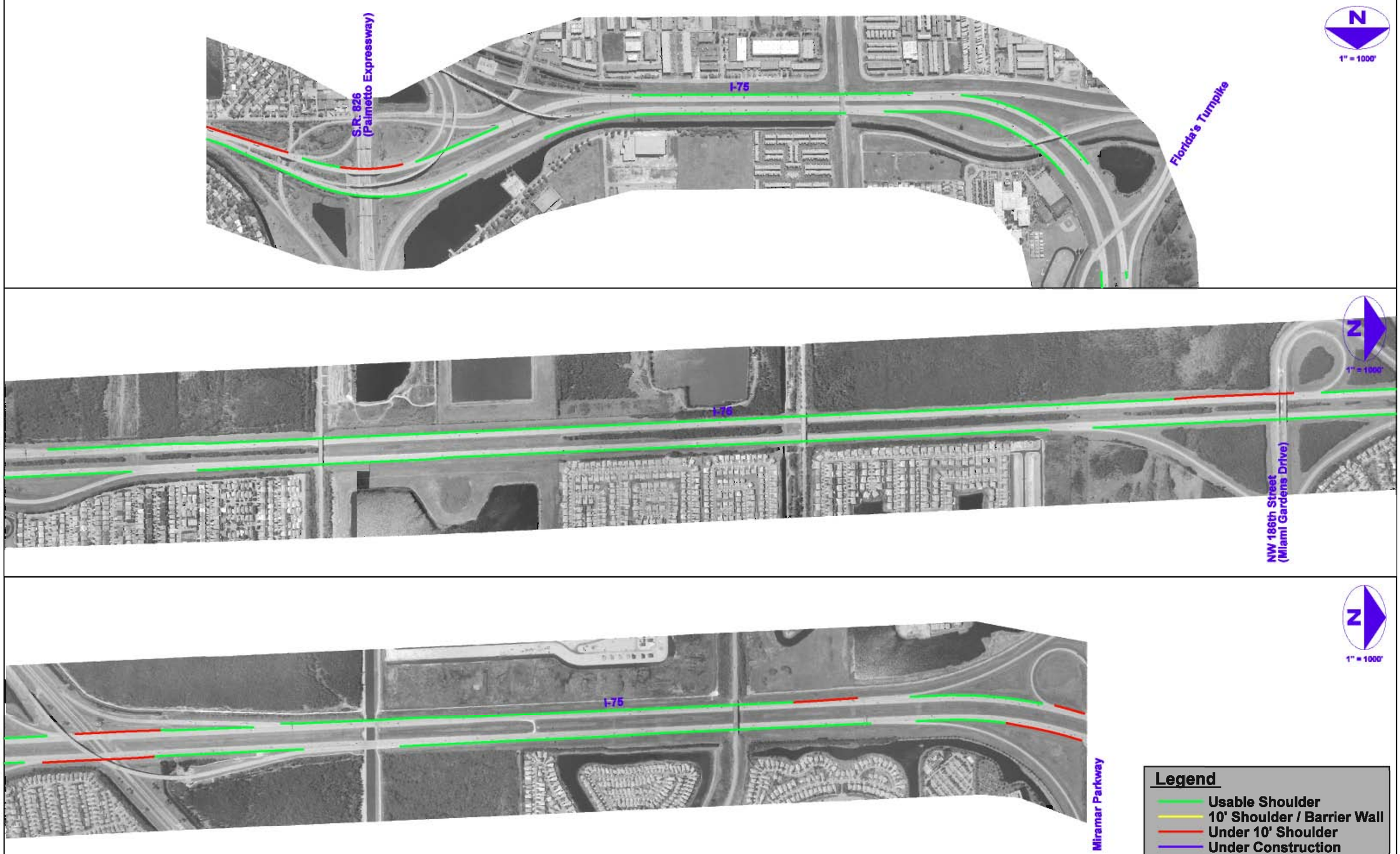
Recommendations

This express bus route was implemented in the summer of 2005 with FDOT providing part of the funding.

SR 826 between NW 67th Avenue and NW 74th Street is heavily congested in both directions during many hours of the day. Construction through the I-75 interchange has been completed and operations have improved. Construction is still underway from NW 103rd Street to NW 25th Street. The construction in this area impacts the availability of the shoulder for use by transit. As long as construction is underway along this stretch of the Palmetto Expressway, the use of the shoulders for congestion by-pass cannot be recommended. Exhibit 4-1 below shows the impact of the construction on the shoulders. The only portion of this route available of congestion by-pass development is between NW 67th Avenue and NW 103rd Street.

It is also recommended that MDT add another express route from the western portion of Pembroke Pines to supplement this service along I-75/SR 826.

Exhibit 4-1



Special Use Lane Study Phase II	Miami Dade MPO	I-75 - Shoulders Usage	Figure No. 4-2

Chapter V – I-95

I-395/SR 112 to I-195/SR 836

I-95 extends from the Broward County line to just south of downtown Miami. It lays east of and parallel to Biscayne Bay. I-95 has High Occupancy Vehicle (HOV) lanes in each direction, adjacent to the center shoulder. The HOV lanes are part of a larger system between Palm Beach County and SR 112. Miami-Dade Transit operates the 95X in the HOV from Golden Glades. South of the SR 112 the 95X operates in mixed flow traffic. I-95 is only being examined south of I-395/SR 112.

The interchange spacing on this short segment of I-95 is 1.6 miles as shown in Table 5-1.

Table 5-1
Interchange Spacing

Interchange	Mile Post	Distance (Miles)
SR 836	3.25	
SR 112	4.9	1.65

As shown in Exhibit 5-1 below the freeway has three through-lanes in each direction with up to two auxiliary lanes. The lanes are12-feet wide. The Average Annual Daily Traffic (AADT) on this segment of I-95 is 213,000 vehicles south of SR 112.

South of the Golden Glades Interchange the primary cause of recurrent congestion along I-95 is the severe lane constriction under SR 112/I-195. In the southbound direction all of the congestion is north of the interchanges and traffic is relatively free flow south of that point. However, in the northbound direction congestion exists most of the day from the downtown on-ramp through SR 836 through the SR 112/I-195 Interchange. Exhibit 5-1 illustrates how the northbound six lanes drop to three lanes at the interchange.

I-95 provides standard lighting, signing and pavement markings. The inside shoulder of I-95 is 4 feet wide and the outside shoulder is 10 feet wide. The shoulder pavement is type S-1 Asphaltic-Concrete with a spread rate of 200 pounds per square yard (equivalent to 2 inches).

During the previous 3-years of records on I-95 there was an average 170 accidents per year, which equates to 0.4 accidents per day on

Exhibit 5-1 Lane Drop at SR 112 Interchange

this very short segment of roadway. Regarding the accidents at the ramps, there was only an average of 19 ramp crashes per year. Ramp crashes made up 11% of the total crashes on this short section of I-95, as shown in Table 5-2.

Table 5-2
3-Year Accident History

Year	# Crashes	# Fatalities	# Injuries	# Ramp Crashes	%
2001	175	3	183	20	11
2002	162	1	180	17	10
2003	175	1	219	20	11
Totals	512	5	582	57	11
Avg./Year	170	2	194	19	
The data shows that on this segment of I-95 occurs a fatality every 85 accidents and all accidents usually have more than one injured person.					

The following Table 5-3 presents the merge distances, measured from gore to gore, for the I-95 from SR 112/I-395 to SR 836 to I-195.

Table 5-3
Merge Distances

Merge Segment	Distance (feet)	
	North Bound	South Bound
DT On and 836 off ramps	2,096’	797’
SR 836/I-195 on and off ramps	1,478’ 950’ 1,267’	1,087’ 850’
SR 836 on and SR 112/I-395 off ramp	4,340’	5,200’

Programmed Projects

There are two projects that are in the LRTP that will affect this corridor:

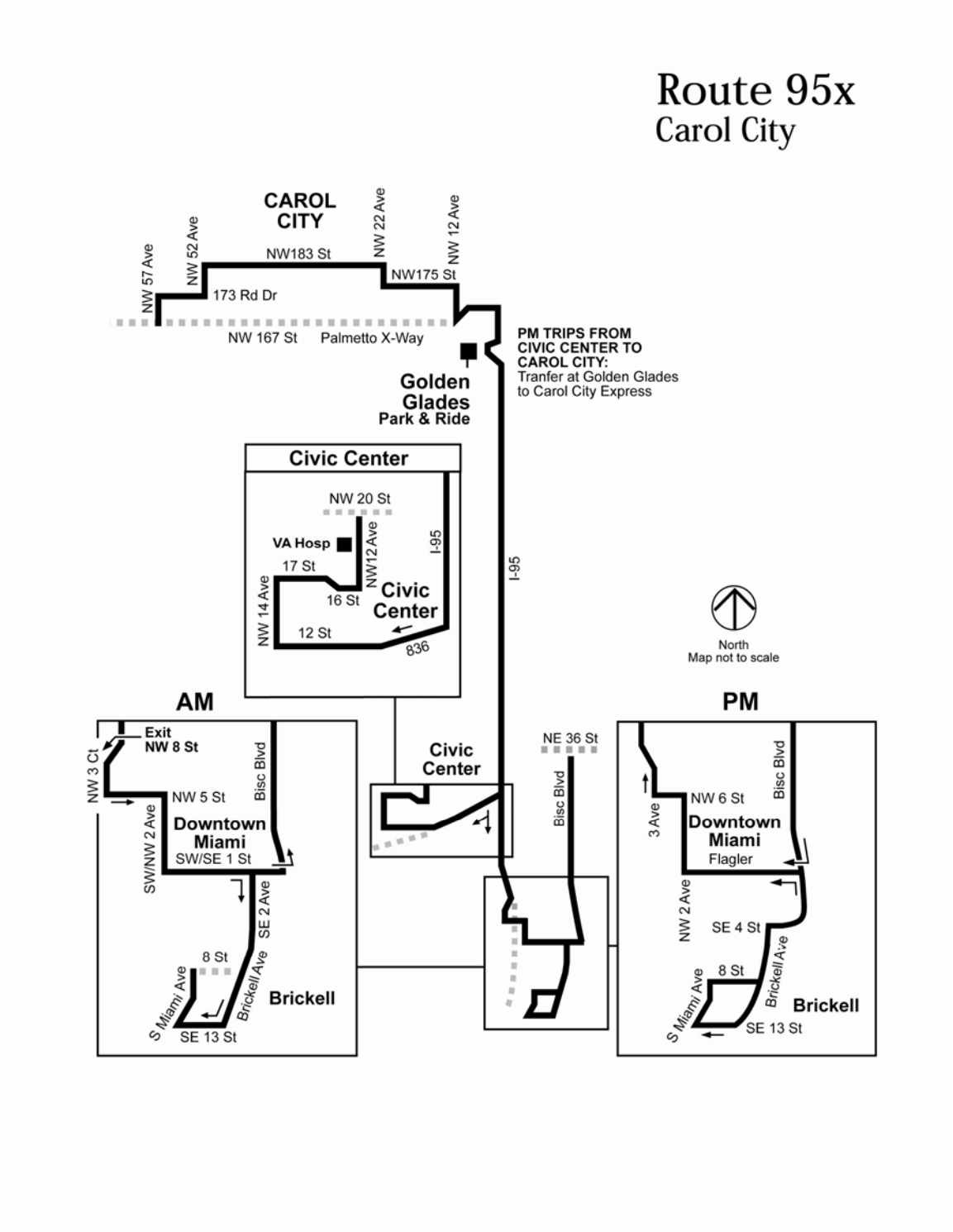
- Construct a reversible managed lane in the median of I-95 from SR 112 to I-395.
- Provide interchange improvements at the I-95/SR 112 Interchange.

Other Factors

No additional transit routes are being considered as a part of this assessment as the 95X already operates on the freeway. MDT operates the 95X from the Golden Glades to downtown Miami. The 95X consists of five separate routes (Aventura, Brickell-Norwood, Carol City, Civic Center-Norwood, and Downtown Civic Center.) The

combined service operates 14 buses per hour during the peak hours. North of SR 112 the 95X operates on the busway. South of SR 112 the 95X operates in mixed flow traffic. The various 95X routes 1,600 passenger per day. Figure 5-1 shows the Route of one of the 95X routes.

Figure 5-1



Within this portion of I-95 there are no potential park and ride sites. The outside shoulders are entirely usable between the SR 836 and SR 112 ramps.

Recommendations

Since the HOV occupies the inside lanes, buses using the HOV facility would be entering the SR 112 interchange in the center lane either preparing to enter or exit the HOV lane. The inside shoulder on I-95 is only 4 feet wide, so the inside shoulder is not available for congestion by-pass use. In the northbound direction there is only 4,340 feet of outside shoulder between the SR 836 ramps and the SR 112 ramps. The bus would have to maneuver across two off-ramp lanes and three through lanes in order to access the northbound HOV lane. The 5-lane merge would probably negate any possible time savings. In the southbound direction the bus would need to exit the HOV lane, cross the through lanes then cross the two on lanes from the SR 112/I-395 interchange. The available shoulder length is 5,200 feet but the bus would probably need to exit the shoulder substantially before the SR 836 off ramp in order to continue to downtown. Figure 5-2 shows the availability of usable shoulders along I-95.

In both directions the benefits of using the shoulder lane would not be significant considering the very short segment. Pursuit of the use of the shoulders for transit congestion by-pass is not recommended at this time.

Legend

- Usable Shoulder
- 10' Shoulder / Barrier Wall
- Under 10' Shoulder
- Under Construction

Special Use Lane Study Phase II	**Miami Dade MPO**	**I-95 - Shoulders Usage**	Figure No. **5-2**

Chapter VI – SR 874/SR 878

Roadway Characteristics

SR-874, the Don Shula Expressway, runs between the Florida Turnpike (HEFT) and the Palmetto Expressway. Diverging from SR 874 is SR 878, the Snapper Creek Expressway. Both freeways serve the highly urbanized areas of Dadeland and Kendall. Both SR 874 and 878 are a part of the MDX system. SR 874 has toll facilities in both directions. There are no toll facilities on SR 878. Interchange spacing on these facilities is highly variable – as close as .4 miles and as well spaced as 2.7 miles. The interchange spacing for both facilities is shown in Table 6-1.

Table 6-1
Interchange Spacing

Interchange	Mile Post	Distance (Miles)
SR-874 (Don Shula Expressway)		
SR 874 @ SR 821 (HEFT)	0	
SR 874 @ SR 990 (Killian Parkway)	2.2	2.2
SR 874 @ SR 94 (Kendall Drive)	3.65	1.45
SR 874 @ SR 878	4.2	0.6
SR 874 @ SR 826	6.9	2.7
On SR-874, the average distance between interchanges is 1.7 miles		
SR-878 (Snapper Creek Expressway)		
SR 878 @ SR 874	0	
SR 878 @ SR 973 (SW 87th Ave.)	0.7	0.7
SR 878 @ SW 72nd Avenue	2.2	1.5
SR 878 @ US 1	2.6	0.4
On SR-878, the average distance between interchanges is .9 miles		

SR 874 has a highly variable number of lanes. Between the Turnpike and Killian Parkway there are three through-lanes in each direction. Between Killian and Snapper Creek Parkway there are four through lanes in each direction and east of Snapper Creek the facility narrows to two lanes in each direction. SR 878 is two lanes in each direction. Except at a couple of canal crossing where the lanes are constricted, the lanes are12 feet wide.

The Average Annual Daily Traffic (AADT) on SR 874 ranges from 47,500 vehicles (east of Snapper Creek.) to over 111,000 vehicles (near Killian Parkway.) The traffic on SR 878 ranges from almost 48,000 at the SR 878 terminus to 31,000 AADT at the US 1 terminus. The following Table 6-2 provides the 2004 AADT as maintained by FDOT for the two facilities.

Table 6-2
2004 Traffic Volumes

Roadway Segment	AADT	AVG.
SR-874		
SR 874 S of Killian	71,000	76,500
SR 874 N of Killian	111,000	
SR 874 N of SW 87 Ave	47,500	
SR-878		
SR 878 W of SR 826	47,799	42,100
SW 878 W of US 1	31,000	
SR 878 E of SW 87 Ave	47,500	

SR 878 experiences very little congestion. Eastbound SR 874 experiences consistent delays with the merge into the Palmetto Expressway and at the Killian off-ramp. Westbound congestion occurs through the Killian Interchange and the toll plaza.

Both SR 874 and SR 878 provide standard lighting, signing and pavement markings. This roadway section has excellent shoulders with most of the segments meeting the minimum of 10 foot width at the outside with a clear path of obstructions, except at the interchanges.

According to Table 6-3, during the previous 3-years of records on SR 874 there was an average 637 accidents per year, which equates to 1.75 accidents per day. On SR 878, there was an average of 74 accidents per year, which equates to only .2 accidents per day. Similar to SR-836, the SR-874 has a high number of accidents, but the rate of fatalities and injuries are very low. This situation creates an alternative for buses to by-pass traffic congestion due to non-recurrent congestion. As always, in such situations when cars are parked along the right shoulders, transit driver would have to yield to emergency vehicles either parked on the shoulder or using the shoulder to access the accident.

Also, both facilities show a high rate of accidents on the ramps that could be a potential problem for transit operations. For SR-874 and SR-878 records show that 9% and 14% of the accidents occur at the ramps. But, shoulders along the ramps can also be used by transit to by-pass these accidents.

Table 6-3
3-Year Accident History

Year	# Crashes	# Fatalities	# Injuries	# Ramp Crashes	%
SR 874					
2001	626	5	290	61	10
2002	574	4	246	50	9
2003	712	1	338	68	10
Total	1912	10	874	179	9
Avg./Year	637	3	291	60	
The existing data shows that on this segment of SR-874 occurs a fatality every 212 accidents and one injured person every 2.2 accidents.					
SR 878					
2001	75	2	31	9	12
2002	63	1	36	8	13
2003	85	0	41	14	17
Total	223	3	108	31	14
Avg./Year	74	1	36	10	
Regarding SR-878, the data shows that on this segment there is a fatality every 74 accidents and one injured person every 2 accidents.					

Table 6-4 presents the merge distances, measured from gore to gore, for the expressway segments.

Table 6-4
Merge Distances

Merge Segment	Distance (feet)	
	East Bound	West Bound
SR 826 on and off ramps	1,705’	612’
SR 826 and NW 84 St	2,994’	1,668’ 3,765’
NW 84 St on and off ramps	4,916’	2,656
NW 84 St and NW 186 St	10,597’	14,541’
NW 186 St on and off ramps	3,490’	1,315’
NW 186 St and Turnpike	5,442’	2,249’
Turnpike and Miramar	6,067’	7,212’
Miramar on and off ramps	3,736’	4,218
Miramar and Pines Blvd.	8,780	8,004
NW 74 St on and off	1,230’	1,209’

NW 74 St and US 27	3,084’	3,152’
US 27 on and off	364’ 1,251’ 354’	333’ 1,230’ 412’
US 27 to NW 103 St	2,904’	2,360’
NW 103 St on and off	2,038’	1,383’ 1,056’
NW 103 St and NW 122 St	4,224’	4,155’
NW 122 St on and off	491’	1,959’
NW 122 St and I-75	3,078’	2,693’
I-75 on and off	2,730’ 1,320’ 3,152’	1,748’ 1,806’
1-75 and NW 154 St		2,202’

Programmed Projects

The TIP and the LRTP have the following projects programmed for this corridor:

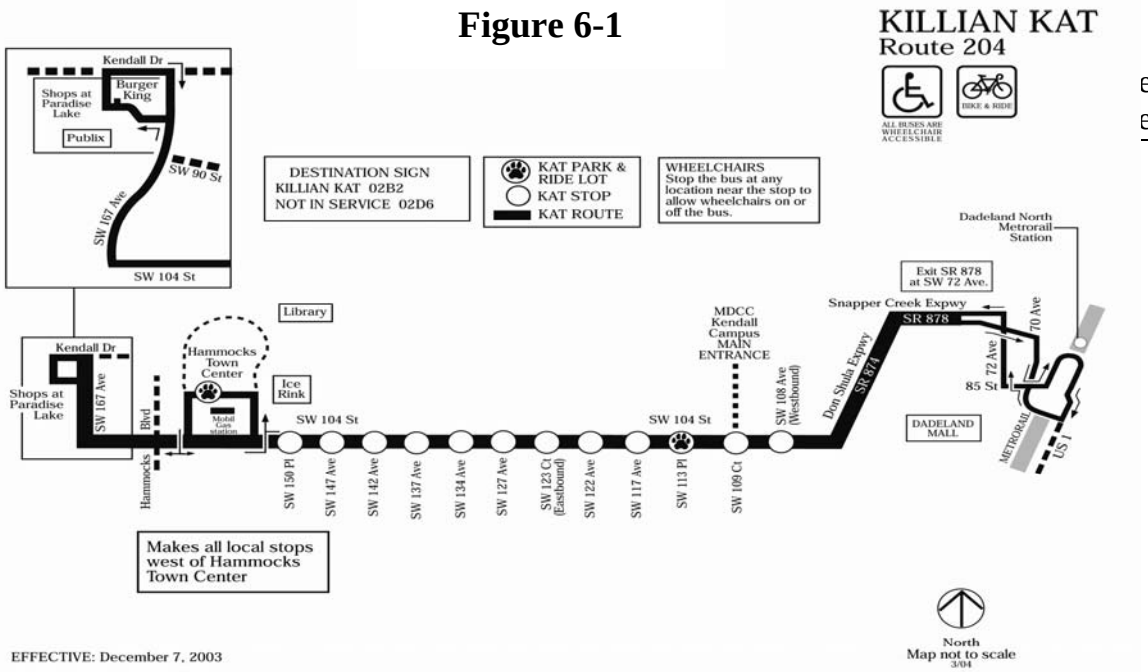
- TIP- Reconstruct toll plaza west of Killian Parkway along SR 874
- LRTP – Provide a new northbound off-ramp from SR 874 at Kendall Drive.
- LRTP – Modify the Killian Drive/SR 874 interchange to accommodate the new toll plaza.
- LRTP- Modify interchanges from Kendall Drive to SR 826.

Existing Express Bus Routes

Two express bus routes operate on portions of SR 878 and three routes operate along SR 878. All of the routes have a terminus at the Metrorail station at Dadeland South.

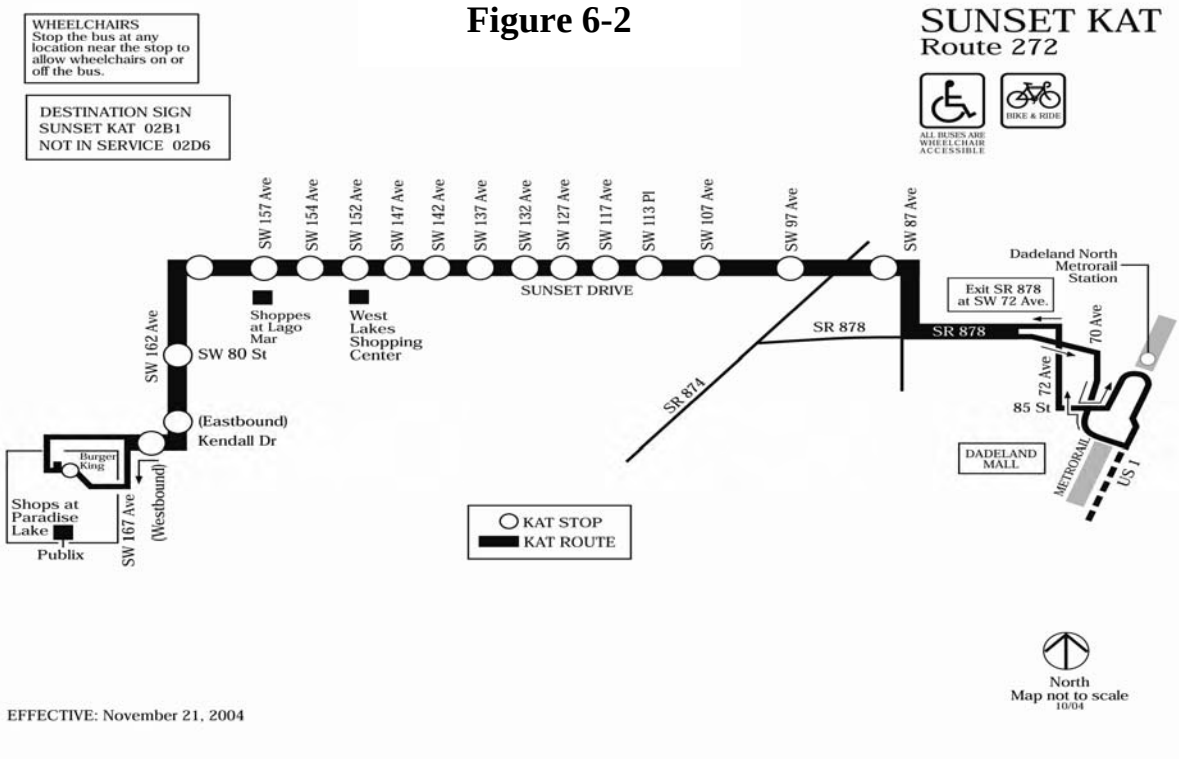
Route 204, the Killian KAT is shown in Figure 6-1. It operates during the peak periods only from SW 167 Avenue to Dadeland North. It enters SR 874 at the SW 104 Street ramps, runs along SR 874 for 2 miles, and then turns onto the SR 878 running the 2.75 miles to the Metrorail station. The Killian KAT operates approximately 60 roundtrips along this route between the hours of 5:30 am – 9:30 am and 3:00 pm and 9:00 pm. Most of the trips operate on 6 minute headways. It carries 1,200 passengers a day.

Figure 6-1



Route 272, the Sunset KAT is shown in Figure 6-2. It operates between the West Lake Shopping Center and Dadeland North on a variable schedule thorough out the day between 5:45 am and 7:30 pm. The route has 50 roundtrips through out the day with variable headways ranging from 10 minutes to 40 minutes. Route 272 enters SR 878 at SW 87 Avenue running for about 1.5 miles before reaching the Metrorail station. It carries about 750 passengers per day.

Figure 6-2



Route 288, the Kendall KAT is shown in Figure 6-3. It operates between SW 157 Avenue and Dadeland North. The schedule includes 28 roundtrips operated at 12 minute headways between 6:00 am – 9:00 am and 4:00 pm - 7:00 pm. The route operates for ½ mile on SR 874 after it enters the Expressway at N. Kendall Drive. It then turns on to SR 878 and runs the final 2.75 miles to the Metrorail station. It carries 600 passengers per day.

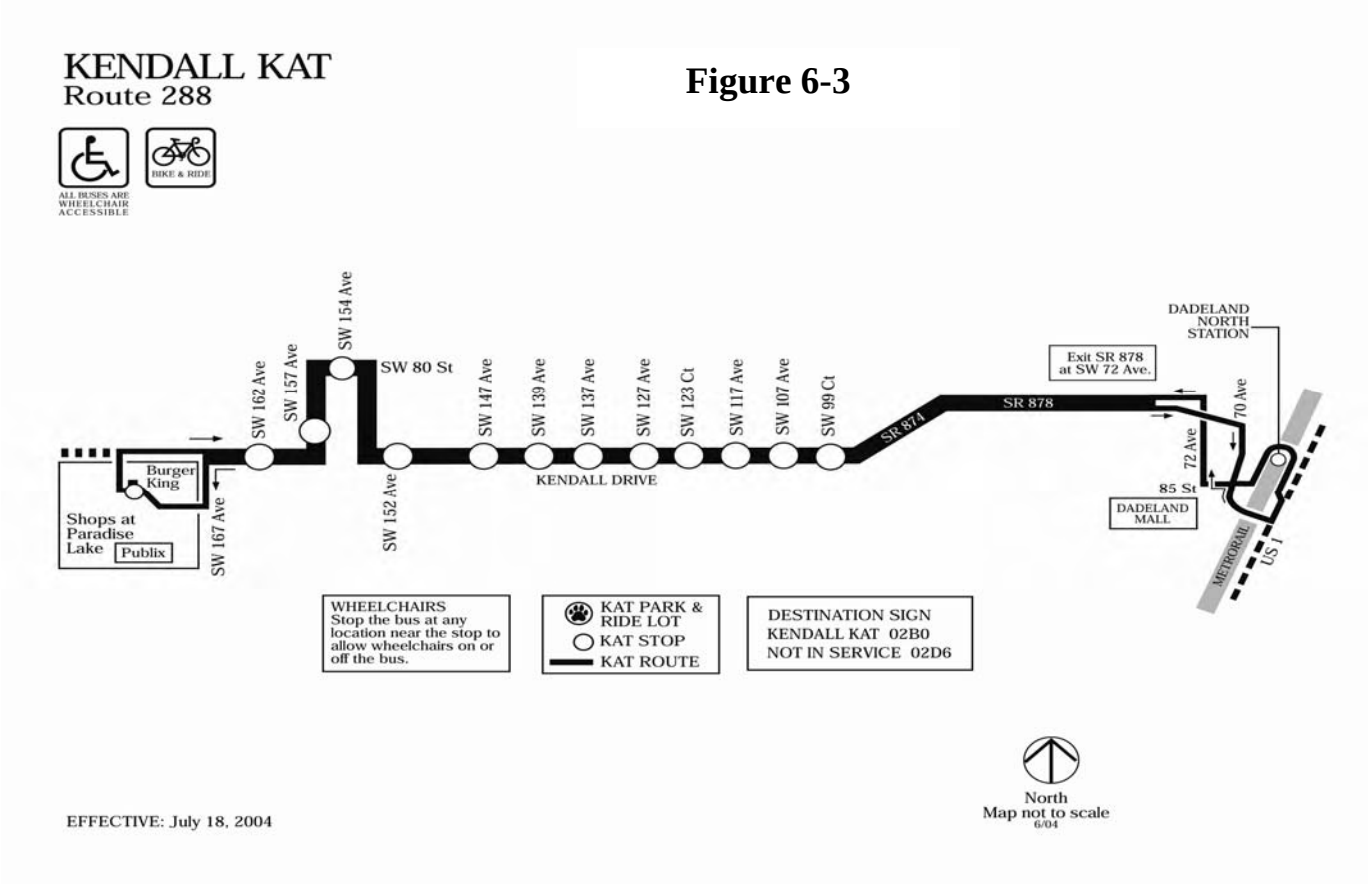


Figure 6-3

On SR 874 between SW 104 Street and N. Kendall Drive, Route 204 is running 10 buses per hour (during peak hours only) in each direction. From Kendall Drive through the interchange with SR 878 to SW 87th Avenue a maximum of 16 buses per hour in each direction are operating during peak periods. That number is as low as once an hour during midday. Along 878 for the last 1.5 miles to Dadeland North 21 buses are operating in each direction during the peak periods with as few as one bus per hour in the off peak.

MDT would use the shoulders along SR 874 and SR 878 to bypass traffic congestion. Other than I-95, these are the only expressway facilities that have existing routes operating along these corridors. This is a different approach to the one considered for the other corridors.

Potential Park and Ride Facilities

An initial survey of the SR 874 corridor between Killian and the Snapper Creek Expressway did not reveal any locations close enough to alignment to serve as a park and ride lot for the freeway express service. The SR 878 alignment is too close to the end of the route to consider any park and ride locations.

East of the current transit routes there are unused bus pull-offs and shelters on each side of SR 874 between SW 72 and 87th Avenues. As shown in Figures 6-1 through 6-3, all three KAT routes turn on to the Snapper Creek Expressway and do not pass this location.

Usable Shoulder Segments

Exhibit 6-1
Narrow shoulder on SR 874

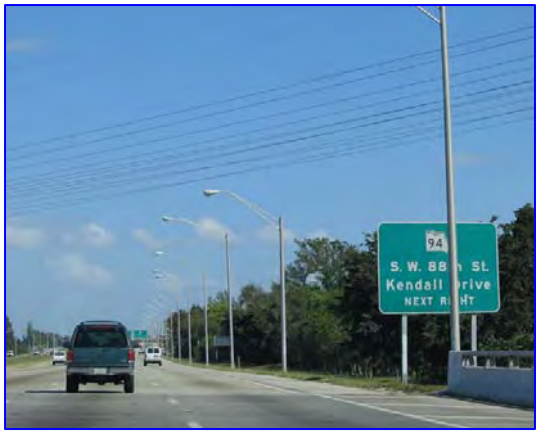
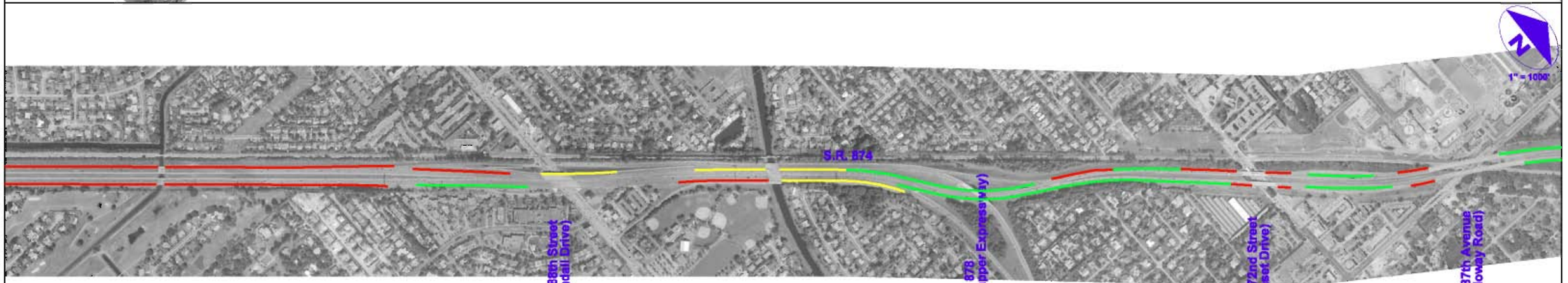
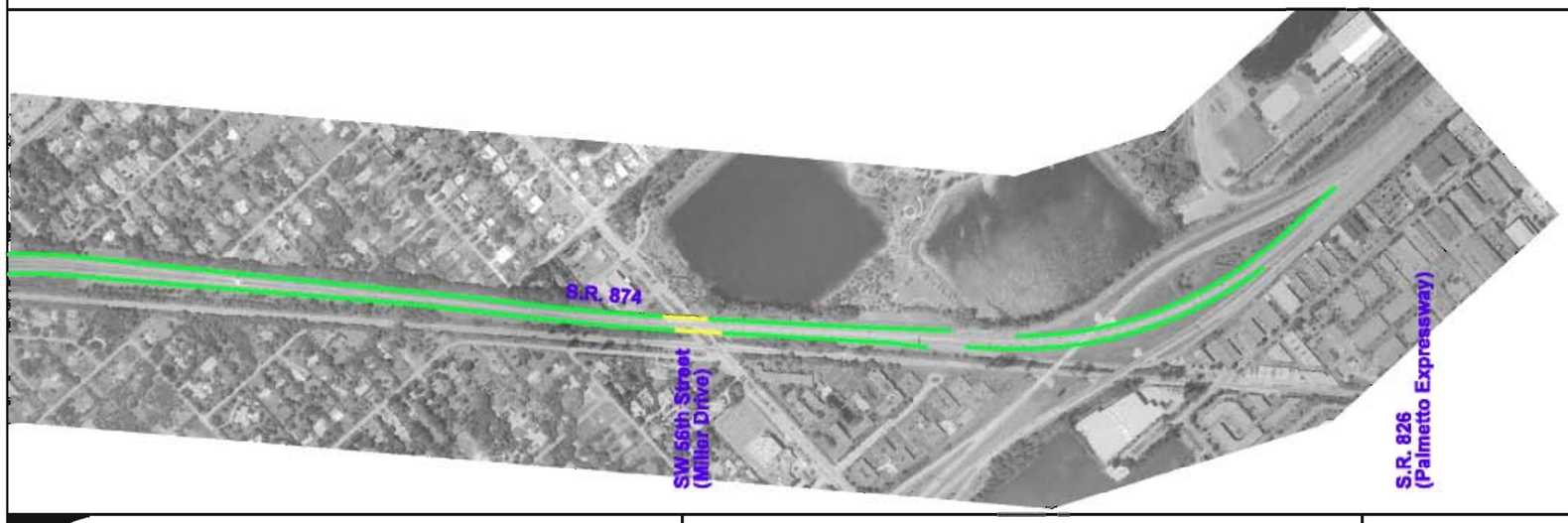


Exhibit 6-1 shows the usable shoulder segments on the two expressways. On SR 874 the 10-foot shoulders are entirely usable between the ramps for Killian Parkway and the Florida Turnpike, except around the toll plaza. As shown in both Exhibit 6-1 and 6-2 the majority of the shoulders in both directions between Killian Parkway and SW 87th Avenue are not suitable as a congestion bypass lane. However, the shoulders from SW 87th Avenue to SR 826 are adequate to support shoulder bypass operations. Figure 6-4 illustrates the availability of shoulder usages along SR 874.

Exhibit 6-2
Right hand barriers impact use of shoulders on SR 878 between Killian and SW 88 St.

Exhibit 6-2 shows that east bound the majority of the shoulder on SR 878 is too narrow for use as a congestion by-pass lane. However, almost the entire length of the westbound shoulder is usable from the Palmetto Expressway over crossing to the interchange with SR 874. Figure 6-5 illustrates the availability of shoulder usages along SR 878.





Special Use Lane Study Phase II	Miami Dade MPO	S.R. 874 - Shoulders Usage	Figure No. 6-4

Legend

- Usable Shoulder
- 10' Shoulder / Barrier Wall
- Under 10' Shoulder
- Under Construction

Special Use Lane Study Phase II	Miami Dade MPO	S.R. 878 - Shoulders Usage	Figure No. 6-5

Recommendations

The current bus routes utilizing SR 874 and 878 operate on SR 874 between Killian Parkway and Dadeland South via SR 878. The usable shoulder segments on SR 874 are west of Killian Parkway and east of SW 87th Avenue entirely outside of the current bus routing. On SR 878 which is fully utilized by the bus routes only the westbound shoulders are suitable for congestion bypass. Figures 6-4 and 6-5 show the availability of shoulders usages along SR 874 and SR 878, respectively.

It is recommended that the westbound shoulder of SR 878 be signed for bus use only. MDT should coordinate with MDX to start using the shoulders, as appropriate, for those existing routes servicing this corridor.

Chapter VII – Implementation Plan

Participating Agencies

Following the completion of the October 2004 Phase I report - Special Use Lane Study a series of meetings were held to determine how to implement the use of freeway shoulders for congestion by-pass. The following agencies were participating in these meetings:

- Florida Department of Transportation (FDOT) District 6
- Metropolitan Planning Organization (MPO)
- Miami-Dade Expressway Authority (MDX)
- Miami-Dade Transit (MDT)
- Turnpike Enterprise

These agencies have worked together to look at bus operations, safety concerns, and jurisdictional issues. The meetings led to conversations with officials from Minneapolis. After many of the concerns were addressed the participating agencies moved forward with investigating legislation and then developed a Letter of Agreement to advance the implementation of this project.

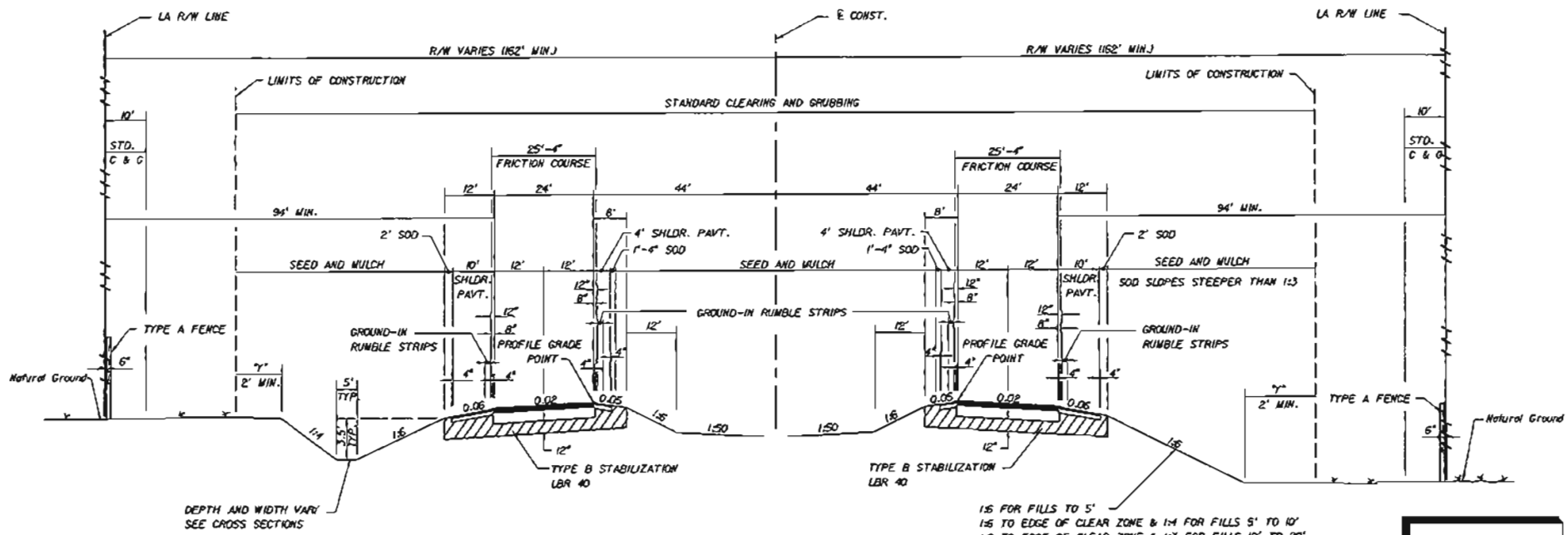
Assumptions

A. Bus Load Impact on Shoulders

One of the major concerns expressed by all parties involved in this process is the impact that buses may cause on the shoulders pavement. This element of the roadway is not design to carry the load of transit buses. The purpose of the shoulders is for drivers to use it on emergency situations.

The 20-year experience of this project in Minneapolis has indicated that no major capital investment for shoulders repair has been needed. However, as part of the regular capital program, new constructions and/or major improvements to expressway will include a new shoulder design. This action has been taken to prevent future deterioration of the existing shoulders caused by the buses. As previously indicated, Minneapolis has over 240 miles of use of shoulders along their expressway system and over 1,000 daily trips.

The project considered for Miami-Dade does not have the impact of the one experienced in Minneapolis. It is expected that the proposed service for Miami-Dade will have a minimum impact on the pavement based on the number of buses and trips using the shoulders. Attachment D provides for a preliminary technical analysis to determine the potential impact of buses on the shoulders. To illustrate this situation, Figure 7-1 show a cross section of an urban highway used on the shoulders and a full design for a regular traffic lane carrying the load of all vehicles, including trucks and buses. Figures 7-2 and 7-3 show different types of barrier inlets used on the shoulders of urban highways also carrying the load of all vehicles.



TYPICAL SECTION
SR 8
STA. 567+25.67 TO STA. 1056+84.35

TRAFFIC DATA

CURRENT YEAR = 1998 AADT = 22,300
ESTIMATED OPENING YEAR = 2000 AADT = 23,300
ESTIMATED DESIGN YEAR = 2020 AADT = 51,500
K = 9 % D = 56 % T = 10 % (24 HOUR)
DESIGN HOUR T = 5 %
DESIGN SPEED = 70 MPH

TRAFFIC DATA IS REQUIRED TO BE NOTED FOR CURRENT YEAR, OPENING YEAR, AND DESIGN YEAR. POSTED SPEED (MPH) IS OPTIONAL.

FOR STANDARD TYPICAL SECTION NOTES REFER TO EXHIBIT 6-1, THIS CHAPTER

NEW CONSTRUCTION

OPTIONAL BASE GROUP 9 WITH
TYPE SP STRUCTURAL COURSE (TRAFFIC D) (2½")
TYPE SP STRUCTURAL COURSE (TRAFFIC D) (1½") (PG 76-22) AND
FRICTION COURSE FC-5 (¾") (PG 76-22)

MEDIAN SHOULDER PAVEMENT

OPTIONAL BASE GROUP 1 WITH
TYPE SP STRUCTURAL COURSE (TRAFFIC D) (1½")
TYPE SP STRUCTURAL COURSE (TRAFFIC D) (1½") (PG 76-22) AND
FRICTION COURSE FC-5 (¾") (PG 76-22)

OUTSIDE SHOULDER PAVEMENT

OPTIONAL BASE GROUP 1 WITH
TYPE SP STRUCTURAL COURSE (TRAFFIC B) (1½") AND
FRICTION COURSE FC-5 (¾") (PG 76-22)

NOTE:
HEIGHT OF FILL IS THE VERTICAL DISTANCE FROM THE EDGE OF THE OUTSIDE TRAVEL LANE TO TOE OF FRONT SLOPE.

4 LANE
INTERSTATE SYSTEM
NEW CONSTRUCTION
DIVIDED
RURAL
WITH PROJECTED
20 YR. AADT OF 1500
OR GREATER
DESIGN SPEED
70 MPH

"Y" THE AREA DISTURBED BY CONSTRUCTION VARIES.

EXHIBIT TYP-10
Date: 1/1/05

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

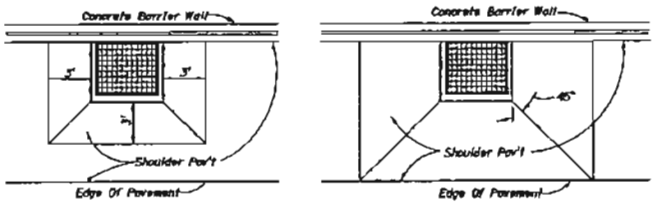
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
		- - -

TYPICAL SECTIONS

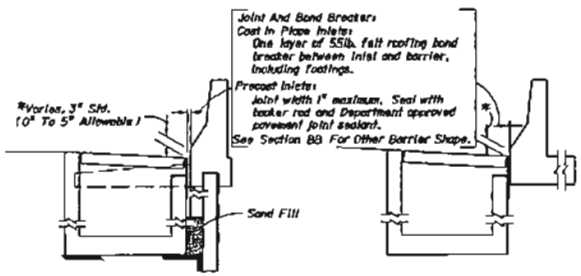
SHEET NO.

Figure No. 7-1



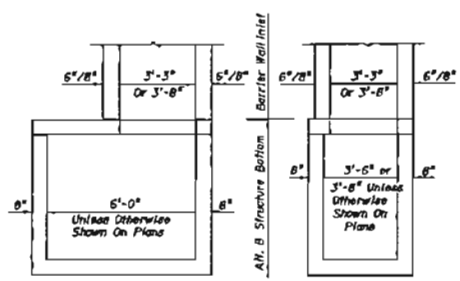
LOW SIDE SUPERELEVATION HIGH SIDE TRANSITION

PAVEMENT WARP FOR SHOULDERS IN SUPERELEVATION



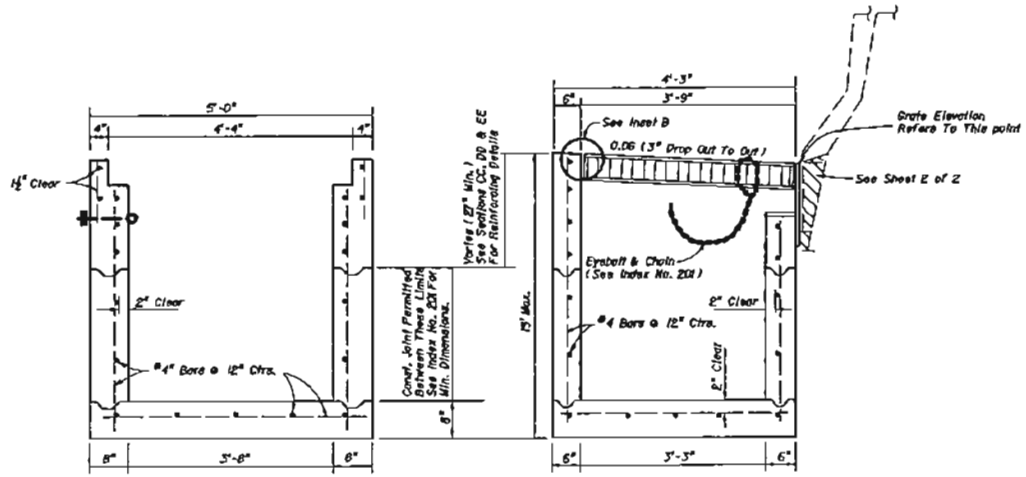
BARRIER WALL / RETAINING WALL SINGLE FACE ROADWAY BARRIER

INLET SECTION AT WALLS

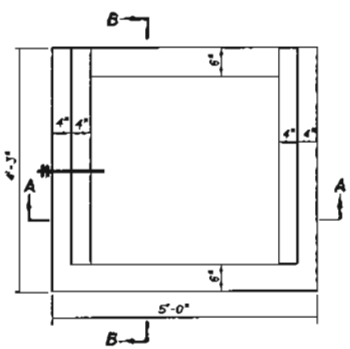


Note: Alt. B Structure Bottom Only. See Index No. 200.

INLET WITH STRUCTURE BOTTOM



SECTION AA (WITHOUT GRATE) SECTION BB



TOP VIEW (WITHOUT GRATE)

GENERAL NOTES

1. This inlet is primarily intended for use adjacent to concrete barrier walls on paved shoulders. Use of the inlet adjacent to other wall types shall be approved by the Drainage Engineer. The inlet is suitable for bicycle and occasional pedestrian traffic, but should not be placed in a designated pedestrian travel way. It is not intended for use in curb and gutter or other areas where throated inlets are required, nor areas subject to high debris.
2. Inlets located in embankments constructed with earth anchored retaining wall shall be designed with minimum depths to reduce adverse impact on the anchorage system. Runs of pipe parallel to and near anchored wall shall be avoided wherever practical. Special coordination must be exercised during the design and construction of storm water systems within anchored wall systems.
3. Inlet bottoms and/or tops may be either precast or cast-in-place. Whether cast as a single unit or as multiple segments, and whether precast or cast-in-place, the upper 2'-3" of the inlet shall be reinforced in accordance with sections CC, DD and EE.
4. Exposed edges shall be chamfered ¾".
5. When Alternate G grate is specified in the plans, the grate is to be hot dipped galvanized after fabrication. Field installation of the filler bar called for in Inset B will not be permitted, thereby requiring tolerance adjustment during fabrication and/or casting, or, matching grate to structure prior to galvanizing.
6. For supplemental details see Index Nos. 200 and 201.
7. Inlets to be paid for under the contract unit for Inlets (Barrier Wall), Each.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

BARRIER WALL INLET

	Name	Date
Designed By	[illegible]	03/98
Drawn By	KSD	03/98
Checked By	JMB	03/98

Approved By [signature]
State Drainage Engineer

Revision	Sheet No.	Index No.
04	1 of 2	218

Figure No. 7-2

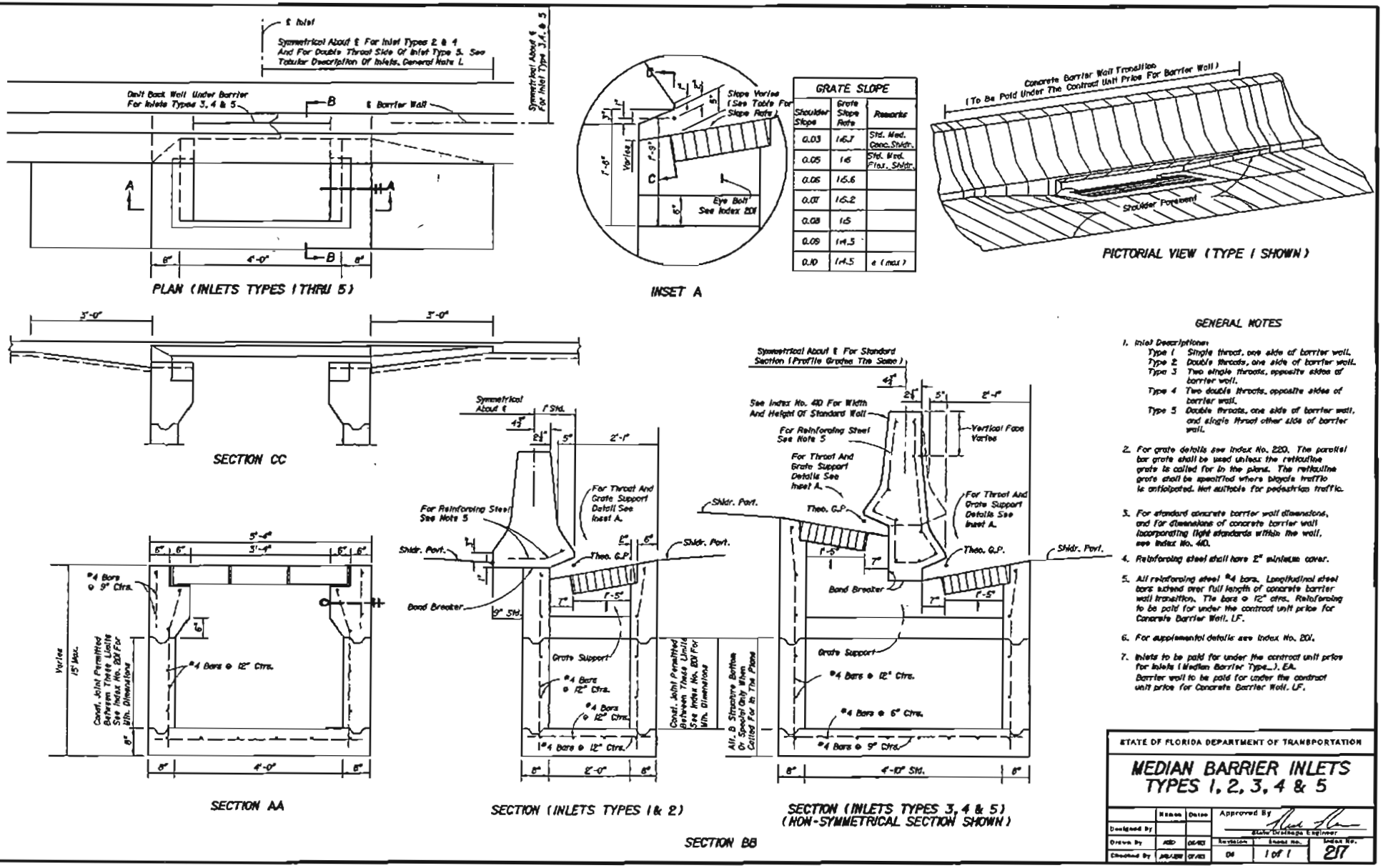

℄ Inlet
Symmetrical About ℄ For Inlet Types 2 & 4 And For Double Throat Side Of Inlet Type 3. See Tabular Description Of Inlets, General Note 1.
Symmetrical About ℄ For Inlet Type 1, 3, & 5
Omit Back Wall Under Barrier For Inlets Types 3, 4 & 5
℄ Barrier Wall
A
B
6"
4'-0"
8"
PLAN (INLETS TYPES 1 THRU 5)
Slope Varies (See Table For Slope Rate)
Eye Bolt See Index 201
INSET A
GRATE SLOPE
Shoulder Slope
Grate Slope Rate
Remarks
0.03 16.7 Std. Med. Conc. Shldr.
0.05 16 Std. Med. Flat. Shldr.
0.06 15.6
0.07 15.2
0.08 15
0.09 14.5
0.10 14.5 e (max)
Concrete Barrier Wall Transition (To Be Paid Under The Contract Unit Price For Barrier Wall)
Shoulder Pavement
PICTORIAL VIEW (TYPE 1 SHOWN)
3'-0"
3'-0"
SECTION CC
#4 Bars @ 9" Ctrs.
#4 Bars @ 12" Ctrs.
Varies 15" Max.
Const. Joint Permitted Between These Limits See Index No. 201 For Min. Dimensions
5'-4"
3'-4"
SECTION AA
Symmetrical About ℄
1" Std.
For Reinforcing Steel See Note 5
For Throat And Grate Support Details See Inset A.
Shldr. Perf.
Theo. G.P.
Bond Breaker
9" Std.
Grate Support
#4 Bars @ 12" Ctrs.
Const. Joint Permitted Between These Limits See Index No. 201 For Min. Dimensions
All 8 Structure Bottom Or Special Only When Called For In The Plans
2'-0"
SECTION (INLETS TYPES 1 & 2)
Symmetrical About ℄ For Standard Section (Profile Grades The Same)
See Index No. 410 For Width And Height Of Standard Wall
Vertical Face Varies
#4 Bars @ 6" Ctrs.
#4 Bars @ 9" Ctrs.
4'-10" Std.
SECTION (INLETS TYPES 3, 4 & 5) (NON-SYMMETRICAL SECTION SHOWN)
SECTION BB
GENERAL NOTES
1. Inlet Descriptions:
Type 1 Single throat, one side of barrier wall.
Type 2 Double throats, one side of barrier wall.
Type 3 Two single throats, opposite sides of barrier wall.
Type 4 Two double throats, opposite sides of barrier wall.
Type 5 Double throats, one side of barrier wall, and single throat other side of barrier wall.
2. For grate details see Index No. 220. The parallel bar grate shall be used unless the reticuline grate is called for in the plans. The reticuline grate shall be specified where bicycle traffic is anticipated. Not suitable for pedestrian traffic.
3. For standard concrete barrier wall dimensions, and for dimensions of concrete barrier wall incorporating light standards within the wall, see Index No. 410.
4. Reinforcing steel shall have 2" minimum cover.
5. All reinforcing steel #4 bars. Longitudinal steel bars extend over full length of concrete barrier wall transition. The bars @ 12" ctrs. Reinforcing to be paid for under the contract unit price for Concrete Barrier Wall, LF.
6. For supplemental details see Index No. 201.
7. Inlets to be paid for under the contract unit price for Inlets (Median Barrier Type_). EA. Barrier wall to be paid for under the contract unit price for Concrete Barrier Wall, LF.
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
MEDIAN BARRIER INLETS TYPES 1, 2, 3, 4 & 5
Designed By
Drawn By ASD 06/03
Checked By JRS/JBR 07/03
Issues Dates
Approved By
State Drainage Engineer
Revision 04
Sheet No. 1 of 1
Index No. 217

Figure No. 7-3

During the pilot project the condition of the shoulders will be monitored. If abnormal wear is observed then shoulders will be resurfaced or rebuilt, as needed.

B. Criteria for Shoulder Use

Width

FDOT design standards state that paved shoulders should be continuous on all freeway facilities and on high vehicular arterial facilities. The usable paved width of the right shoulder should be at least 10 feet wide and 12 feet wide where the Directional Design Hour Volume (DDHV) for truck traffic exceeds 250 vehicles per hour. Ramp shoulder widths are usually constructed adjacent to acceleration and deceleration lanes with transitions to the freeway shoulder width at the taper ends. Shoulder cross slope should range between 2-6 percent and can be at least 1 percent greater than the pavement cross slope on tangent sections to facilitate drainage. To provide visual contrast, the color or texture of the shoulders should be different from that of the travel lanes.

In order to have safe transit operations on the shoulders we are looking for areas that meet these requirements. Further a ten or ten and one-half foot shoulder adjacent to a vertical barrier will not be used for bus by-pass.

Length

The minimum amount of shoulder length that should be set up for congestion by-pass given acceleration, deceleration and other elements for design could be determine by a combination of existing standards from the FDOT Design Standards Index Topic No. 625-010-003 (Index 301, 525, 526) and engineering judgment.

For a freeway or a high speed facility we recommend the following distances for decelerations and acceleration situations:

- Deceleration Distance
  Entry Speed 50-30 mph 315’ (deceleration) + 180’ (diverging) = 495’

- Acceleration Distance
  Entry Speed 30-50 mph 500’ (acceleration) + 250’ (merging) = 750’

The combined entry/exit distance is approximately 1,250 feet. When examining the freeway distances between gores the shortest distance is slightly in excess of 2,000 feet and between interchange ramps we have distances of 500 feet up to about 1,500 feet. The buses could comfortably move in and out of the longer shoulders within an interchange and could take advantage of all the sections with adequate shoulder width between freeway interchanges. 1,250 feet is recommended as the minimum spacing for use of shoulders , but this short length should be used primarily between ramps within an interchange. More realistically 2,500 foot lengths are more usable for passenger buses – given the need for a reasonably comfortable ride.

Stopping Sight Distance

The sum of the distance traversed during the brake reaction time and the distance to brake the vehicle to a stop is the Stopping Sight Distance (SSD).

The computed distances for wet pavements and for various speeds are shown below. This information was provided by the 2001 AASHTO A Policy on Geometric Design of Highways and Streets, Chapter 3, Exhibit 3-1.

Design Speed 40 mph *SSD 305'
Design Speed 45 mph *SSD 360'
Design Speed 50 mph *SSD 425'

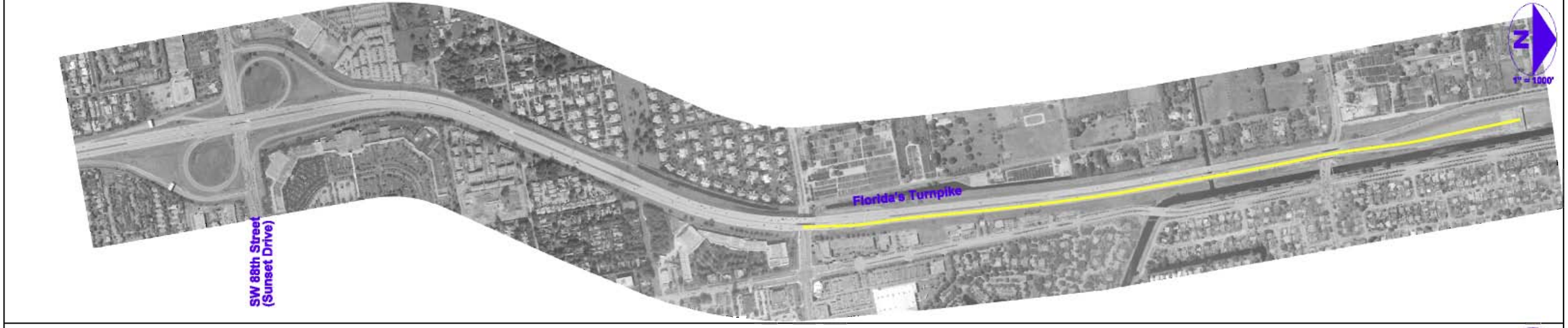
All of the stopping distances work within the minimum shoulder lengths recommended.

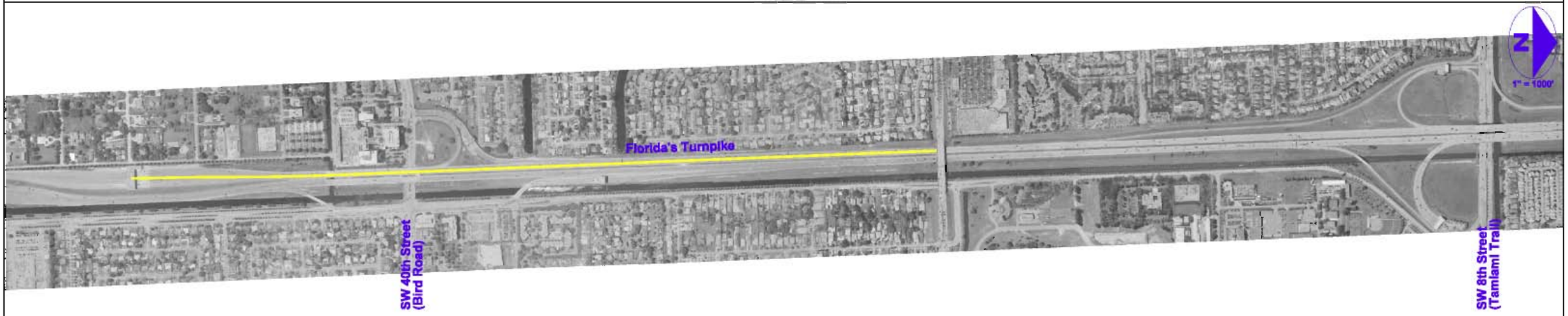
C. Congestion

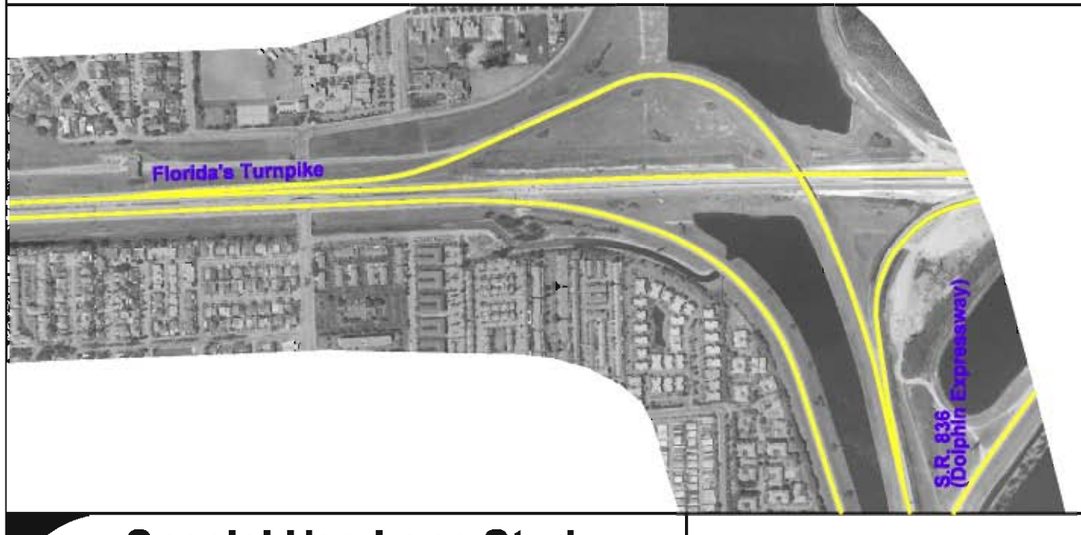
The proposed use of shoulders by transit buses is for the purpose to by-pass traffic congestion, once the speed on regular traffic lanes is 35 mph or less. On expressways traffic congestion can be classified as recurrent and non-recurrent. Recurrent congestion could be defined as the condition of the highway when the capacity of the facility does not meet the traffic demand. This situation create a gridlock where traffic speed is very low, it could take more than twice the travel time under normal condition and the length of the congestion could take several miles of the highway. This condition can be seen mostly during the peak period. Different alternatives have been developed to alleviate traffic congestion. The proposed use of shoulders by transit buses is one of these alternatives, which also contribute to improve transit services.

Additionally, congestion may occur during non-peak periods. This congestion is called non-recurrent congestion. It may be caused by accidents or incidents along the highway. Accidents, construction, special events, and detours may cause this non-recurrent congestion.

Based on field inspections and the available data, recurrent congestion is easy to identify and the following figures illustrate where it occurs. However, non-recurrent congestion may happen at any moment at any place. This condition can not be predicted nor forecasted. Therefore, based on the physical conditions of the shoulders and the criteria established, shoulder segments along the studied facilities will be selected for the use of the transit buses to prevent this condition. Figures 7-4 through 7-12 show the location of the congested freeway segments identified in this study.



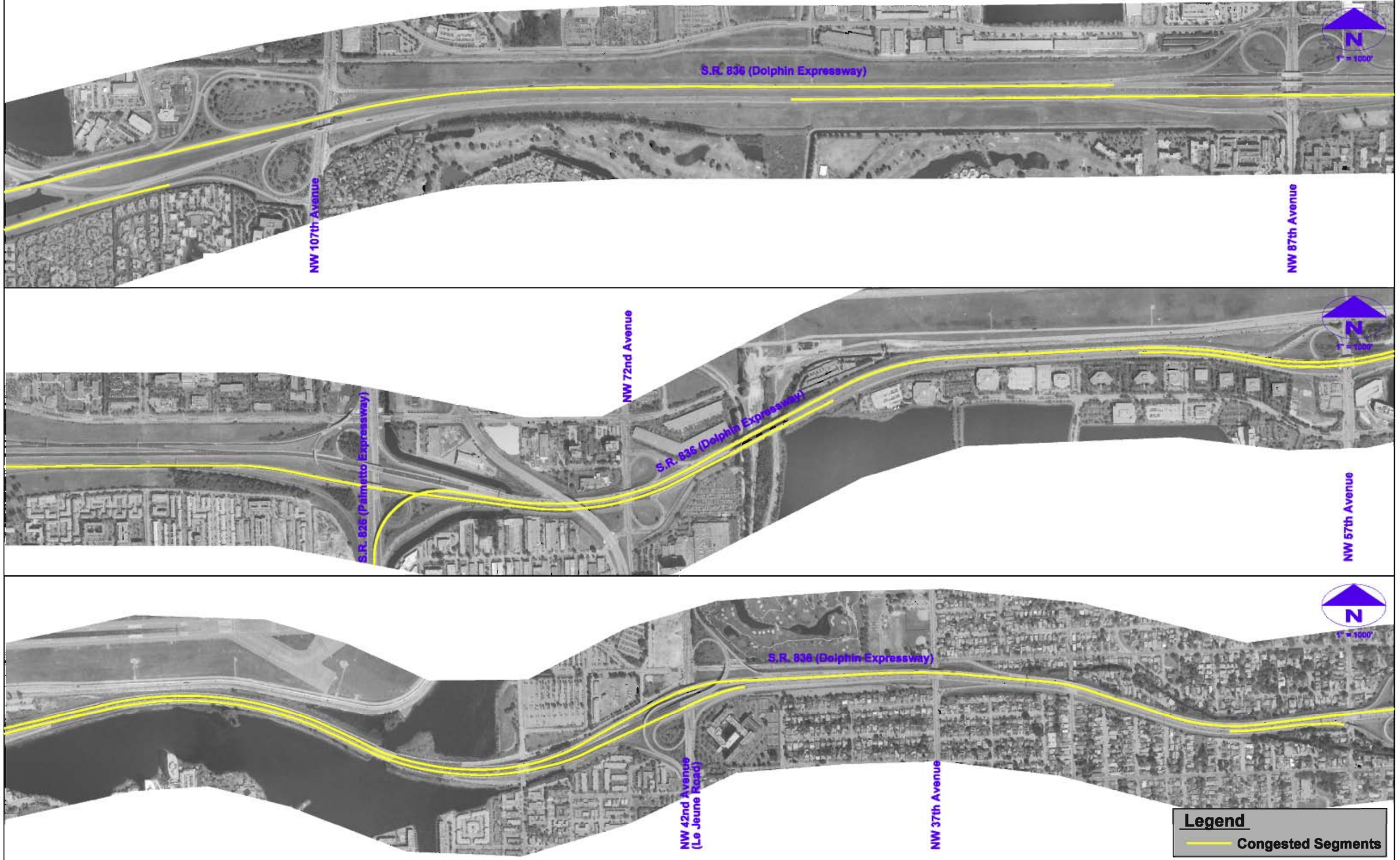




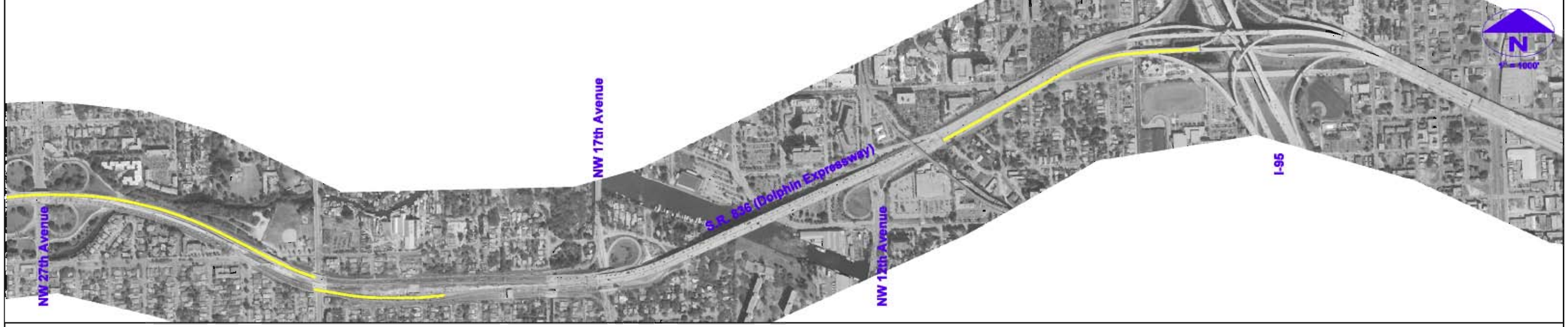
N
1" = 1000'

Legend
Congested Segments

Special Use Lane Study Phase II	**Miami Dade MPO**	**Florida's Turnpike - Congested Segments**	Figure No. **7-4**



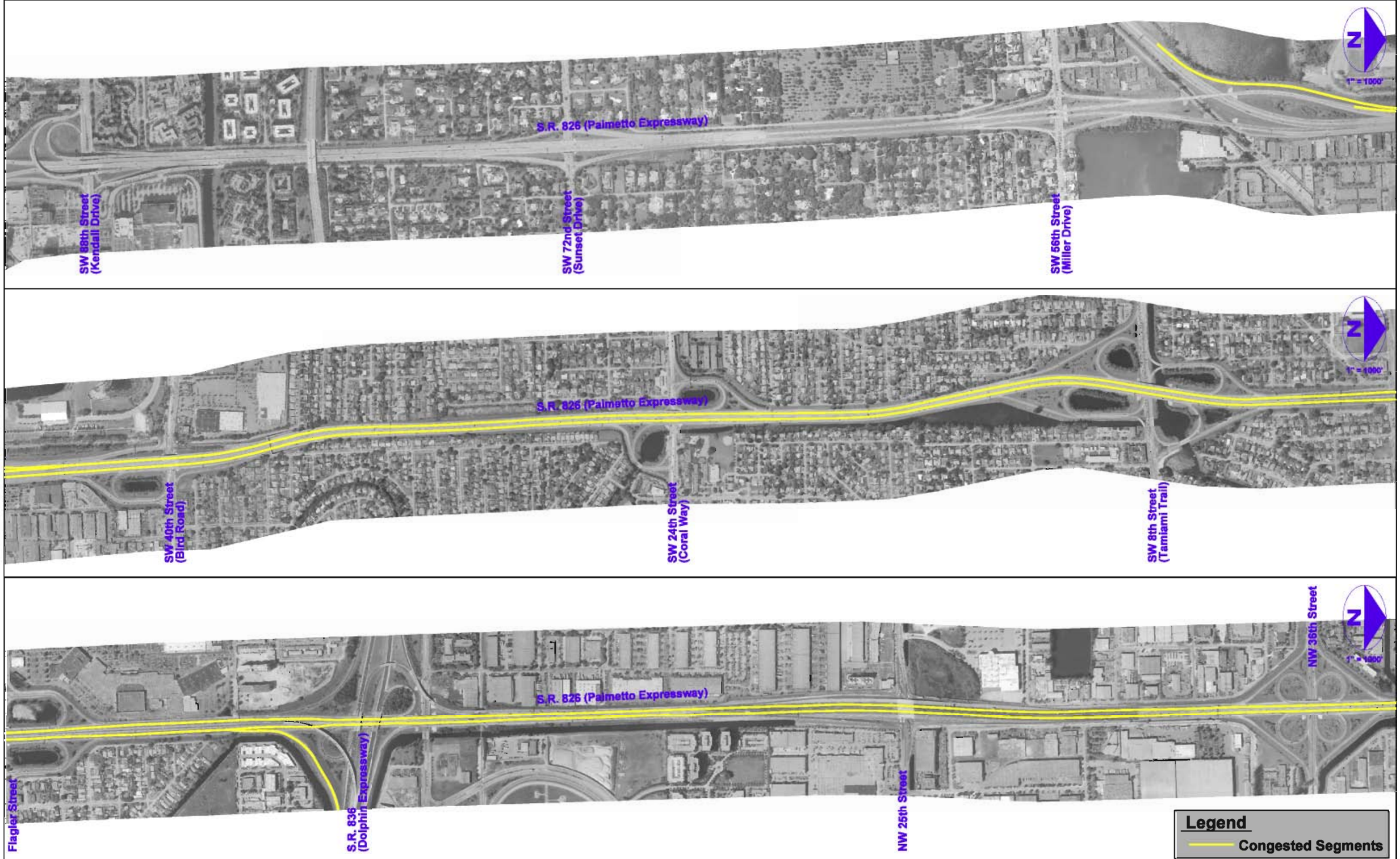
Special Use Lane Study Phase II	Miami Dade MPO	S.R. 836 - Congested Segments	Figure No. 7-5



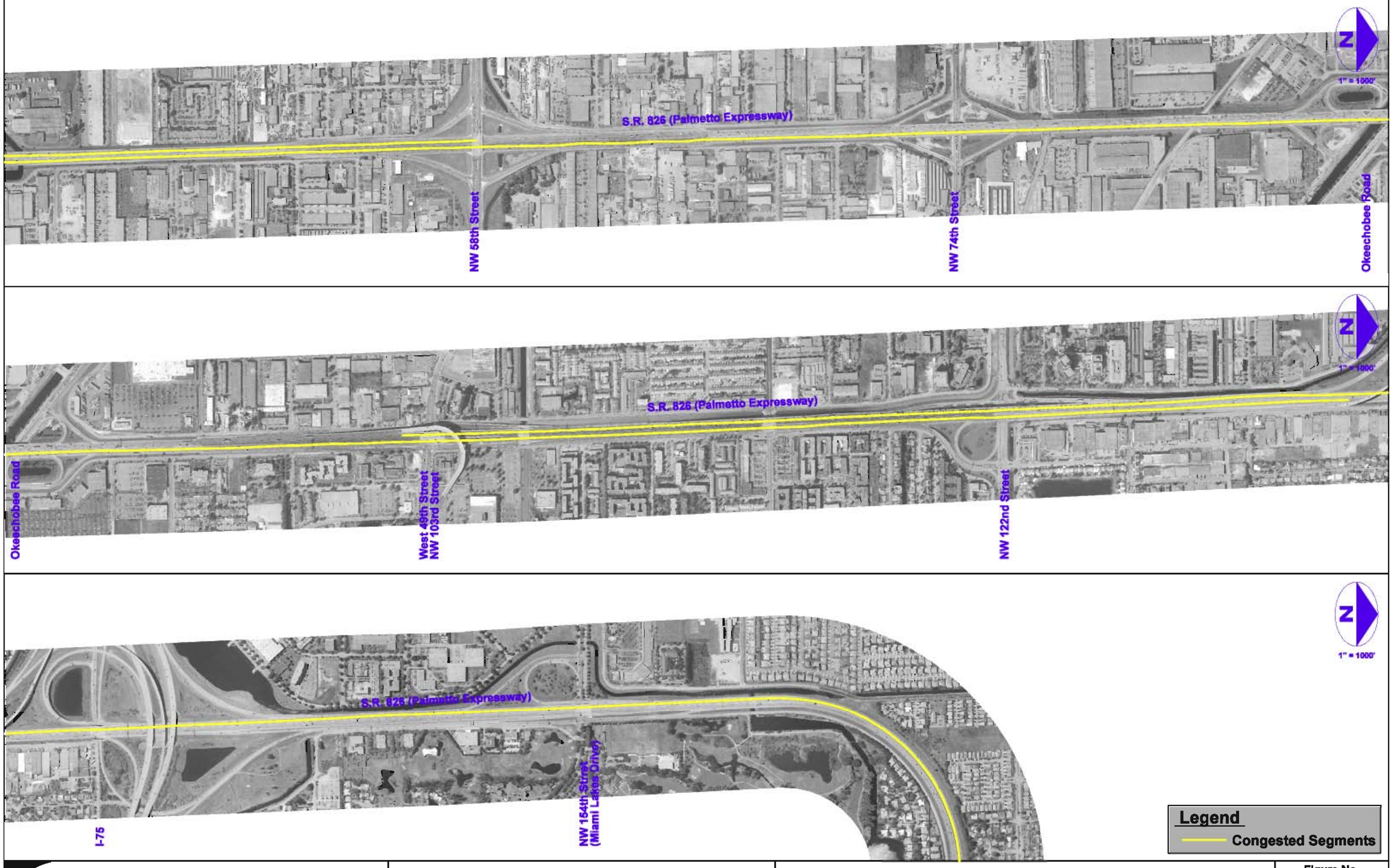
Legend

Congested Segments

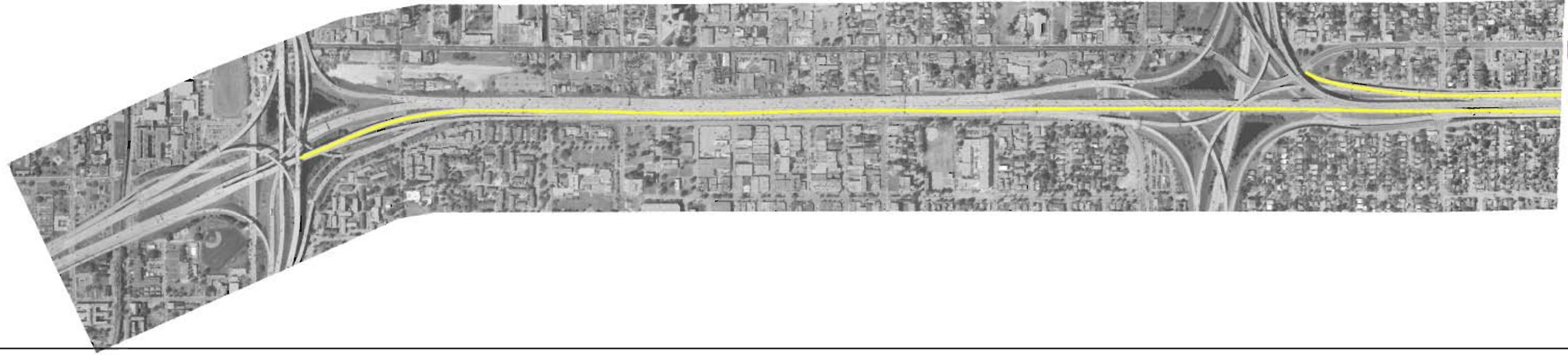
Special Use Lane Study Phase II	Miami Dade MPO	S.R. 836 - Congested Segments	Figure No. 7-6



Special Use Lane Study Phase II	Miami Dade MPO	S.R. 826 - Congested Segments	Figure No. 7-7



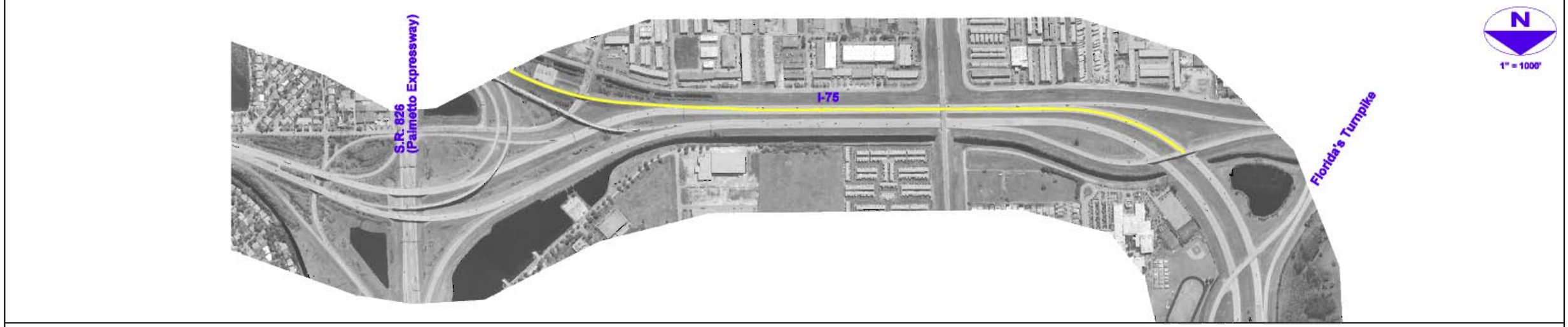
Special Use Lane Study Phase II	Miami Dade MPO	S.R. 826 - Congested Segments	Figure No. 7-8

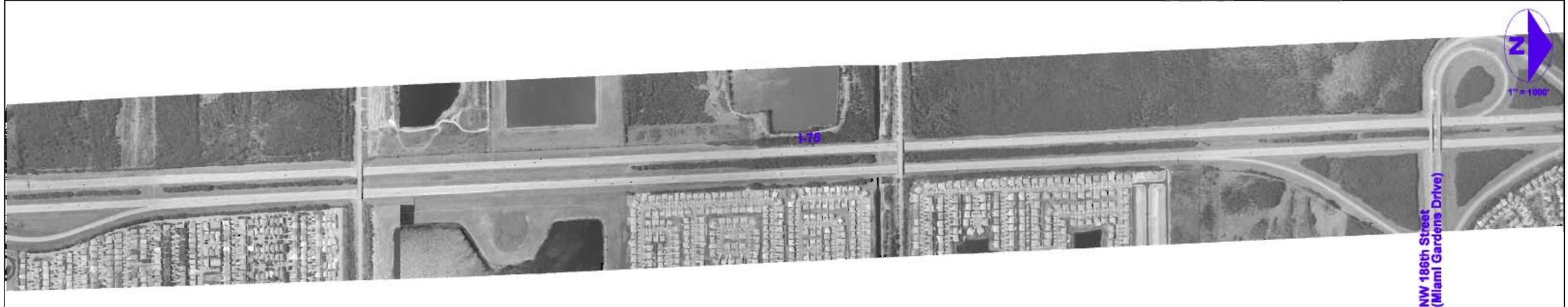


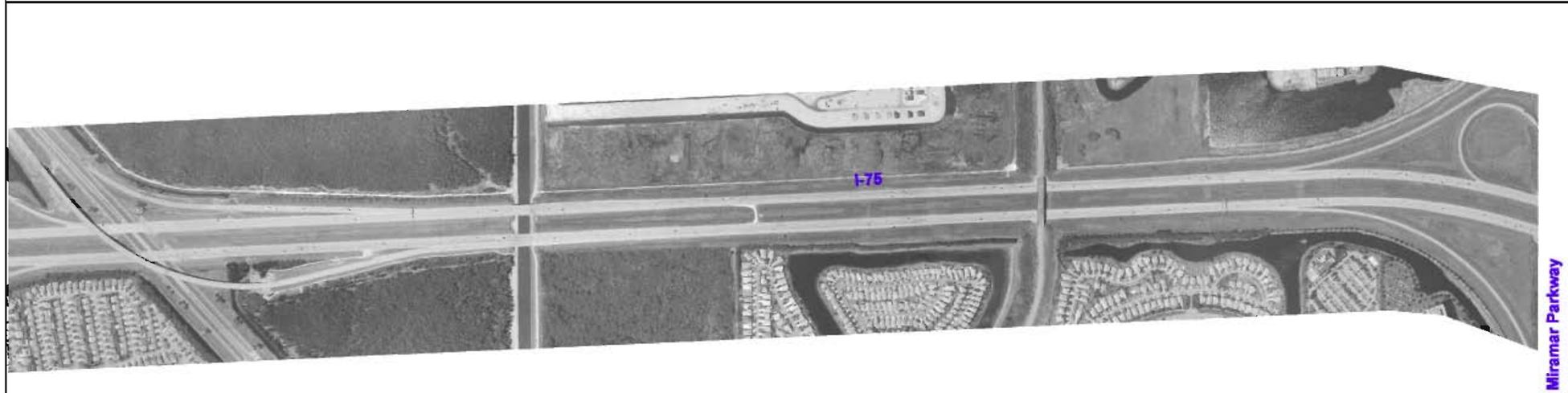
Legend

Congested Segments

Special Use Lane Study Phase II	**Miami Dade MPO**	**I-95 - Congested Segments**	Figure No. **7-9**

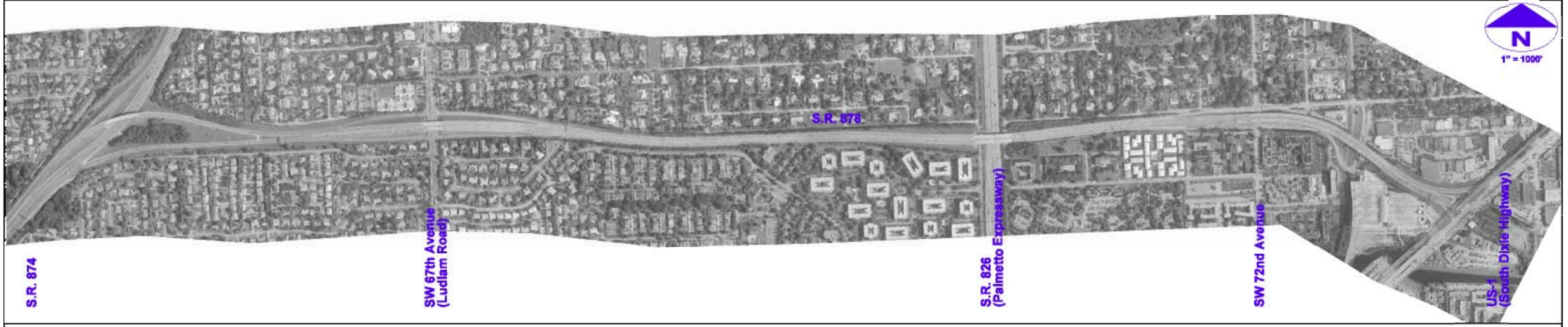






Special Use Lane Study Phase II	Miami Dade MPO	I-75 - Congested Segments	Figure No. 7-10

Special Use Lane Study Phase II	Miami Dade MPO	S.R. 874 - Congested Segments	Figure No. 7-11



Legend

Congested Segments

Special Use Lane Study Phase II	Miami Dade MPO	S.R. 878 - Congested Segments	Figure No. 7-12

D. Signage

Figures 7-13 through 7-15 show the signs that are recommended for use with this project.

Recommendations

SR-821 (Turnpike Extension) / SR-836 Corridor

Based on the field inspections conducted along this corridor and the available data, this is the best candidate for implementing the use of shoulders by transit buses in Miami-Dade County. Figure 7-16 through 7-18 presents the corridor, along with the proposed transit route, appropriate park and ride locations shoulder segments appropriate for use for by-pass and suggested sign locations.

Operational Issues:

Buses will need to operate through the east bound toll plaza. All buses operating on this route should be equipped with transponders so that they can operate through the express sun pass lanes. The bus will need to abandon shoulder operation no further east than the southbound off-ramp for NW 27th Avenue in order to negotiate across SR 836 to use the express sun pass lane. After passing through the sun pass lane the bus will then need to cross back to the shoulder lane in order to turn off SR 836 to access Government Center.

It is proposed to have several routes operating along SR 836. One of these routes would terminate at the future MIC or continue on to MIA. That route could begin operations prior to the completion of the MIC by being routed into the terminal area and tying to airport employee bus routes. This route would leave east bound shoulder operations at the NW 57th Avenue off-ramp to negotiate across SR 836 to use the left-hand exit to northbound LeJeune Road. The route could also access the MIC via NW 57th Avenue/Perimeter Road.

Again it should be noted that the shoulder by-pass program will need to be extremely flexible during the MDX construction program on SR 836. The areas available for congestion by-pass will change frequently and the contractors will need to work closely with MDT to relocate signs indicating where the bus operations will occur along the shoulder.

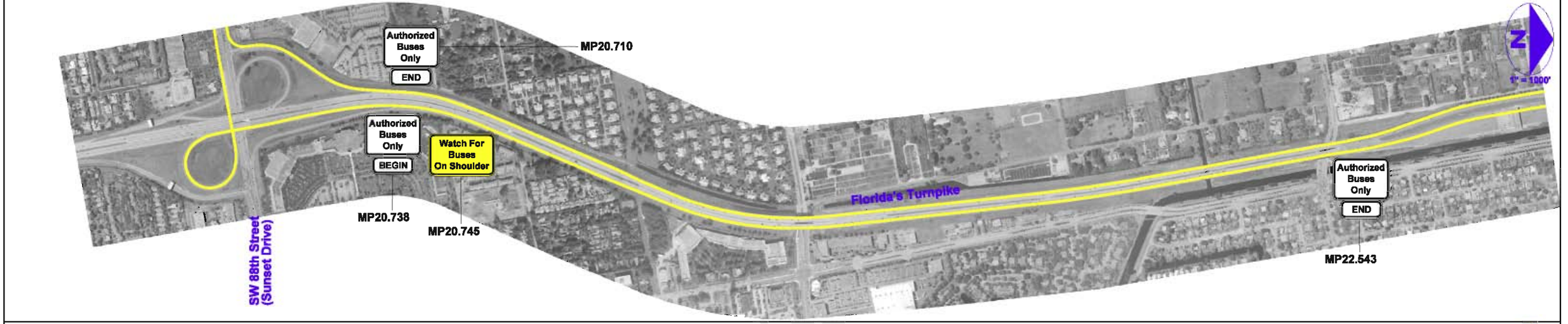
Cost:

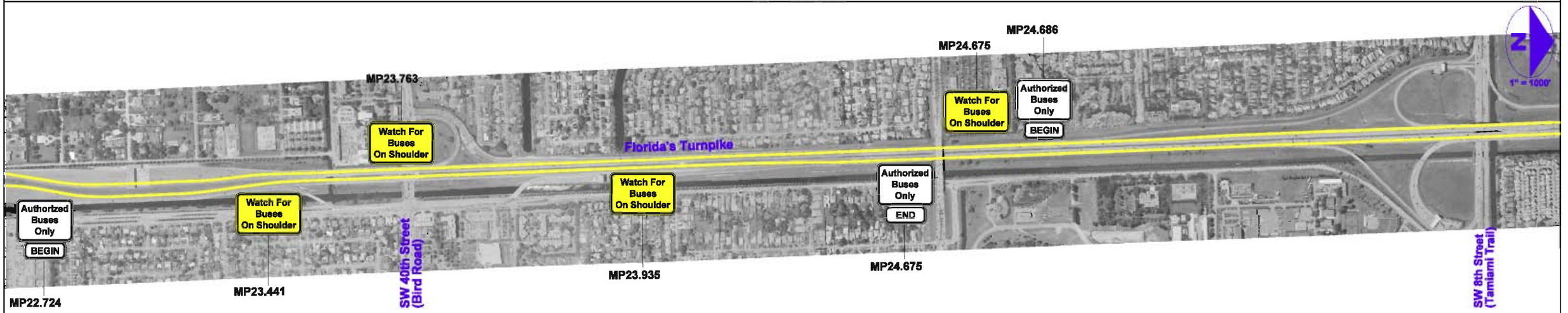
To begin operation very few improvements would be needed. The usable shoulder areas in the vicinity of Bird Road along the Turnpike (in both directions) have rumble strips that would need to be milled and resurfaced to accommodate bus trips. The remainder of route does not have rumble strips so no other locations need to be repaved. Based on FODT unit cost figures the cost of milling and resurfacing the section of Turnpike shoulder in the vicinity of Bird Road would be close to $90,000. If the decision is made not to relocate the

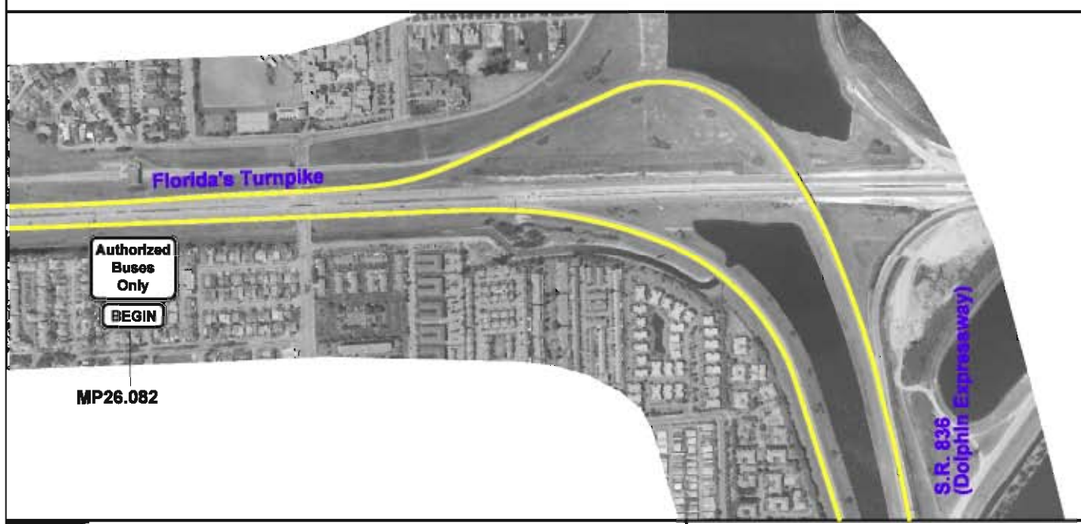
Fig. 7-13

Fig.
7-14

Fig.
7-15







NOTE:

MILE POST SIGN LOCATION IS APPROXIMATE.

ESTIMATED COST:

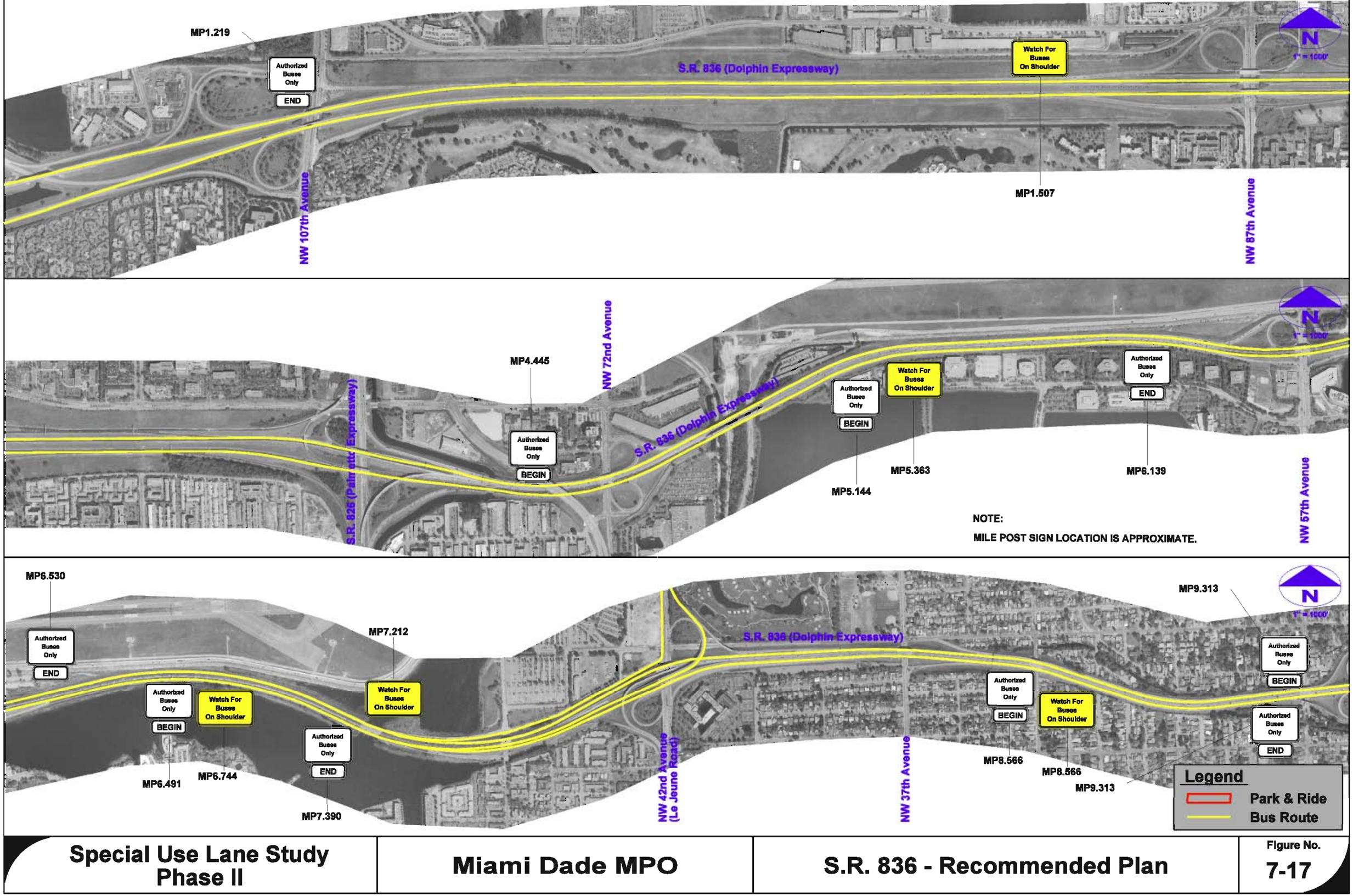
12 SIGNS @ $70 = $840.

Legend

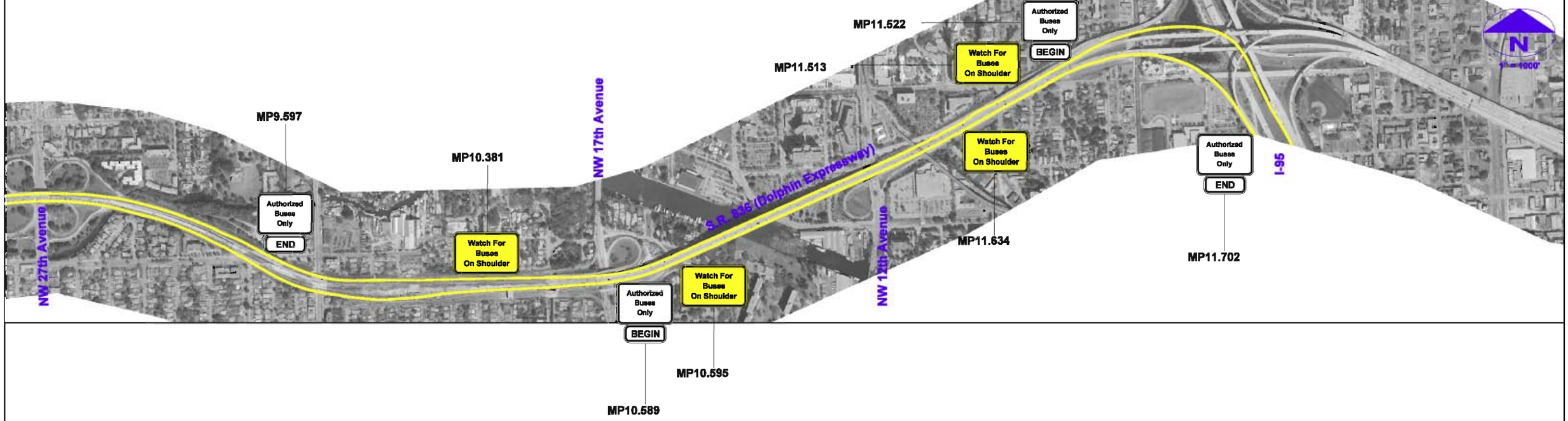
Park & Ride

Bus Route

Special Use Lane Study Phase II	Miami Dade MPO	Florida's Turnpike - Recommended Plan	Figure No. 7-16



Special Use Lane Study Phase II	Miami Dade MPO	S.R. 836 - Recommended Plan	Figure No. 7-17



NOTE:

MILE POST SIGN LOCATION IS APPROXIMATE.

ESTIMATED COST:

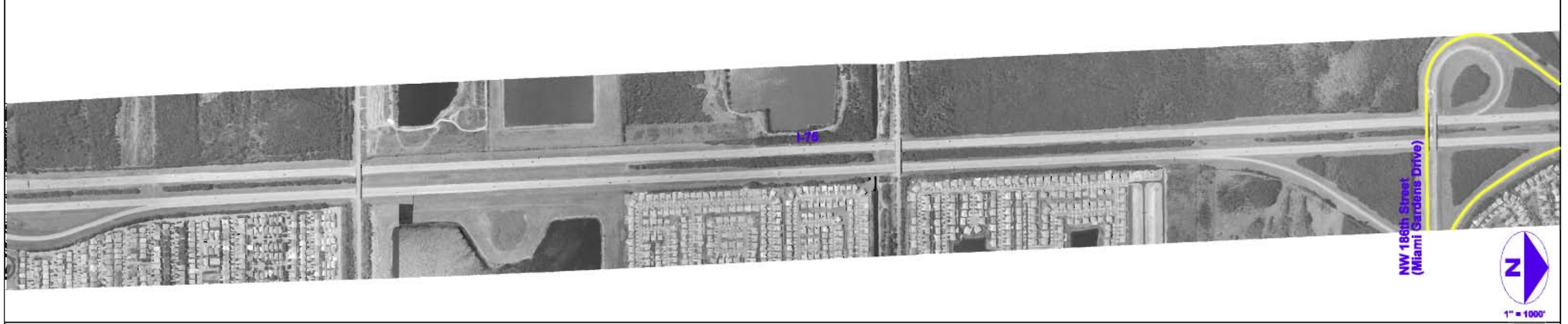
23 SIGNS @ $70 = $1610.

Legend

Park & Ride

Bus Route

Special Use Lane Study Phase II	Miami Dade MPO	S.R. 836 - Recommended Plan	Figure No. 7-18



NOTE:

MILE POST SIGN LOCATION IS APPROXIMATE.

ESTIMATED COST:

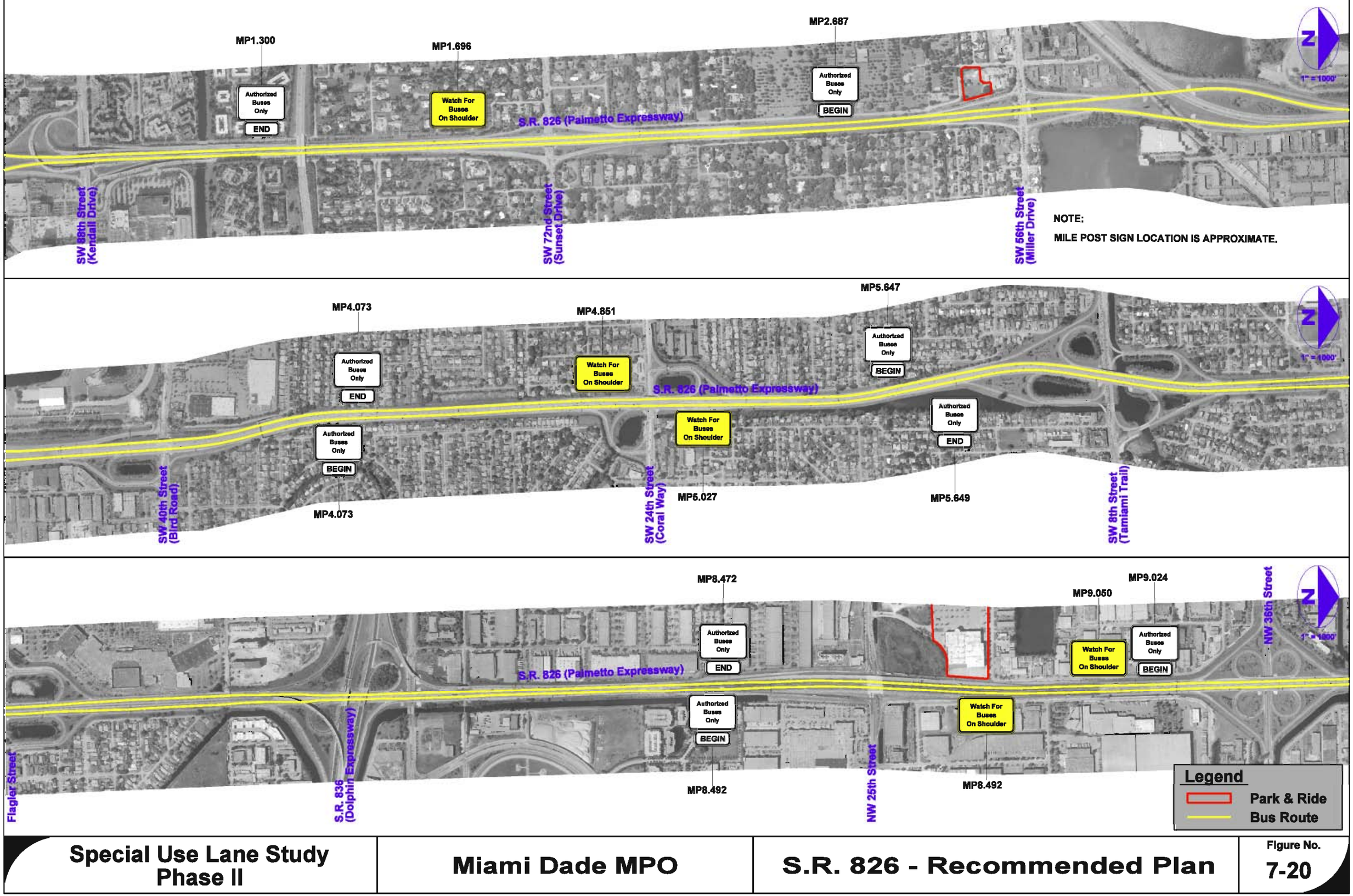
8 SIGNS @ $70 = $560.

Legend

Park & Ride

Bus Route

Special Use Lane Study Phase II	Miami Dade MPO	I-75 - Recommended Plan	Figure No. 7-19



Special Use Lane Study Phase II	Miami Dade MPO	S.R. 826 - Recommended Plan	Figure No. 7-20

Special Use Lane Study Phase II	Miami Dade MPO	S.R. 826 - Recommended Plan	Figure No. 7-21

N

1" = 1000'

NOTE:

MILE POST SIGN LOCATION IS APPROXIMATE.

ESTIMATED COST:

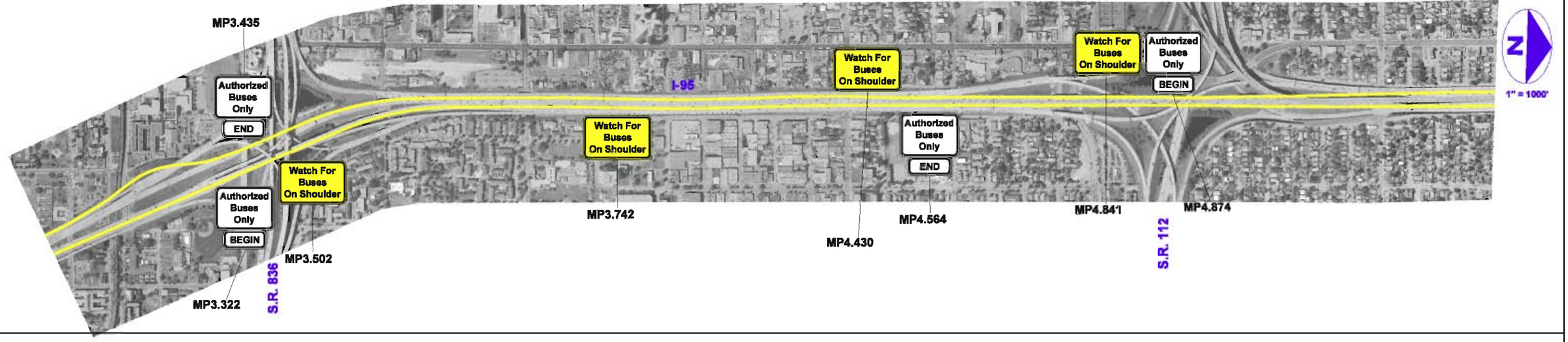
26 SIGNS @ $70 = $1820.

Legend

Park & Ride

Bus Route

Special Use Lane Study Phase II	**Miami Dade MPO**	**S.R. 826 - Recommended Plan**	Figure No. **7-22**



NOTE:

MILE POST SIGN LOCATION IS APPROXIMATE.

SIGN INDICATED ON THIS GRAPHIC WOULD BE INSTALLED IF BUS OPERATIONS ON SHOULDER ARE FEASIBLE.

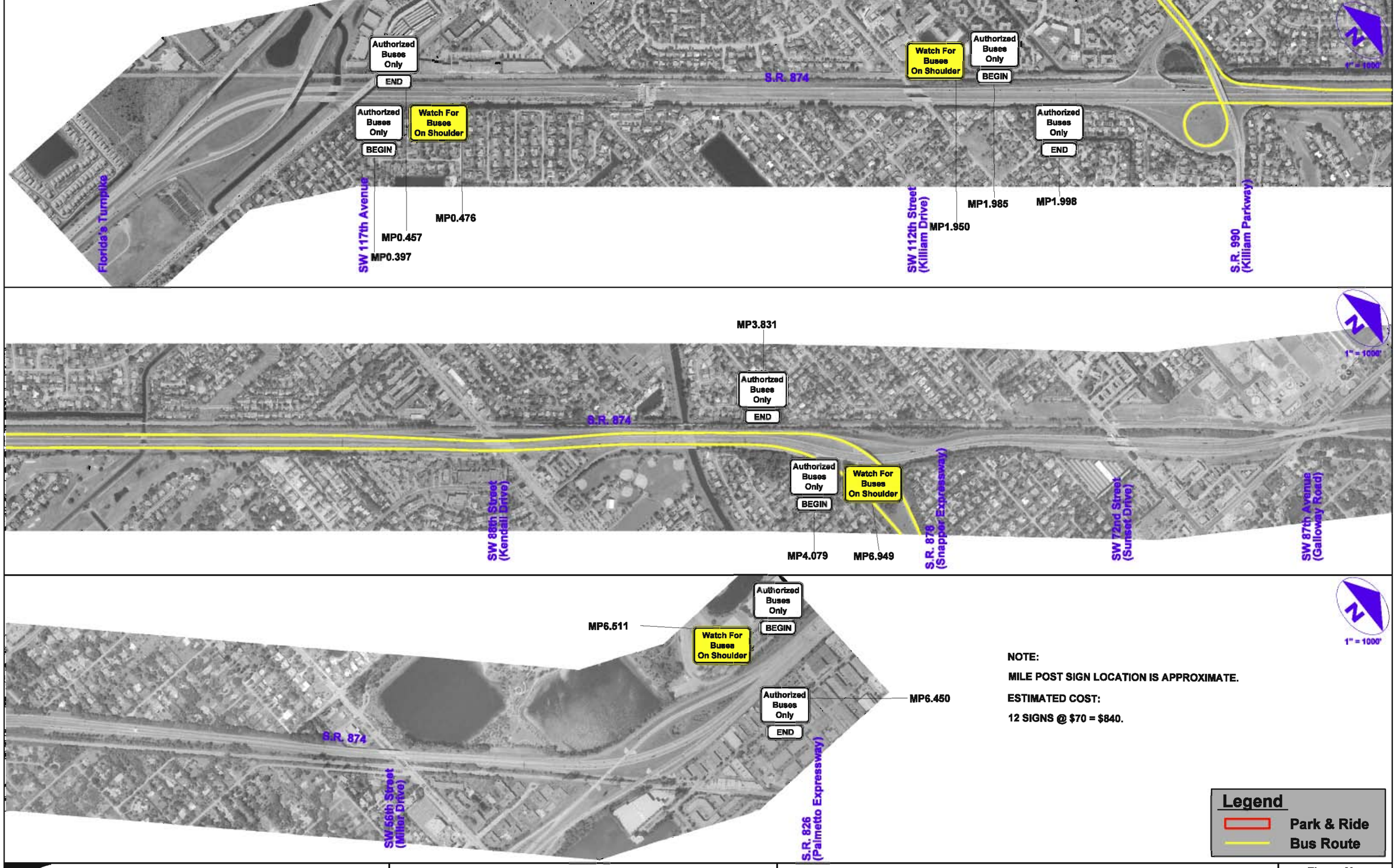
ESTIMATED COST:

8 SIGNS @ $70 = $560.

Legend

- Park & Ride
- Bus Route

Special Use Lane Study Phase II	Miami Dade MPO	I-95 - Recommended Plan	Figure No. 7-23



NOTE:

MILE POST SIGN LOCATION IS APPROXIMATE.

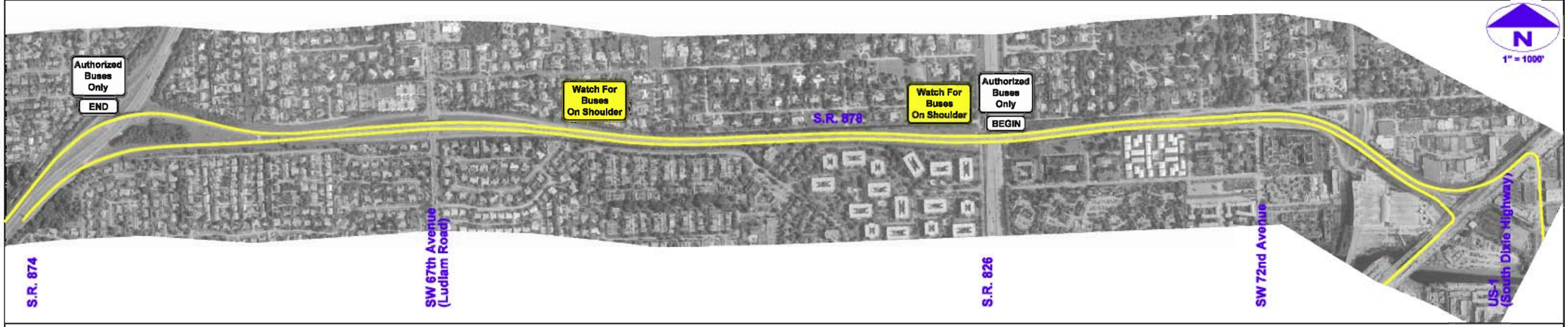
ESTIMATED COST:

12 SIGNS @ $70 = $840.

Legend

- Park & Ride
- Bus Route

Special Use Lane Study Phase II	Miami Dade MPO	S.R. 874 - Recommended Plan	Figure No. 7-24



NOTE:

MILE POST SIGN LOCATION IS APPROXIMATE.

ESTIMATED COST:

4 SIGNS @ $70 = $280.

Legend

Park & Ride

Bus Route

Special Use Lane Study Phase II	Miami Dade MPO	S.R. 878 - Recommended Plan	Figure No. 7-25

rumble strips on the shoulder of the Turnpike, because of safety reasons then the milling and resurfacing would not be necessary.

There are a few overpasses that have drainage structures that could be in areas used by buses for congestion by-pass. As you can see in Figures 7-2 and 7-3 the FDOT standard drainage outlet that is incorporated with a barrier wall is generally flush with the pavement and should not need to be reconstructed.

The only other cost is for the installation of signs per the drawings. The weighted FDOT cost for a single posted sign installed is $200 per item.

I-75 / SR-826 Corridor

Due to the ease of implementation of this express service, Miami-Dade Transit has already implemented the Broward County/NW Dade route from Pembroke Lakes Mall to the Palmetto Metrorail station. The project is being funded by a service development grant from FDOT to foster inter-county regional transit service. Negotiations are underway with the Pembroke Lakes Mall for the transfer point and possible park and ride facilities. The route will have a stop at a very small park and ride lot at CB Smith Park. Figure shows the bus routes along SR 826 and I-75. These figures also show the potential location of park and ride facilities near the expressways and the locations of the signs indicating where the shoulders can accommodate shoulder by-pass operations.

Like SR 836 substantial construction is underway along SR 826. Operations will need to be flexible to take advantage of shoulder by-pass locations.

Since all of the facilities that would be used for this route is very recent or has been recently reconstructed, the only costs would be for the signing indicated in the Figure 7-19.

SR-826 Corridor

The severe congestion in this corridor places a high priority for the implementation of shoulder by-pass lanes. Figures 7-20 through 7-22 shows the potential route along the corridor, the location of possible park-and-ride facilities along the corridor, and the portions of the corridor that should be signed for bus use for congestion by-pass. This corridor has been under reconstruction and will continue to be reconstructed for a number of years in the future. The use of available shoulders is critical to the operation of successful express bus service and FDOT, the Contractors and MDT need to closely coordinate construction progress and adjust routes accordingly. Maintenance of traffic plans need to take into consideration the bus routes whenever possible.

The only initial cost of the program will be installation of signs as indicated in the drawings. The signing will be an on-going expense to keep up with the constantly changing construction zones.

I-95 Corridor

The shoulder by-pass northbound between I-195 and I-395 would be a major addition to the I-95 busway. This northbound segment suffers from sever congestion because of the loss of lanes under I-395 overpass. This short segment of freeway drops the two right lanes in the northbound direction. Thus in the worst area of congestion the bus would have to cross two lanes of exiting traffic and merge into traffic that is generally at a dead stop. If the merge is slow then the bus will block the exit ramp to SR 112 westbound. Once the bus is in the interchange it needs to continue merging to the left to enter the busway on the north side of the interchange. The northbound shoulder would provide about 4,200 feet of congestion by-pass on the approach to the busway. This would be a substantial benefit unless too much time is lost in the 5 lane crossing to the busway.

In the southbound direction the busway terminates north of the SR 112 interchange at a point where the freeway drops two other lanes. The 6 southbound lanes are forced to merge into 3 lanes through the interchange. Two right hand lanes are added south of the interchange. The southbound segment is exhibits little congestion and is not really needed for congestion by-pass.

The cost of this providing congestion by-pass on the shoulders would be limited to the cost of the sign installation identified on Figure 7-23.

SR-874 / SR-878 Corridor

As can be seen in Figures 7-24 and 7-25 the area available for shoulder by-pass (except for the eastbound segment of the Snapper Creek Expressway) is not where the current bus routes operate. No buses operate in the areas with sufficient shoulders along SR 874. Shoulders can accommodate bus operations in both directions south and west of SW 104 Street (Killian) and east of the interchange with Snapper Creek.

As the bus routing grows the there are good portions of SR 874 that could be used for congestion by-pass. Construction plans for the toll plaza will impact the amount of shoulder available for congestion by-pass south and west of Killian.

Park and Ride

FDOT has initiated a park and ride study that will further investigate the potential for park and ride lots along these corridors.

Liability

Miami-Dade Transit is responsible for all liability incurred during the operation of its transit system. The extent of the County's liability will be specified in individual agreements between the operator and facility owner.

Enforcement

Concern has been expressed about the level of violators driving on the shoulders behind buses. Surveillance and enforcement is the sole prerogative of the Florida Highway Patrol on Interstate Highways and on the Turnpike**.** On SR 826, SR 836, SR 874 and SR 878, Miami-Dade Police Department can issue citations when they observe violations occurring. Municipal police have

no jurisdiction on these facilities and thus cannot be used to actively curtail violations by non-authorized vehicles driving on the shoulders. MDT should coordinate with FHP and Miami-Dade County Police Department regarding the implementation of the project.

Bus Driver Training Program

Currently very few of the MDT routes operate on freeways. As the number of express routes operating on freeways expand, all drivers need some training in operating buses at higher speeds, safe breaking, and lane changing. All bus drivers need to be thoroughly instructed on the operations of the congestions by-pass facilities so that they are fully cognizant of the rules for use of the lanes including:

All drivers should be fully capable of driving in a 10 ½ foot lane at 35 miles per hour as this is no different than driving on any of the arterials. Drivers will need to understand that if traffic begins to pass them at speeds greater than 35 miles per hour then the bus should not be operating on the shoulder. Finally each bus driver assigned to a specific route prior to carrying passengers on a freeway must drive that route with a trainer to fully understand what segments of the freeway shoulders are eligible for by-pass and how to move across the on and off ramps associated with interchanges. The driver will also need to understand at what point he must exit the shoulder lane in order to move through toll plazas.

Marketing / Educational / Awareness Campaign

The public awareness campaign for this project should have three approaches. The first approach should begin prior to the initiation of the freeway express routes. The campaign should identify that service is about to be initiated on a given route. The campaign should provide the routing, the headways, the travel time, the cost and the location of any park and ride facilities.

The second part of the campaign should be initiated as soon as the route is operational and the signs for the shoulder operations are in place. The MDT needs to provide a media event where reporters and elected officials are place on two buses both leaving the starting point at the exact same time during the morning rush hour. One of the buses will be allowed to use the shoulder and the other bus will stay in traffic. The news coverage will show the bus by-passing the congestion and then documenting how much time was saved *en route*. A further part of this part of the campaign could be to have the "best " MDT driver operating the express bus – perhaps the local winner of the bus rodeo. The add would show that no matter how good the driver is he can not beat the use of express bus service that can take advantage of the shoulder by-pass lanes.

The final leg of the public awareness would be public service announcements that inform the public about buses operating on the freeway shoulders. The message should stress that shoulders are still provided for emergency use and for Authorized Vehicles only. The announcement should emphasize that enforcement will be rigorous and that no warnings will be issued. The final emphasis will be that bus operation on the shoulders is not an invitation to follow the bus down the freeway. Finally remind the public that all buses are equipped with radios and can report violators to the FHP.

Evaluation Study

As indicated in the proposed Interlocal Agreement, once the recommended service is implemented, a study should be conducted to evaluate the service provided along the shoulders, including the impacts to transit and highway areas. This study should provide recommendations along the study to improve and correct any deficiency that may be identify during the operation.

Other

Before implementing any route MDT should invite the participating agencies for a "dry run" of the proposed services. A first run should be with the technical staff to verify the conditions and a second run with officials to obtain their input. It is recommended that a videotape of the runs be produced for bus driver training purposes.

The Future

The development of shoulder by-pass lanes is not an end unto itself. The shoulders should only be signed once Miami-Dade Transit is prepared to operate express buses on the freeways. The success of the freeway express operations will be in-large part to the ability of the buses to out-pace stop-and-go traffic. MDT should closely monitor the success of these initial routes to determine the potential for increasing their headways. To this end MDT is undertaking a three-year pilot program for the use of expressway shoulder for operation as congestion by-passes. During this pilot project bus operations will be monitored as to real ridership and time savings to determine the success of the program. The final evaluation at the end of the three year program will be used to determine whether to continue or to expand the program. Participation of agencies and implementation of routes will occur after the negotiation of individual Letters of Agreement.

NEXT STEPS

1. Approval of the Interlocal Agreement by parties involved in implementing the pilot project.
2. Implement Action Plan as proposed in Chapter VII.
3. Coordinate the installation of signs and other required improvements with FDOT, MDX and the Turnpike.
4. Initiate Marketing/Educational Campaign
5. Initiate training of bus drivers
6. Coordinate with FHP for surveillance and enforcement
7. Clean-up of all debris and other materials along the shoulders
8. Coordinate with the required entities for establishing the Park and Ride facilities, as needed
9. Coordinate with MDX for the use of the transponders for the buses
10. Coordinate the evaluation study through the MPO
11. Initiate service

Attachments

This Chapter includes the following 5 attachments:

- Attachment A: Special Use Lane Fact Sheet
- Attachment B: Interlocal Agreement
- Attachment C: BRT Opportunities Report - Executive Summary
- Attachment D: Shoulder Impact Assessment
- Attachment E: Summary of Comments Received and their Response.

ATTACHMENT A
Special Use lane Fact Sheet

Miami-Dade County
Metropolitan Planning Organization (MPO)

Special Use Lane
Fact Sheet

1. BACKGROUND

The idea of using roadway shoulders to allow buses to bypass congestion on highways, is one of a number of congestion management tools which the MPO, along with operational transportation agencies is exploring, or has already instituted.

The MPO completed a study in October 2004, entitled "Special Use Lane Study." It evaluated some freeways and major arterials that have potential to accommodate some type of special use lane. Two connected core systems were recommended for implementation. The first one was called the Expressway Core System that includes the use of transit buses along the shoulders of the expressways. The second one was the arterial Core System that recommends the implementation of a bus rapid transit (BRT) system along Flagler Street, Biscayne Boulevard and Kendall Drive.

2. RECOMMENDATION

A recommendation was made to pursue the implementation of the Expressway Core System.

3. COORDINATION

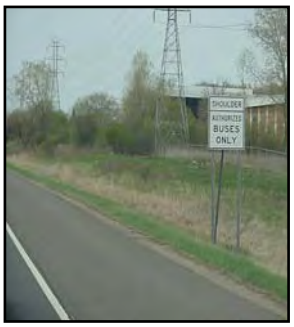
Two meetings were held with representatives of: MPO (Lead agency), Miami-Dade Transit (MDT), Miami-Dade Expressway Authority (MDX), Florida Department of Transportation (FDOT-6), Turnpike Enterprise and Miami-Dade Public Works Department.

4. INMEDIATE ACTIONS

a. Amend Florida Statutes to allow transit buses to use shoulders along expressways
b. Develop a Scope of Work to develop a bus service implementation plan for the Express Core System
c. Coordinate a visit to Miami from representatives of Minnesota DOT and/or Minneapolis Transit Agency

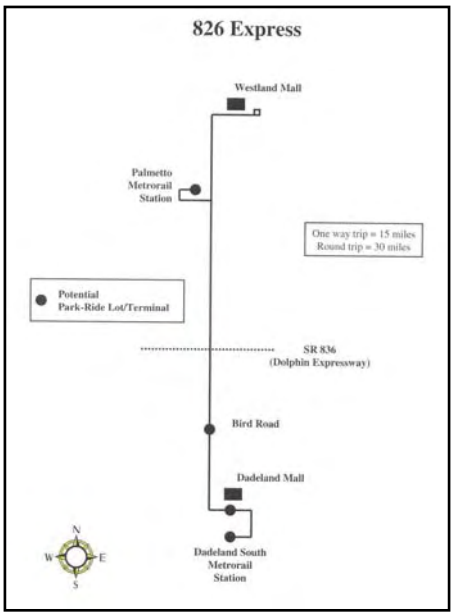
5. MINNEAPOLIS EXPERIENCE

- Use of shoulder started operation in 1992.
- Minnesota Statutes were amended to allow transit buses to use shoulders only as a bypass of traffic congestion when mainline traffic speed is below 35 mph. Buses operating on the shoulder must yield to merging, entering, and exiting traffic and must yield to other vehicles on the shoulder. Buses may never exceed 35 mph.
- There are over 80 shoulder segments totaling over 220 miles used by transit buses as established by law. Every year they add approximately 20 - 30 miles to the system.
- Over 250 transit trips per day are using these facilities.
- No major improvements or modifications have been made to the shoulders.
- No major accidents have been occurred since 1998.
- Only appropriate signage has been used to warn drivers about the use of the shoulders.
- Average budget for improvements and maintenance $1.5 M per year.
- Customers perceive savings two times greater than actual.



6. POTENTIAL NEW SITES

Maryland, Virginia, Minnesota, Washington, British Columbia, Ontario are among the jurisdictions that have implemented or are considering implementing bus use on shoulders programs.



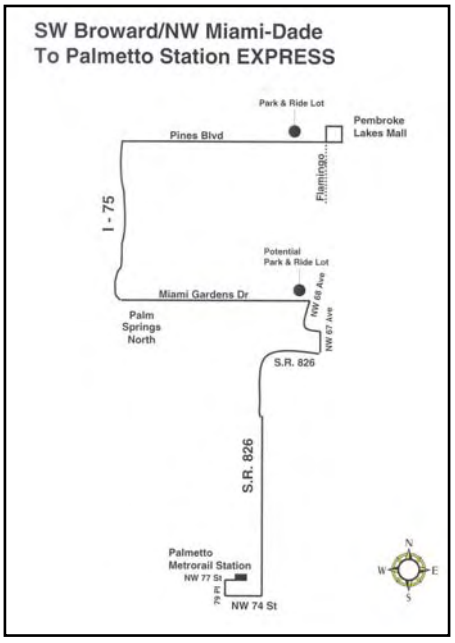
7. MIAMI-DADE PROPOSED SERVICES

MDT has developed four express routes to initiate this service:

- **a.** From Kendall Dr. through the Turnpike Extension, Dolphin Expressway to the Airport and Downtown Miami.
- **b.** From Kendall Dr. through the Palmetto Expressway to the Miami Lakes area.
- **c.** From Pembroke Pines Blvd. in Broward through I-75 and Palmetto Expressway to Palmetto Metrorail Station.
- **d.** From Pembroke Pines Blvd. through Flamingo Road and Palmetto Expressway to Palmetto Metrorail Station.

8. PROPOSED AMENDMENT TO THE FLORIDA STATUTES

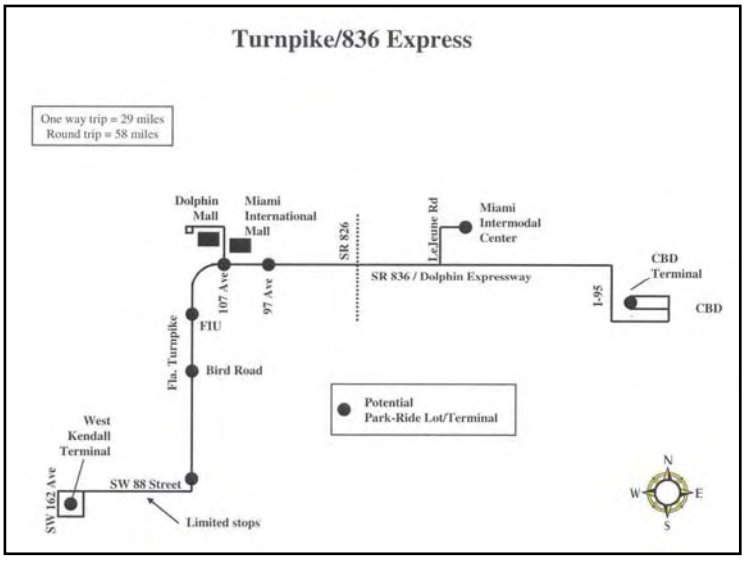
- **a.** Proposed amendment was included in the Miami-Dade County 2005 State Legislative Priorities for next legislative session to allow transit buses to use shoulders along expressways.
- **b.** Language used was very similar to the one used by Minnesota DOT. The Florida proposal modified Minnesota statute language to make it simpler, and consistent with Florida terminology, and to allow its use anywhere in Florida.
- **c.** Conditions for using the shoulders are the same as those approved by Minnesota Legislation.
- **d.** The Secretary of Transportation needs to authorize any segments along the expressway system to be used by transit buses. Facilities under the jurisdiction of the MDX should also be approved by the MDX Board of Directors.



9. SPECIAL USE LANE – PHASE II

This second phase study is underway. Data collection has been completed. The study will be completed by June 2005 and include:

- **a.** Recommendations for highway and transit improvements.
- **b.** Recommendations regarding engineering, safety, enforcement and operational issues.
- **c.** Time schedule and estimated cost of recommended improvements..



For more information, please contact Jesus Guerra, MPO project Manager, at (305) 375-2069 or by e-mail at guerraj@miamidade.gov

ATTACHMENT B
Letter of Agreement

With October 28, 2005 changes
Need to confirm who erects signs and installs roadway markings.

Interlocal Agreement Among Miami-Dade County, the Miami-Dade Metropolitan Planning Organization and the Miami-Dade Expressway For Conducting a Pilot Program for Transit Operations on Expressway Shoulders

This is an Interlocal Agreement, made and entered into by and among Miami-Dade County, a political subdivision of the State of Florida, hereinafter referred to as "the County"; the Miami-Dade Expressway Authority, a _____of the State of Florida, hereinafter referred to as "the Authority"; and the Miami-Dade County Metropolitan Planning Organization, a ___of the State of Florida, hereinafter referred to "the MPO".

WITNESSETH:

WHEREAS, it is in the interest of Miami-Dade County, the Miami-Dade Expressway Authority and the Miami-Dade County Metropolitan Planning Organization to reduce traffic congestion by improving transit operations to attract choice riders; and

WHEREAS, the Miami-Dade Transit Agency operates or will operate express bus routes on certain Miami-Dade Expressway roadways;

WHEREAS, the buses on those routes operate, in part, on normally congested roadways; and

WHEREAS, strategies to speed the operations of those transit services would make transit more attractive to choice riders; and

WHEREAS, several communities throughout the Country allow operation of express buses on the shoulders of expressways under certain conditions; and

WHEREAS, the State of Florida Department of Transportation has authorized a three-year pilot program to determine is such shoulder operations would be advantageous in Miami-Dade County; and

WHEREAS, the Miami-Dade County Metropolitan Planning Organization has completed a study of such operations and recommends a pilot program be implemented on specific segments of MDX roadways where the shoulder is suitable for Metrobus operations and where traffic conditions warrant such an operation; and

NOW, THEREFORE,

IN CONSIDERATION of the mutual terms, conditions, promises, covenants and payments hereinafter set forth, the parties agree as follows:

ARTICLE 1

DEFINITIONS

1.1 "The County" shall include Miami-Dade County and the Miami-Dade Transit Agency and authorized representatives thereof.

1.2 "MDT" shall mean the Miami-Dade Transit and authorized representatives thereof.

1.3 "FDOT" shall refer to the State of Florida Department of Transportation, its rules and regulations, and representatives thereof.

1.4 "MPO" shall refer to the Miami-Dade Metropolitan Planning Organization and authorized representatives thereof

1.5 "MDX" shall refer to the Miami-Dade Expressway Authority and authorized representatives thereof.

1.6 "USDOT" shall refer to the United States Department of Transportation, its rules and regulations, and representatives thereof.

ARTICLE 2

GENERAL REQUIREMENTS

2.1 Compliance with Applicable Laws and Regulations. The parties to this agreement shall comply with all existing and future laws, statutes, ordinances, codes, rules, regulations, and procedural requirements, whether federal, state, or local, which are applicable to, or in any manner affect, the pilot program and any subsequent operations of MDT transit services on the roadways of the MDX. Each party

shall be responsible for ensuring compliance of its employees, contractors, agents, or assigns with all applicable county, state, and federal requirements, including, but not limited to, all safety, mechanical, roadway and vehicular standards mandated by appropriate laws, regulations, ordinances, and documents and complying therewith.

2.3 Drug-free Workplace and Testing. In accordance with the Code of Miami-Dade County, the County, and it contractors, in any, shall continue to maintain a drug-free workplace program including pre-employment drug testing and other periodic drug testing for all persons holding safety-sensitive positions, as defined by USDOT, related to transit operations. Effective upon execution of the Agreement, the County shall require that its employees and contractor, if applicable, comply with all applicable requirements of the USDOT regulations for drug and alcohol testing. To the extent that any terms in this Agreement are inconsistent with the USDOT regulation, the requirements of the USDOT shall control.

2.12 Representative. Each party shall designate individual(s) to act as liaison to the other parties and notify the other parties thereof. Each party shall promptly notify the other parties of any changes.

2.13 Amendments or modifications. Unless provided otherwise elsewhere in this Agreement, amendments and modifications to this Agreement must be in writing and shall require the signatures of the County Manager, the MPO Director, and the MDX Executive Director or their designees, subject to authorization by their respective Boards.

ARTICLE 3

PILOT PROGRAM FOR TRANSIT BUSES USING SHOULDERS ALONG THE SHOULDERS OF MIAMI-DADE EXPRESSWAY ROADWAYS

3.1 Concept. This pilot program is based on recommendations found in the ____ [report name], dated October 2005, commissioned by the MPO and performed by The Corradino Group hereinafter referred to "the Report". Under the concept MDT transit buses operation in MDX roadways would operate in the right shoulder of the roadways under specific traffic-congestion condition specified in Section 3.3 below. Such operations would remove MDT buses from slow traffic thus speeding their passengers to their destinations and providing an attractive alternative to citizens using their automobiles. This type of operation is currently being used in other parts of the Country as detailed in the Report. No major construction will be needed to implement this pilot program.

3.2 Authority. This pilot program is undertaken under the authority of the FDOT as detailed in a letter from ____ to ____ dated ____, 2005.

3.3 Conditions for Shoulder Operations. MDT buses shall operate on the right shoulder of MDX roadways under the following conditions:

3.3.1 Where the Report has found that the shoulders are suitable for shoulder operations or where the parties otherwise agree that should operations are appropriate.

3.3.2 When the traffic on the mainline lanes of the expressway is operating at speeds of less than 35 miles per hour, MDT buses may operate on the shoulders at the discretion of the Metrobus operator.

3.3.3 Metrobus operation on the shoulders shall not exceed 35 miles per hour.

3.3.4 Metrobuses operating on the shoulders must yield to entering, merging and exiting traffic and to emergency and law enforcement vehicle.

3.3.5 Where disabled or law enforcement vehicles, construction, or other obstacles occupy the shoulder, Metrobuses operating on the shoulders shall move from the shoulders.

3.4 Responsibilities of the Parties.

3.4.1 The MPO shall be responsible for the following activities and financing them:

3.4.1.1 The development of technical studies for implementing the pilot projects including an Action Plan, engineering reports and drawings, specifications for installation of signs and revised roadway markings, and an estimated cost. It is expected that these tasks will be performed by a contractor to the MPO.

3.4.1.2 The monitoring the pilot program and developing semi-annual progress reports for distribution to the Boards and staff of the parties to this Agreement.

3.4.1.3 The production of a final report in the final semi-annual period of this project with recommendations concerning continuation, reduction, or expansion of the shoulder operations or any other strategy for improving transit operations on MDX roadways.

3.4.2 MDT will be responsible for the following activities and financing them:

3.4.2.1 The operation of the transit services on the roadway shoulders by providing the vehicles.

3.4.2.2 The training of Metrobus operators to conform to the conditions of this pilot program.

3.4.2.3 The development, production, and distribution of informational materials to inform public officials, the general public, expressway drivers, and transit riders of the goals, objectives and details of the pilot program and the implementation of the pilot program.

3.4.2.4 The processing and reimbursement of the costs of any repairs to roadway shoulders associated with this pilot program

3.4.2.5 The processing and reimbursement of the costs of the installation and maintenance of signs and roadway markings associated with this pilot program.

3.4.3 MDX shall be responsible for the following activities:

3.4.3.1 Maintenance of the shoulders such that they are free and clear of debris to allow shoulder operations to the maximum extent allow by the conditions of this pilot program.

3.4.3.2 Striping or re-striping or other similar tasks that are needed to permit transit operations of strategies to improve transit operations.

3.4.3.3 Fabrication, installation, maintenance, and where necessary, replacement of roadway signs along the segments of the roadways where shoulder transit operations will take place as detailed in the Report.

3.4.3.4 Distribution of informational material concerning the pilot program to expressway drivers.

3.4.3.5 There shall be no major construction activities in association with the implementation of any strategies for improved transit operations along MDX roadways.

3.4.3.6 The installation and repair of shoulders, signs, and pavement markings associated with this project.

3.4.3.7 The cost of the installation and maintenance of signs and roadway markings associated with this pilot program shall be detailed and forwarded to MDC for reimbursement.

3.4.3.8 The cost of any repairs to the shoulders needed to continue this pilot program shall be detailed and forwarded to MDC for reimbursement.

ARTICLE 4

INSURANCE

The parties hereto acknowledge that all parties are self-insured governmental entities subject to the limitations of Section 768.28, F.S. The parties shall maintain a fiscally sound and prudent risk management program with regard to its obligations under this Agreement in accordance with the provision of Section 768.28, F.S. The parties shall collect and keep on file documentation of insurance of any and all contractors which may participate in any way in this pilot program. The parties shall further require that any such contractor to include the other parties as a named insured and shall provide the other parties with a copy of the insurance policy purchased by any contractor participating in this pilot program.

ARTICLE 5

INDEMNIFICATION

Text in italics is added to include the MPO. Need to have this text confirmed by the County Attorney.

Miami-Dade County (County) shall indemnify and hold harmless the Miami-Dade Expressway Authority (MDX) *and the MPO* and its officers, employees, agents and instrumentalities from any and all liability. Losses or damages including attorney's fees and cost of defense, which the MDX, *the MPO,* or its officers, employees, agents or instrumentalities may incur as a result of claims, demands, suits, causes of actions or proceedings of any kind or nature arising out of, relating to or resulting from the use of the shoulder of SR 826, SR 874, SR 878, SR 924, SR 112 by Miami-Dade Transit vehicles. County shall pay all claims and losses in connection therewith and shall investigate and defend all claims and losses in connection therewith and shall investigate and defend all claims, suits or actions of any kind or nature in the name of the MDX *and the MPO*, where applicable, including appellate proceedings, and shall pay all costs, judgments and attorney's fees which may issue thereon.

ARTICLE 6

TERMS, MODIFICATIONS AND MISCELLANEOUS PROVISIONS

6.1 Term of Agreement. This Agreement shall become effective upon approval of the Boards of the parties and execution by the County Manager, the MPO Director

and the Executive Director of the MDX or their designees and shall remain in effect for one year beyond the period of operation of the pilot program. This Agreement is subject to three five-year options to renew, by agreement between the County Manager, the MPO Director and the Executive Director of the MDX or their designees

6.2 Period of Operation of the Pilot Program, The period of operation of the pilot program shall begin after all the parties agree that preparations for shoulder operations have been accomplished. Such preparations shall include, but not be limited to training of Metrobus Operators, preparation of the shoulders, and installation of roadway signage, and distribution of information to public officials, the general public, expressway drivers and transit riders. The period of operation shall extend for three years unless terminated earlier by agreement of the parties or under direction from the FDOT. The period of operation may be extended by agreement of the parties and the FDOT.

6.3 Renegotiation or Modification. Any substantive changes in operation of the pilot program as set forth herein shall only be implemented after all parties have entered into a written agreement describing the changes.

6.4 Termination for Cause. This agreement may be terminated for cause by any party upon no less than one hundred twenty (120) days written notice to the other parties. If the notification is from the MPO or MDX, the notice shall be sufficiently in advance for MDT to implement a change in service in accordance with the Collective Bargaining Agreement between Miami-Dade County and Local 291 of the Transport Workers' Union.

6.5 Termination without Cause. Any party may terminate this Agreement without cause upon no less than three hundred sixty (360) days written notice to the other parties.

6.6 Notices. All notices and other communications required to be remitted pursuant to this Agreement to the other parties hereto shall be in writing and shall be delivered by verified facsimile transmission or certified mail, return receipt requested, to the parties at the address indicated below:

FOR MIAMI-DADE COUNTY:

Miami-Dade Transit
111 N.W. First Street Suite 910
Miami, FL 33128
Attention: Director, Miami-Dade Transit

FOR THE MPO

Metropolitan Planning Organization
111 N. W. First Street Suite 910
Miami, Florida 33128
Attention: Director

FOR THE MDX

Miami-Dade Expressway Authority

_____
Miami, Florida 331__

6.7 Complete and Binding Agreement. This writing embodies the full and complete agreement of the parties. No other terms, conditions or modifications shall be binding upon the parties unless in writing and signed by the parties.

7.8 Execution. This document shall be executed in six (6) counterparts, each of which shall be deemed an original. Two originals shall be distributed to each of the parties.

7.9 Governing Law. This Agreement shall be construed in accordance with the laws of the State of Florida.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their respective and duly authorized officers the day and year first above written.

ATTEST:

HARVEY RUVIN, CLERK

MIAMI-DADE COUNTY, a political subdivision of the State of Florida

By Its Board of County Commissioners

By: : _____
DEPUTY CLERK

By: _____
GEORGE BURGESS
COUNTY MANAGER

Approved by County Attorney as
to form and legal sufficiency _____.

ATTEST:

MIAMI-DADE EXPRESSWAY AUTHORITY, a _____of the State of Florida By Its Board of Directors

By: _____
SERVANDO PARAPAR
EXECUTIVE DIRECTOR

ATTEST:

MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION, a _____of the State of Florida By Its Governing Board

By: _____
JOSE-LUIS MESA
DIRECTOR

October 28, 2005

Interlocal Agreement Among Miami-Dade County, the Miami-Dade Metropolitan Planning Organization and the Florida's Turnpike Enterprise For Conducting a Pilot Program for Transit Operations on Expressway Shoulders

This is an Interlocal Agreement, made and entered into by and among Miami-Dade County, a political subdivision of the State of Florida, hereinafter referred to as "the County"; the Florida's Turnpike Enterprise, a _____of the State of Florida, hereinafter referred to as "FTE"; and the Miami-Dade County Metropolitan Planning Organization, a ___of the State of Florida, hereinafter referred to "the MPO".

WITNESSETH:

WHEREAS, it is in the interest of Miami-Dade County, Florida's Turnpike Enterprise and the Miami-Dade County Metropolitan Planning Organization to reduce traffic congestion by improving transit operations to attract choice riders; and

WHEREAS, the Miami-Dade Transit Agency operates or will operate express bus routes on sections of Florida's Turnpike Enterprise roadways;

WHEREAS, the buses on those routes operate or will operate, in part, on normally congested roadways; and

WHEREAS, strategies to speed the operations of those transit services would make transit more attractive to choice riders; and

WHEREAS, several communities throughout the Country allow operation of express buses on the shoulders of expressways under certain conditions; and

WHEREAS, the State of Florida Department of Transportation has authorized a three-year pilot program to determine is such shoulder operations would be advantageous in Miami-Dade County; and

WHEREAS, the Miami-Dade County Metropolitan Planning Organization has completed a study of such operations and recommends a pilot program be implemented on specific segments of FTE roadways where the shoulder is suitable for Metrobus operations and where traffic conditions warrant such an operation; and

NOW, THEREFORE,

IN CONSIDERATION of the mutual terms, conditions, promises, covenants and payments hereinafter set forth, the parties agree as follows:

ARTICLE 1

DEFINITIONS

1.1 "The County" shall include Miami-Dade County and the Miami-Dade Transit Agency and authorized representatives thereof.

1.2 "MDT" shall mean the Miami-Dade Transit and authorized representatives thereof.

1.3 "FDOT" shall refer to the State of Florida Department of Transportation, its rules and regulations, and representatives thereof.

1.4 "MPO" shall refer to the Miami-Dade Metropolitan Planning Organization and authorized representatives thereof

1.5 "FTE" shall refer to the Florida's Turnpike Enterprise and authorized representatives thereof.

1.6 "USDOT" shall refer to the United States Department of Transportation, its rules and regulations, and representatives thereof.

ARTICLE 2

GENERAL REQUIREMENTS

2.1 Compliance with Applicable Laws and Regulations. The parties to this agreement shall comply with all existing and future laws, statutes, ordinances, codes, rules, regulations, and procedural requirements, whether federal, state, or local, which are applicable to, or in any manner affect, the pilot program and any subsequent operations of MDT transit services on the roadways of the FTE. Each party shall

be responsible for ensuring compliance of its employees, contractors, agents, or assigns with all applicable county, state, and federal requirements, including, but not limited to, all safety, mechanical, roadway and vehicular standards mandated by appropriate laws, regulations, ordinances, and documents and complying therewith.

2.3 Drug-free Workplace and Testing. In accordance with the Code of Miami-Dade County, the County, and it contractors, in any, shall continue to maintain a drug-free workplace program including pre-employment drug testing and other periodic drug testing for all persons holding safety-sensitive positions, as defined by USDOT, related to transit operations. Effective upon execution of the Agreement, the County shall require that its employees and contractor, if applicable, comply with all applicable requirements of the USDOT regulations for drug and alcohol testing. To the extent that any terms in this Agreement are inconsistent with the USDOT regulation, the requirements of the USDOT shall control.

2.12 Representative. Each party shall designate individual(s) to act as liaison to the other parties and notify the other parties thereof. Each party shall promptly notify the other parties of any changes.

2.13 Amendments or modifications. Unless provided otherwise elsewhere in this Agreement, amendments and modifications to this Agreement must be in writing and shall require the signatures of the County Manager, the MPO Director, and the FTE Executive Director or their designees, subject to authorization by their respective Boards.

ARTICLE 3

PILOT PROGRAM FOR TRANSIT BUSES USING SHOULDERS ALONG THE SHOULDERS OF MIAMI-DADE EXPRESSWAY ROADWAYS

3.1 Concept. This pilot program is based on recommendations found in the ____ [report name], dated October 2005, commissioned by the MPO and performed by The Corradino Group hereinafter referred to "the Report". Under the concept MDT transit buses operation in FTE roadways would operate in the right shoulder of the roadways under specific traffic-congestion condition specified in Section 3.3 below. Such operations would remove MDT buses from slow traffic thus speeding their passengers to their destinations and providing an attractive alternative to citizens using their automobiles. This type of operation is currently being used in other parts of the Country as detailed in the Report. No major construction will be needed to implement this pilot program.

3.2 Authority. This pilot program is undertaken under the authority of the FDOT as detailed in a letter from ____ to ____ dated ____, 2005.

3.3 Conditions for Shoulder Operations. MDT buses shall operate on the right shoulder of FTE roadways under the following conditions:

3.3.1 Where the Report has found that the shoulders are suitable for shoulder operations or where the parties otherwise agree that should operations are appropriate.

3.3.2 When the traffic on the mainline lanes of the expressway is operating at speeds of less than 35 miles per hour, MDT buses may operate on the shoulders at the discretion of the Metrobus operator.

3.3.3 Metrobus operation on the shoulders shall not exceed 35 miles per hour.

3.3.4 Metrobuses operating on the shoulders must yield to entering, merging and exiting traffic and to emergency and law enforcement vehicle.

3.3.5 Where disabled or law enforcement vehicles, construction, or other obstacles occupy the shoulder, Metrobuses operating on the shoulders shall move from the shoulders.

3.4 Responsibilities of the Parties.

3.4.1 The MPO shall be responsible for the following activities and financing them:

3.4.1.1 The development of technical studies for implementing the pilot projects including an Action Plan, engineering reports and drawings, specifications for installation of signs and revised roadway markings, and an estimated cost. It is expected that these tasks will be performed by a contractor to the MPO.

3.4.1.2 The monitoring the pilot program and developing semi-annual progress reports for distribution to the Boards and staff of the parties to this Agreement.

3.4.1.3 The production of a final report in the final semi-annual period of this project with recommendations concerning continuation, reduction, or expansion of the shoulder operations or any other strategy for improving transit operations on FTE roadways.

3.4.2 MDT will be responsible for the following activities and financing them:

3.4.2.1 The operation of the transit services on the roadway shoulders by providing the vehicles.

3.4.2.2 The training of Metrobus operators to conform to the conditions of this pilot program.

3.4.2.3 The development, production, and distribution of informational materials to inform public officials, the general public, expressway drivers, and transit riders of the goals, objectives and details of the pilot program and the implementation of the pilot program.

3.4.2.4 The installation of appropriate signage under a permit from FTE.

3.4.2.5 The processing and reimbursement of the costs of any repairs to roadway shoulders associated with this pilot program. These costs shall include those incurred if shoulder rumble strips need to be moved or removed. The agreement of MDC and FTE is needed for MDC to pay for the cost of moving or removing the shoulder rumble strips to permit continued operation of this pilot program.

3.4.2.6 The processing and payment of the costs of the installation and maintenance of signs and roadway markings associated with this pilot program.

3.4.3 FTE shall be responsible for the following activities:

3.4.3.1 Maintenance of the shoulders such that they are free and clear of debris to allow shoulder operations to the maximum extent allow by the conditions of this pilot program.

3.4.3.2 Striping or re-striping or other similar tasks that are needed to permit transit operations of strategies to improve transit operations.

3.4.3.3 Maintenance, and where necessary, replacement of roadway signs along the segments of the roadways where shoulder transit operations will take place as detailed in the Report.

3.4.3.4 Distribution of informational material concerning the pilot program to expressway drivers.

3.4.3.5 There shall be no major construction activities in association with the implementation of any strategies for improved transit operations along MDX roadways.

3.4.3.6 The installation and repair of shoulders, signs, and pavement markings associated with this project. The cost of such activities shall be detailed and forwarded to MDC for reimbursement.

3.4.3.7 The cost of the installation, maintenance, and where necessary, replacement of signs and roadway markings associated with this pilot program shall be detailed and forwarded to MDC for reimbursement.

3.4.3.8 The cost of any repairs to the shoulders needed to continue this pilot program shall be detailed and forwarded to MDC for reimbursement.

ARTICLE 4

INSURANCE

The parties hereto acknowledge that all parties are self-insured governmental entities subject to the limitations of Section 768.28, F.S. The parties shall maintain a fiscally sound and prudent risk management program with regard to its obligations under this Agreement in accordance with the provision of Section 768.28, F.S. The parties shall collect and keep on file documentation of insurance of any and all contractors which may participate in any way in this pilot program. The parties shall further require that any such contractor to include the other parties as a named insured and shall provide the other parties with a copy of the insurance policy purchased by any contractor participating in this pilot program.

ARTICLE 5

INDEMNIFICATION

Text in italics is added to include the MPO. Need to have this text confirmed by the County Attorney.

Miami-Dade County (County) shall indemnify and hold harmless Florida's Turnpike Enterprise (FTE) *and the MPO* and its officers, employees, agents and instrumentalities from any and all liability. Losses or damages including attorney's fees and cost of defense, which the FTE, *the MPO,* or its officers, employees, agents or instrumentalities may incur as a result of claims, demands, suits, causes of actions or proceedings of any kind or nature arising out of, relating to or resulting from the use of the shoulder of Florida's Turnpike including the Homestead Extension (SR 821) by Miami-Dade Transit vehicles. County shall pay all claims and losses in connection therewith and shall investigate and defend all claims and losses in connection therewith and shall investigate and defend all claims, suits or actions of any kind or nature in the name of the FTE *and the MPO,* where applicable, including appellate proceedings, and shall pay all costs, judgments and attorney's fees which may issue thereon.

ARTICLE 6

TERMS, MODIFICATIONS AND MISCELLANEOUS PROVISIONS

6.1 Term of Agreement. This Agreement shall become effective upon approval of the Boards of the parties and execution by the County Manager, the MPO Director and the Executive Director of the FTE, or their designees and shall remain in effect for one year beyond the period of operation of the pilot program. This Agreement is subject to three five-year options to renew, by agreement between the County Manager, the MPO Director and the Executive Director of the FTE or their designees.

6.2 Period of Operation of the Pilot Program, The period of operation of the pilot program shall begin after all the parties agree that preparations for shoulder operations have been accomplished. Such preparations shall include, but not be limited to training of Metrobus Operators, preparation of the shoulders, and installation of roadway signage, and distribution of information to public officials, the general public, expressway drivers and transit riders. The period of operation shall extend for three years unless terminated earlier by agreement of the parties or under direction from the FDOT. The period of operation may be extended by agreement of the parties and the FDOT.

6.3 Renegotiation or Modification. Any substantive changes in operation of the pilot program as set forth herein shall only be implemented after all parties have entered into a written agreement describing the changes.

6.4 Termination for Cause. This agreement may be terminated for cause by any party upon no less than one hundred twenty (120) days written notice to the other parties. If the notification is from the MPO or FTE, the notice shall be sufficiently in advance for MDT to implement a change in service in accordance with the Collective Bargaining Agreement between Miami-Dade County and Local 291 of the Transport Workers' Union.

6.5 Termination without Cause. Any party may terminate this Agreement without cause upon no less than three hundred sixty (360) days written notice to the other parties.

6.6 Notices. All notices and other communications required to be remitted pursuant to this Agreement to the other parties hereto shall be in writing and shall be delivered by verified facsimile transmission or certified mail, return receipt requested, to the parties at the address indicated below:

FOR MIAMI-DADE COUNTY:

Miami-Dade Transit
111 N.W. First Street Suite 910
Miami, FL 33128
Attention: Director, Miami-Dade Transit

FOR THE MPO

Metropolitan Planning Organization
111 N. W. First Street Suite 910
Miami, Florida 33128
Attention: Director

FOR THE FTE

Florida's Turnpike Enterprise
_____
, Florida 3____

6.7 Complete and Binding Agreement. This writing embodies the full and complete agreement of the parties. No other terms, conditions or modifications shall be binding upon the parties unless in writing and signed by the parties.

7.8 Execution. This document shall be executed in six (6) counterparts, each of which shall be deemed an original. Two originals shall be distributed to each of the parties.

7.9 Governing Law. This Agreement shall be construed in accordance with the laws of the State of Florida.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their respective and duly authorized officers the day and year first above written.

ATTEST:

HARVEY RUVIN, CLERK

By: : _____
DEPUTY CLERK

Approved by County Attorney as
to form and legal sufficiency _____.

MIAMI-DADE COUNTY, a
political subdivision of the
State of Florida

By Its Board of County
Commissioners

By: _____
GEORGE BURGESS
COUNTY MANAGER

ATTEST:

FLORIDA'S TURNPIKE
ENTERPISE, a _____of the
State of Florida By ___

By: _____
CHRIS WARREN
DEPUTY EXECUTIVE
DIRECTOR AND CHIEF
OPERATING OFFICER

ATTEST:

MIAMI-DADE METROPOLITAN
PLANNING ORGANIZATION, a
_____of the State of Florida By
Its Governing Board

By: _____
JOSE-LUIS MESA
DIRECTOR

ATTACHMENT C
BRT Opportunities Report
Executive Summary

Overview of Bus Rapid Transit Opportunities as Part of an Integrated Multi-Modal Strategy to Improve Travel Time in Miami-Dade County (BRT OPPORTUNTIES STUDY)

Executive Summary

Prepared for:

Miami-Dade Metropolitan Planning Organization

Prepared by:

Center for Urban Transportation Research
National Bus Rapid Transit Institute
College of Engineering, University of South Florida
4202 E. Fowler Avenue CUT 100
Tampa, Florida 33620-5375

Final – June 2005

Overview of Bus Rapid Transit Opportunities as Part of an Integrated Multi-Modal Strategy to Improve Travel Time in Miami-Dade County (BRT OPPORTUNTIES STUDY)

Introduction

Today, public transit bus service in the United States and most of the world does not inspire a great deal of customer satisfaction and community support. Local bus service is often too unreliable, inconvenient, slow, and circuitous. In response, communities have often turned to very expensive alternatives such as light and heavy rail systems to improve service delivery and image. However, there is now an alternative that provides premium transit service at a relatively low cost. Many communities are turning to a concept known as Bus Rapid Transit (BRT) as one solution. BRT can provide high-quality, rail-like transit service at a lower capital, operation, and maintenance cost than most rail-based options while delivering comparable level of service to customers.

The origins of BRT can be traced back to South America in the 1970s. Faced with high population growth and limited traveling options, and limited financial resources to build necessary highway capacity, South American planners are credited with creating a new public transit paradigm called BRT to address these issues. The concept was to use rubber-tired buses as a type of "surface metro system" utilizing dedicated and exclusive lanes for buses. Those designing the first BRT systems knew that the ultimate objective was to swiftly, efficiently, and cost-effectively move people, rather than cars. Today, around the world ranging from Asia, South America, Europe, and the U.S., the BRT concept is becoming increasingly utilized by communities looking for cost-effective rapid transit solutions. Of course, Miami-Dade County also has an example of BRT operating parallel to South Dixie Highway on dedicated right-of-way that will ultimately extend from Dadeland South to Homestead. As new BRT systems emerge, the state-of-the-art in BRT continues to evolve to meet local community needs.

What is BRT?

The term BRT refers to a wide range of improvements intended to make bus service faster, more reliable, and attractive to customers. With this flexibility, communities like Miami-Dade County (MDC) can design a rapid transit system to serve unique corridors in a short timeframe while working within financial constraints. Lessons indicate that with a committed and focused planning process and a person dedicated to leading this process, a community can have a comprehensive BRT route up and running in revenue service in 9 to 18 months. This is not even remotely possible with light or heavy rail. Transit Cooperative Research Project (TCRP) *Report 90* defines BRT as "a flexible, rubber tired rapid transit mode that combines stations, vehicles, services, runningways, and Intelligent Transportation System (ITS) elements into an integrated system with a strong positive identity that evokes a unique image. BRT applications are designed to be appropriate to the market they serve and their physical surroundings, and they can be incrementally implemented in a variety of environments." Using a combination of technologies, unique design features, and operating procedures permits rubber-tired BRT vehicles the ability to approach the speed and service quality of rail-based rapid-transit modes.

While conventional wisdom states that people will ride rail but not buses, many in the transit industry believe that the public has no preference for transit vehicles with steel wheels or those with rubber tires if the quality of service is the same. Evidence from currently operating BRT

systems suggests this belief to be true. BRT in the U.S. has essentially begun the process of reinventing bus service, creating a renaissance in bus–based public transit service. It provides faster and more reliable service and offers customers greater comfort, convenience, and even safety when compared to other bus services, all at a significantly lower cost (in virtually every instance) to building, operating, and maintaining rail systems. More important, perhaps, a basic BRT system like the Metro Rapid in Los Angeles can be running and providing better service to customers in a corridor many years before a rail project can even get off of the system engineer's drawing board. In support of BRT, the US Secretary of Transportation Norm Minetta commented that "Bus Rapid Transit gives communities the best bang for their buck when it comes to investing in transit."

The following bullet points are some of the known reasons why individuals opt for privately-operated vehicles (POV) in favor of public transit (all modes). In every instance, a BRT system will address and alleviate each of these concerns.

- Inconvenient in terms of location of stations/stops
- Frequency of service
- Fear of crime at stations and on-board transit vehicles
- Service is much slower than POVs, especially when local buses make frequent stops and require multiple transfers to reach final destination
- Overcrowding of vehicles makes ride uncomfortable
- Buses pollute the environment
- Stigma associated with using "The Bus"

In support of its BRT Initiative, the Federal Transit Administration (FTA) published the report "Characteristics of Bus Rapid Transit for Decision-Making" (C-BRT) in August 2004 to provide transportation planners and decision-makers with basic information and data to support the development and evaluation of BRT. The C-BRT report provides general information on the various BRT system elements and estimated impacts in a single, easy-to-use reference for end users. The C-BRT report was used extensively throughout this project to define the different BRT elements in order to provide consistency to the BRT planning process. For example, the various definitions for station types (basic, enhanced, designated, etc.) were taken directly from the C-BRT document. A copy of this report is available for download at www.fta.dot.gov.

Project Focus

The Bus Rapid Transit Opportunities Study complements, not duplicates, the *People's Transportation Plan's* (PTP) rapid transit expansion component in a number of corridors. This project examined the feasibility of establishing BRT in relatively quick timeframe in four of the corridors noted in the *PTP* as well as seven others. While some of these corridors might ultimately accommodate rapid rail further off in the future, it was important to determine if it is possible to have some form of rapid public transit service in place prior to the time that rail might be implemented. The overall project objective was to identify arterial-based corridors in MDC where relatively low-cost BRT treatments can give Miami-Dade Transit (MDT) buses competitive advantages as they provide new and faster service, and to identify the most feasible types of BRT improvements that can be made in the shortest timeframe to improve mobility options and travel times. The introduction of a new, high-quality mode of public transit that offers faster travel choices to transit customers is an integral objective of the *PTP*.

Corridor Selection

Clearly, a key consideration in corridor selection is to minimize travel distances and travel times for the largest segment of the population in the County. Satisfying this objective resulted in the selection of 11 corridors that have a mix of major destinations/origins such as employment centers, universities and schools, and shopping areas as well as many other mixed land uses including dense residential areas.

As mentioned, the *PTP* identified rapid transit expansion in four corridors in MDC that were reviewed in this report: Biscayne Boulevard, Flagler Street, Kendall Drive, and LeJeune Road. Selection of the four *PTP* rapid transit corridors is based on various levels of analysis during the last decade coupled with extensive public involvement. Based on this and input from the Miami-Dade Metropolitan Planning Organization (MPO) and MDT, additional candidate BRT corridors were selected for analysis. These corridors represent those with the highest current concentration of MDT bus service and ridership as well as transit-supportive land uses. These corridors meet the needs of the entire MDT transit system network in terms of connectivity, geographic east-west and north-south coverage, and potential success in terms of increased system and future corridor ridership resulting from forecasted growth and traffic congestion mitigation. The proposed BRT corridors are:

- Flagler Street (*PTP* Corridor)
- Biscayne Boulevard (US 1) (*PTP* Corridor)
- LeJeune Road (*PTP* Corridor)
- Kendall Drive (*PTP* Corridor)
- NW 79th Street
- NW 7th Avenue
- SW 107th Avenue
- W 49th Street
- SW 87th Avenue
- SW 137th Avenue
- Coral Way

Building the BRT Corridors

The choice of what BRT elements to incorporate into a BRT system ultimately determines its overall performance. Performance characteristics, together with individual BRT elements, directly steer how system benefits are generated. This relationship is shown in Exhibit ES-1. The exhibit also shows the major BRT elements.

Exhibit ES-1: Major BRT Elements – System Performance - System Benefits

Major Elements of BRT		System Performance		System Benefits
• Runningways • Stations • Vehicles • Fare Collection • ITS • Service and Operations Plan	⇨	• Travel Time Savings • Reliability • Safety & Security • Capacity • Identity and Image	⇨	• Ridership • Transit – Supportive Land Development • Capital Cost Effectiveness • Operating Efficiency • Environmental Quality • Land Development

BRT systems are typically developed as phased projects. It is suggested that MDC gain experience with BRT at the demonstration level before committing to a full, county-wide network. The phased approach is also consistent with the realities of system financing, which might not be immediately available to support a county-wide BRT system in spite of the relatively modest cost. Planning for BRT in MDC should provide an expansive vision that goes well beyond the immediate planning and construction phase of the initial demonstration corridors. For example, during the early planning /engineering process of Miami-Dade's BRT program, the stated vision of the county-wide system could be to "put 75 percent of MDC's residents within a half-mile of a rapid transit corridor by 2015." This type of vision will set an important political precedent for the BRT system's ultimate form. The suggested corridor-level BRT elements will certainly evolve as experience is gained with BRT. However, it is worthwhile to create a county-wide vision of BRT at the sketch planning level, as this project has done, that will stimulate both political and public support for better and more rapid public transit service.

Essentially, there is no one-size-fits-all approach to BRT system design. As a result, a common-sense approach to applying major BRT elements was followed in each corridor by balancing BRT system performance against cost. Many BRT systems have achieved great success (increased ridership that exceeded expectations including the South Miami Dade Busway) using only a few of the major BRT elements including Traffic Signal Priority (TSP), assertive marketing, and a simple service and operation plan with limited capital funding (as low as $250,000 per mile for the Metro Rapid in Los Angeles). The Miami-Dade BRT program will include several key BRT elements that will improve the service characteristics and customer experience over existing MDT local and metro area express (MAX) services during the demonstration phase. These key features include:

Demonstration Phase BRT Elements

- Use of existing arterial streets in mixed traffic for BRT runningways (all corridors)
- ITS including Traffic Signal Priority and traffic signal coordination (all corridors)
- Frequent all-day BRT service with local service overlay (all corridors)
- Schedules that focus on maintaining headways rather than meeting specific schedule time points, requiring no published schedules (all corridors)
- Wide BRT station spacing (approximately 1 mile) (all corridors)
- Visually appealing enhanced BRT stations including shelters, boarding platforms, benches, security features, real-time next trip information, and other amenities. Station design and area around stations should be uniform for all BRT stations, but distinctly different than other MDT bus stops (all corridors)
- Near-level or level boarding at stations (all corridors)
- Branding and marketing of the BRT system as a new, unique, and premium transit service including unique color schemes for BRT vehicles (all corridors)
- Queue-jumper lanes at intersections (only corridors where warranted)
- Dedicated, curb-side arterial bus-only lanes (only in Biscayne Boulevard corridor for a total of 1.5 miles in each direction)
- Simple, linear route layouts (all corridors)
- Integration with other MDT transit modes and park-n-ride locations (all corridors)
- Use of existing MDT vehicle fleet (all corridors)
- Bicycle and pedestrian access and linkages (all corridors)

Once experience is gained with BRT and conditions warrant, the BRT corridors can be expanded to include new higher-capacity vehicles, ITS technology including electronic fare

payment/collection with all-door boarding, additional dedicated bus-only runningway, additional marketing and branding of system elements, and an expanded feeder bus network to serve the BRT routes if necessary.

Operating Costs

Operating costs were estimated based on information from MDT whom suggested the use of $65 per revenue hour as the rule-of-thumb estimate when planning new MAX services. Based on this information, the cost of the proposed BRT operations were estimated on the basis of $65 per revenue hour. Annual operating costs were estimated on the basis of the several spans of service and levels of service for comparison purposes. Exhibits ES-2 and ES-3 present a summary of the estimated daily operating costs by proposed BRT corridor.

The operating cost estimates shown in the exhibits focus only on vehicle revenue service. The actual rollout of BRT service may require additional management support and allocation of existing MDT resources in a manner that cannot be identified at this level of sketch planning. The BRT customer facilities, advanced ITS technologies, and other new components of the BRT service will have operating and maintenance costs that as yet cannot been estimated or quantified in this sketch plan.

Exhibit ES-2: Operating Cost Estimates

A	B	C	D	E	F	G	H	I	J
Proposed BRT Corridor	**Route Numbers for MDT Routes that Operate on all or a Portion of Candidate BRT Corridors**	**Estimated RT Distance of Proposed BRT Corridors (miles)**	**Estimated Speed of BRT Service in Corridor /1**	**Estimated RT Time (minutes) /3**	**Layover Time (minutes)**	**Total RT Time (minutes) (E + F)**	**Service Span**	**No. of Revenue Hours**	**Operating Cost per Revenue Hour /4**
NW 79th Street	107 (G), 112 (L)	29.7	17.0	105	10	115	5 AM to 12 PM	19	
Flagler Street	11, 51 (MAX)	30.9	19.4	95	10	105	5 AM to 2 AM	21	
NW 7th Avenue	77	19.6	18.0	65	7	72	5 AM to 12 PM	19	
US 1 – Biscayne Blvd	3, 16, 93 (MAX)	26.8	19.8	82	8	90	5 AM to 2 AM	21	
Coral Way	Coral Way MAX (224), 24	21.1	18.0	71	7	78	5 AM to 12 PM	19	
LeJeune Road	42, 110 (J)	21.9	18.8	70	7	77	5 AM to 12 PM	19	$65.00
W 49th Street	33	14.1	17.3	48	6	54	5 AM to 11 PM	18	
Kendall Drive /2	88, 104, 288	15.1	22.4	40	4	44	5 AM to 11 PM	18	
SW 87th Avenue	87	25.2	17.8	85	10	95	5 AM to 11 PM	18	
SW 107th Avenue	71	43.1	16.4	155	15	170	5 AM to 11 PM	18	
SW 137th Avenue	West Dade Connection (137)	33.0	23.6	84	8	92	5 AM to 11 PM	18	

/1 Based on speed (mph) of fastest MDT service operating in the proposed corridor - calculated by applying estimated 25 percent time savings resulting from various BRT elements compared to local/MAX service speeds.
/2 Used speed of Route 104 to calculate Column D for Kendall Drive Corridor due to proposed BRT not operating on high-speed freeway like the Kendall KAT.
/3 Used Time, Speed, and Distance Calculator at *http://www.csgnetwork.com/csgtsd.html* to calculate estimated Total RT times.
/4 Obtained from MDT Planning staff - $65/revenue hour is $ figure used by MDT when planning new MAX service.
/5 To calculate annual cost of proposed BRT service, multiply the daily costs by 250 weekdays. To calculate annual cost of weekend service (assumes service span is constant), multiply the daily costs by 50 for each weekend day. To change the service span, reduce/expand the number of daily operating hours accordingly.

Exhibit ES-3: Operating Cost Estimates (continued)

A	K	L	M	N	O	P	Q	R	S	T	U	V
Proposed BRT Corridor	Total BRT Vehicles Needed Scenarios - Vehicles Per Hour (Headway)				Total BRT Daily Revenue Hours for Scenarios				Total BRT Daily Operating Cost for Scenarios			
	12 (5 Minutes)	6 (10 Minutes)	5 (12 Minutes)	4 (15 Minutes)	12 (5 Minutes)	6 (10 Minutes)	5 (12 Minutes)	4 (15 Minutes)	12 (5 Minutes)	6 (10 Minutes)	5 (12 Minutes)	4 (15 Minutes)
NW 79th Street	23	12	10	8	437	219	182	146	$28,405	$14,203	$11,835	$9,468
Flagler Street	21	11	9	7	441	221	184	147	$28,665	$14,333	$11,944	$9,555
NW 7th Avenue	14	7	6	5	274	137	114	91	$17,784	$8,892	$7,410	$5,928
US 1 – Biscayne Blvd	18	9	8	6	378	189	158	126	$24,570	$12,285	$10,238	$8,190
Coral Way	16	8	7	5	296	148	124	99	$19,266	$9,633	$8,028	$6,422
LeJeune Road	15	8	6	5	293	146	122	98	$19,019	$9,510	$7,925	$6,340
W 49th Street	11	5	5	4	194	97	81	65	$12,636	$6,318	$5,265	$4,212
Kendall Drive /2	9	4	4	3	158	79	66	53	$10,296	$5,148	$4,290	$3,432
SW 87th Avenue	19	10	8	6	342	171	143	114	$22,230	$11,115	$9,263	$7,410
SW 107th Avenue	34	17	14	11	612	306	255	204	$39,780	$19,890	$16,575	$13,260
SW 137th Avenue	18	9	8	6	331	166	138	110	$21,528	$10,764	$8,970	$7,176

Note: Same footnotes in Exhibit ES-2 apply to Exhibit ES-3.

Capital Costs

Capital costs for the suggested BRT elements were estimated primarily using two sources: (1) United States Department of Transportation's Intelligent Transportation Systems Joint Program Office's *ITS Benefits and Costs Database* and (2) the Federal Transit Administration's C-BRT report. These costs are intended to provide a preliminary snapshot of the magnitude of the probable capital costs to implement BRT in each of the proposed 11 corridors. The capital costs do not represent a comprehensive accounting of all items or development efforts that will be needed during actual implementation. Exhibits ES-4 and ES-5 show the estimated capital costs associated with each suggested BRT element.

Exhibit ES-4: Estimated Capital Costs for Suggested BRT Elements

A	B	
BRT Elements	Cost Range per BRT Element	
	Low $	High $
Mixed-traffic runningway	$0	$0
Transit Signal Priority (TSP) (per intersection)	$5,000	$20,000
Traffic signal coordination / optimization (per intersection)	$2,000	$3,500
Queue-jumper lane	$100,000	$290,000
Special bus traffic signal (per intersection) /1	$1,000	$4,000
Enhanced BRT station	$25,000	$35,000
Designated (reserved) arterial lane / Bus-only lane (per mile, excluding ROW acquisition)	$2.5 Million	$2.9 Million
Real-time bus arrival information (per station)	$4,000	$8,000
Silent alarms (per station) /1	$1,000	$2,500
POP EFC TVM (w/Smart Cards) (per station)	$30,000	$60,000

/1 Estimated costs – no $ figures available
Note: BRT vehicle costs not shown at corridor level
Sources: Federal Transit Administration. *Characteristics of Bus Rapid Transit for Decision-Making.* August 2004 and USDOT. *Cost-Benefits of ITS Database* (http://www.benefitcost.its.dot.gov/).

Exhibit ES-5: Estimated Capital Costs for Proposed BRT Corridors

A	B	C	D
Proposed BRT Corridor	**Estimated Capital Costs**		
	Low $	**High $**	**Per Mile $**
NW 79th Street	$1,804,000	$3,306,000	$171,938
Flagler Street	$1,920,000	$3,765,000	$229,234
NW 7th Avenue	$1,410,000	$2,568,500	$203,192
US 1 – Biscayne Blvd (Scenario 1)	$9,680,000	$12,944,500	$844,198
US 1 – Biscayne Blvd (Scenario 2)	$2,180,000	$4,244,500	$239,720
Coral Way	$1,686,000	$3,098,500	$226,969
LeJeune Road	$1,308,000	$2,411,500	$170,307
W 49th Street	$1,029,000	$1,910,000	$208,144
Kendall Drive	$1,054,000	$1,965,000	$199,406
SW 87th Avenue	$1,529,000	$2,811,500	$172,516
SW 107th Avenue	$2,537,000	$4,673,500	$167,297
SW 137th Avenue	$1,880,000	$3,440,000	$161,310

Note: Scenario 2 for the Biscayne Boulevard corridor does not include the capital cost for reserved arterial bus-only lane. Scenario 1 does include this cost.

Travel Time Savings

The travel time savings shown in Exhibit ES-6 do not include the impact of electronic fare payment / collection / proof-of-payment and low-floor vehicles which will further reduce total round trip travel time of BRT vehicle trips / runs by significantly reducing station dwell time. Travel time may be the single attribute of a transit system that customers care the most about, particularly for non-discretionary, recurring trips such as those made for work purposes.

As the exhibit shows, using TSP and traffic signal retiming to reduce intersection delays and various other BRT elements to reduce dwell time and speed vehicles through corridors, the estimated round trip travel time savings ranges from a low of 15 minutes to a high of 84 minutes. The 20 percent average travel time savings estimate used in the calculations were obtained from the operational experiences of BRT systems as reported in the C-BRT. Experience in BRT systems in the United States suggests that travel time savings is on the order of 25 to 50 percent for recently implemented BRT systems. Findings from eleven international systems in Canada, Brazil, Ecuador, England, and Japan found that speed improvements associated with BRT implementation ranged from 22 percent to 120 percent.

It should be noted that much of the increases in corridor ridership cannot be explained by travel time savings from more frequent BRT service alone. Customers/riders appear to be attracted to a number of other factors including reliability and a unique brand identity of the BRT service. Furthermore, transit customer surveys reveal that BRT systems are improving the image that choice riders have of public bus transit. Riders, who formerly used modes such as the automobile and other rapid transit (rail), are attracted to BRT due to its premium service nature. BRT system qualities tend to improve the impression that choice riders have of an area's transit system, attracting them to ride "all" transit modes more. Thus, the implementation of BRT service may have a positive impact on overall MDT ridership.

Exhibit ES-6: Estimated Travel Time Savings

Level of Analysis	A	B	C	D	E
	Actual Avg Speed /1, 2	Scheduled Round Trip Run Time (minutes) /3	Scheduled Avg Speed /3	Average Travel Time Savings (20%) /4	Round Trip Travel Time Savings (minutes)
Route 288 – Kendall KAT	22.2	75	18.8	60	15
Route 137 – WDConnector	18.9	180	16.3	144	36
Route 104 – Kendall Local	17.9	120	14.3	96	24
Biscayne MAX	15.8	135	13.3	108	27
Flagler MAX	15.5	210	13.7	168	42
Coral Way MAX	14.4	120	12.4	96	24
Route 42 – LeJeune Local	14.8	240	12.9	192	48
Route 110 (J) – LeJeune Local	15.0	225	10.9	180	45
Route 77 – NW 7th Local	14.4	150	12.8	120	30
Route 88 – Kendall Local	16.3	90	12.2	72	18
Route 87 – 87th Local	14.2	180	11.9	144	36
Route 3/16 – Biscayne Local	13.5	420	10.9	336	84
Route 112 (L) – NW 79th Local	13.6	180	11.4	144	36
Route 107 (G) – NW 79th Local	13.2	210	10.4	168	42
Route 33 – W 49th Local	13.8	155	10.3	124	31
Route 71 – SW 107th Local	13.1	120	11.8	96	24
Route 24 – Coral Way Local	13.0	195	10.4	156	39
Route 11 – Flagler Local	11.2	120	13.2	96	24
Standard Deviation	2.58	78.48	2.23	*61.84*	*15.46*
Median	14.4	180.0	12.4	*134.0*	*33.5*
Mean	15.2	176.8	12.7	*138.9*	*34.7*

/1 Based on total revenue miles and total revenue hours minus recovery time
/2 MDT *Bus Productivity Analysis* dated August 2004
/3 MDT *Omnibus Report* dated July 04 (includes recovery time)
/4 Federal Transit Administration, *Characteristics of Bus rapid Transit for Decision Making*, August 2004
/5 BRT elements include: TSP at major signalized intersections, traffic signal progression coordination at minor signalized intersection, far-side designated stations with level- or near-level boarding, branding/marketing of the BRT system, frequent all-day service with headway-based schedule control, next vehicle arrival display at a stations, and station spacing average of ~1 mile. Does not include the impact of automated fare collection/payment and low-floor vehicles which will further reduce total round trip travel time of BRT vehicle runs.

Note: Much of the increases in corridor ridership cannot be explained by travel time savings/more frequent BRT service alone. Riders appear to be attracted to a number of other factors including reliability and an articulated and unique brand identity of the BRT service. Furthermore, transit customer surveys reveal that BRT systems are improving the image that choice riders have of public bus transit. Riders, who formerly used more attractive modes such as the automobile and other rapid transit (rail), are attracted to BRT due to its premium service. BRT system qualities tend to improve the impression that choice riders have of an area's transit system, attracting them to ride "all" transit more. Thus, the implementation of BRT service may have a positive impact on overall MDT ridership.

Next Steps

It is common knowledge that total population and other factors in MDC will not remain constant in the future and something has to be done to increase mobility. Between 2000 and 2030, the MPO estimates that population in MDC will increase by 43 percent, housing by 40 percent, employment by 34 percent, number of automobiles by 48 percent, and person-trips by 40 percent when compared to current levels. Along with this growth, increasing demands will be placed on the public transit system. Meeting future transportation needs is made even more complex by the multi-directional nature of daily travel throughout MDC. The predominant suburb-to-downtown commute pattern that many large cities experience does not exist as prominently in MDC. While Downtown Miami remains a major trip attractor, people commute from everywhere to everywhere in MDC. While this means that demand is spread throughout the system rather than concentrated in a few corridors, it also means that improvements, and therefore additional resources, are needed throughout including the rapidly growing southern and western portions of the County.

Implementation of BRT service in MDC has been prioritized into three tiers following the suggested rapid transit expansion schedule from the PTP for years 2003 to 2025, as shown in Exhibit ES-7. Tier I BRT corridor implementation is for years 2005 through 2007 and represents the highest priority corridors. Tier II corridor implementation is for years 2008 to 2010 and represent a slightly lower priority. It is anticipated that Tier I represents the highest priority corridors for BRT service; it is suggested that these two corridors be included in the initial BRT demonstration phase. Depending on the costs associated and competing priorities, it is possible that BRT implementation could occur more quickly or even longer than the schedule suggests for any of the corridors.

Exhibit ES-7: Suggested Implementation Timeframe of Proposed Bus Rapid Transit Corridors

A	B	C	D
Proposed BRT Corridor	**Rapid Transit Implementation Status /1**	**Implement Timeframe**	**Tier**
Flagler Street	Very High (*PTP* Corridor)	2005 to 2007	I – Demonstration
US 1 – Biscayne Boulevard	Very High (*PTP* Corridor)	2005 to 2007	I – Demonstration
LeJeune Road	Very High (*PTP* Corridor)	2008 to 2010	II
Kendall Drive	Very High (*PTP* Corridor)	2008 to 2010	II
NW 79th Street	High	2008 to 2010	II
NW 7th Avenue	High	2008 to 2010	II
Coral Way	High	TBD – Out to 2025	
W 49th Street	High		
SW 87th Avenue	High		
SW 107th Avenue	High		
SW 137th Avenue	High		

/1 PTP stands for *People's Transportation Plan*

BRT Demonstration Phase Recommended Corridors – Biscayne Boulevard & Flagler Street

The report recommends the implementation of BRT in the Biscayne Boulevard and Flagler Street corridors during a demonstration phase of two years. This suggests that BRT implementation be approached cautiously, in highly-selective stages which build from a basic, but fully-complemented BRT system as spelled-out in this sketch planning report. There is the possibility of failure if the demonstration phase is implemented with a "poor-boy" attitude. The demonstration phase must be fully-complemented, assertively marketed, and have a firm time duration, then evaluated. If the BRT demonstration routes are a success, the riding public will call for its continuation and expansion to other parts of MDC. This is exactly what happened in Los Angeles with the Metro Rapid. The Los Angeles Metropolitan Transportation Authority is currently implementing 480 route miles of new Metro Rapid BRT service in 26 different corridors. The initial demonstration corridors found that bus service speed was increased by 30 percent, and ridership on buses in the corridor increased by 30 percent as well, at no extra cost. With these sorts of results from the demonstration corridors, BRT sold itself in the remaining corridors of Los Angeles. BRT now is provided in nine corridors in Los Angeles, and in all corridors there are very positive results in terms of increased travel speeds and ridership.

Flagler Street Corridor

Flagler Street is a major roadway facility that runs east/west from the Florida Turnpike to Downtown Miami. For most of its length, it operates as a principal urban arterial with the morning peak hour directional split in the eastbound direction toward Downtown Miami. Flagler Street is characterized by very heavy stop-and-go peak hour traffic. MDT buses operating during the morning and afternoon peak periods are subject to significant delays due to heavy traffic congestion at key/major intersections.

The proposed one-way route length for the BRT service operating on Flagler Street is about 12.4 miles. The proposed route will operate between the Florida Turnpike and Downtown Miami. Flagler Street is currently served by the MDT Metrobus Routes 11 and Flagler MAX. According to MDT, these two Metrobus lines have approximately 15,500 average weekday daily boardings; making this one of the most heavily utilized transit corridors in MDC. This translates into over 1,000 boardings per proposed BRT route mile. There are a number of connecting MDT feeder lines to Flagler Street that serve the Flagler MAX and Route 11.

The types of BRT elements to be incorporated into this corridor initially can be found by reviewing the bullet items on page 4 of this summary. Bus "stations" (note the phrase stations, not "bus stops", which helps imply permanency and rail-like service) will be provided approximately every mile, that provide near-level boarding and deboarding of passengers, electronic passenger information on bus arrivals, simple but distinctive design that connotes speed, and safety/security features. Buses providing rapid service will be painted in a scheme distinctly different from the rest of the MDT fleet. Traffic signal priority will be given to BRT vehicles, and a queue jump facility will be provided at SW 87th Avenue where there is currently a major bottleneck.

Biscayne Boulevard

Biscayne Boulevard (US 1) runs from Downtown Miami in the south to the Broward County Line in the north. It is classified as a principal urban arterial. It has a number of different lane configurations along its approximate 16-mile length. Much of Biscayne Boulevard is 5 lanes; however, periodic short segments consist of 4 lanes and near the Broward County line it widens to 6 and 8 lanes. The corridor is characterized by variation in roadway treatments including raised and painted medians, overpasses, and on-street parking. Biscayne Boulevard has a high number of commercial activity centers and other origins and destinations along its alignment. Recent observation of the corridor indicates that buses operating during the morning and afternoon peak periods at certain intersections are subject to significant delays due to heavy traffic congestion.

The proposed BRT routing for the Biscayne Boulevard corridor will operate between Aventura Mall to the north and the Omni Metromover Station just north of Downtown Miami or possibly the Downtown Miami Bus Terminal. Biscayne Boulevard is the most heavily used transit corridor in the MDC. It is currently served by MDT Routes 3, 16, and the Biscayne MAX (93). According to MDT, these routes combine for approximately 16,000 average daily boardings. This translates into about 1,200 boardings per proposed BRT route mile.

Exhibit ES-8 shows the location / intersection of the suggested enhanced BRT stations for the Flagler Street and Biscayne Boulevard corridors. The exhibit also shows the number of enhanced BRT stations in both the inbound and outbound directions as well as average spacing between stations in miles.

Exhibit ES-8: Suggested Location for Enhanced BRT Stations

A	B	C	D	E
Flagler Street			**Biscayne Boulevard**	
Suggested Location of BRT Stations/Stops				
Stop #	**Westbound**	**Eastbound**	**Northbound**	**Southbound**
1	Miami CBD Terminal	NW 114th Avenue	Miami CBD Terminal	Aventura Mall
2	NW 12th Avenue	NW 107th Avenue	NE 4th Street @ Bayside Market Place	NE 189th Street - Loemann's Fashion Island
3	NW 22nd Avenue	NW 97th Avenue	Omni Bus Terminal @ NE 15th Street	NE 178th Street
4	NW 27th Avenue	NW 87th Avenue	NE 36th Street @ I-195	NE 163rd Street
5	NW 37th Avenue	NW 79th Avenue	NE 55th Street	NE 151st Street - FIU Biscayne Bay Campus
6	NW 42nd Avenue	NW 67th Avenue	NE 62nd Street	NE 123rd Street
7	NW 57th Avenue	NW 57th Avenue	NE 79th Street	NE 108th Street
8	NW 67th Avenue	NW 42nd Avenue	NE 91st Street	NE 91st Street
9	NW 79th Avenue	NW 37th Avenue	NE 108th Street	NE 79th Street
10	NW 87th Avenue	NW 27th Avenue	NE 123rd Street	NE 62nd Street
11	NW 97th Avenue	NW 22nd Avenue	NE 151st Street - FIU Biscayne Bay Campus	NE 55th Street
12	NW 107th Avenue	SW 12th Avenue	NE 163rd Street	NE 36th Street @ I-195
13	NW 114th Avenue	Miami CBD Terminal	NE 178th Street	Omni Bus Terminal @ NE 15th Street
14	NA		NE 189th Street - Loemann's Fashion Island	NE 4th Street @ Bayside Market Place
15			Aventura Mall	Miami CBD Terminal
Corridor Route Length (miles)	12.37		13.4	
# of Enhanced BRT Stations	13		15	
Average Station/Stop Spacing (miles)	0.95		0.89	

Note: Suggested enhanced BRT station locations determined from load factor information obtained from MDT COA performed by CUTR in 2004.

Exhibit ES-9 shows a summary of the proposed capital cost for the Flagler Street and Biscayne Boulevard corridors. The exhibit lists the suggested BRT elements, number of BRT elements, and the low and high capital cost estimates for each BRT element. The exhibit also shows the average cost per mile for each demonstration corridor.

Final Thoughts

In sum, there are at least four important lessons that should be applied to MDC from lessons learned from other BRT systems including:

- Providing better service, even along a local bus route, can increase ridership. It is possible to design a BRT system to be faster, more attractive, and easier to use than the local buses or express services operating within the same corridors. The traveling public will take notice and increase in ridership and "net new" riders to public transit will result.

- Rapid transit bus service on existing arterials can be implemented inexpensively. BRT systems have increased corridor ridership by building a rapid bus-based transit system for a small fraction of what light or heavy rail would cost. The service improvements did not have to be drastic to increase ridership, they just had to provide a similar and positive riding experience.

Exhibit ES-9: BRT Elements and Estimated Capital Cost for Demonstration Corridors

BRT Elements	Flagler Street			Biscayne Boulevard		
	# of Elements	Low $	High $	# of Elements	Low $	High $
Mixed-traffic runningway	1	$0	$0	1	$0	$0
Transit Signal Priority (TSP) (at intersections)	14	$70,000	$280,000	16	$80,000	$320,000
Traffic signal coordination/retiming (at intersections)	44	$88,000	$154,000	49	$98,000	$171,500
Queue-jumper lane (at intersection)	2	$200,000	$580,000	2	$200,000	$580,000
Reserved arterial bus-only lane	0.0 miles	$0	$0	3.0 miles	$7,500,000	$8,700,000
Special bus traffic signals [1]	2	$2,000	$8,000	2	$2,000	$8,000
Enhanced Stations (both IB and OB)	26	$650,000	$910,000	30	$750,000	$1,050,000
Real-time bus arrival displays	26	$104,000	$208,000	30	$120,000	$240,000
Silent alarms at stations [1]	26	$26,000	$65,000	30	$30,000	$75,000
Automated Fare Collection (TVM, Smart Cards)	26	$780,000	$1,560,000	30	$900,000	$1,800,000
Total $	NA	**$1,920,000**	**$3,765,000**	NA	**$9,680,000**	**$12,944,500**
Median $		**$2,842,500**			**$11,312,250**	
Proposed Corridor Mile		**12.4**			**13.4**	
Median $ Per Proposed Corridor Mile		**$229,234**			**$844,198 or $239,720**[2]	

[1] Estimated costs

[2] Scenario 2 listed in Exhibit ES-5 shows the estimated capital cost for Biscayne Boulevard corridor without reserved arterial bus-only lanes. The average capital cost per route mile for Scenario 2 is estimated to be $239,720.

Sources: Federal Transit Administration. *Characteristics of Bus Rapid Transit for Decision-Making.* August 2004 and USDOT. *Cost-Benefits of ITS Database* (http://www.benefitcost.its.dot.gov/)

- Incremental implementation can provide immediate results and allow new technology to be leveraged. BRT systems were able to deliver better service to customers within a short "start-up" timeframe from planning to implementation, which resulted in an immediate improvement in the public perception of transit services and increased support for additional transit projects and improvements including expansion of BRT routes.
- Transit agencies have realized through implementing BRT systems that providing better bus-based service is something they should have been doing for customers all along. In Los Angeles, surveys revealed that 50 percent of the time a regular bus is in service, it is stopped, either to pick up and drop off passengers, or at a red light. This is what causes passengers to become frustrated with public transit as they complain that a trip that would take 15 minutes by car takes 45 minutes by bus. Transit passengers deserve the ability to travel as quickly, or more quickly, than people who are in cars since they are doing their part to decrease traffic congestion, reduce air pollution, and even help the nation's balance of trade and national security by minimizing the use of petroleum fuels. BRT provides the opportunity for transit passengers to have a competitive advantage in speed over other vehicles in arterial corridors.

Finding a Local Champion

Lessons from other locations show that having a local champion to support and bring focus to BRT planning and implementation is critical to its overall success. The success of the world's BRT systems ranging from Curitiba, Brazil (Jaime Lerner); Bogotá, Colombia (Enrique Peñelosa); Los Angeles, CA (Rex Gephart); Oakland, CA (Jon Twitchell) and many others is due

to their efforts as local champions. In some instances, these individuals have continued employment with the transit agencies to oversee all BRT efforts. These individuals were and are responsible for gaining and keeping the ear and voice of the community to achieve results in the planning, implementation, and operation of their respective BRT systems. Public and political support is critical though usually not attainable through public transit agencies alone. Finding and hiring a local champion to plan, implement, operate, and support a BRT initiative is critical to its overall success. This strategy has proven to produce the best results.

Technical Memoranda

The three Technical Memoranda that supplement this Executive Summary presents more detailed descriptions of the sketch planning and conceptual design work undertaken for the overall BRT program as part of this project. The Technical Memoranda describes the background work, the proposed BRT corridors, BRT route alignments, and ridership, capital cost, and travel time estimates.

ATTACHMENT D
Shoulder Impact Assessment

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During discussion about this project, concerns were raised about the impact to the pavement of bus operations on the shoulder.

In order to examine the impact, a typical section of shoulder was selected for assessment. SR 836 was recently widened and upgraded and new shoulders were constructed. The shoulders are S-1 AC – a rigid pavement design of asphaltic concrete. The structural number of this type of shoulder can be derived using the cross section shown in the FDOT Rigid Design Manual (Figure 6-1 on page 6.5). The design parameters are summarized.

- Friction Course = 4”
- Structural Course = 4”
- Stabilization Course = 8”

Applying the coefficients for these courses the structural number (SN) can be calculated, as follows:

SN = (0.44*4)+(0.14*4)+(0.11*8)=3.2

The relationship of the axle weight to damage for a 22 Kip total axle load is 2.34 by interpolating between the values for SN=5 and SN=2.5 in the appendix of the FDOT Rigid Pavement Design Manual.

Pavement is generally designed to accommodate a single axle load. The single axle load for a 40 passenger bus was discovered to be 10,000 pounds for the front axel and 19,000 pounds for the rear axle.

The single axle weight for the bus is 29 Kips (10,000 pounds + 19,000 pounds). Using the relation/proportion

22Kip/2.34 = 29/X

where X is the equivalent damage in ESAL. The bus damage is 3.09.

With a structural number of 3.2 the pavement design can withstand the bus damage number of 3.09.

Further the impact was examined with ESAL over the potential life of the program.

The load equivalency factor (LEF) for 10,000 pound load is 0.0877 (Front axle) and the LEF for the 19,000 pounds is 1.255 (rear axle). Adding those equivalency numbers together the Equivalent single axle load (ESAL) is 1.3427 (0.0877+1.255 = 1.3427).

Given uncertain operations we assume that no more than 12 buses per day (3 buses per hour *4 hours of peak period/peak direction). Given this assumption the ESAL for shoulder operations would be 12*1.3427=16.112 ESAL per day. Given 261 week-days

per year the annual ESAL would equal 261*16.112=4,205. In other words the bus operations would equate to 4,205 axels per year (2,100 vehicles). The buses would only use the shoulder bypass along SR 836 until the Special Use Lanes are built. If the shoulder had to accommodate operations for 5 years the total ESAL would be 5*4,205=21,026 ESAL (10,500vehicles); if it were to operate for 10-years the total ESAL would be 10*4,205=42,050 ESAL (21,000 vehicles). The total Equivalent Single Axle Loads for ten years is the equivalent to one day's total traffic on one lane of the freeway.

The SN from the buses is smaller than the one for the existing pavement, therefore it is OK to drive the buses on the shoulder.

Attachment E
Agency Comments

Comment	Response
MDX	
The 10 foot shoulder sections on 878 and 874 are in good condition and should be able to support planned transit by pass operations.	Comment noted
There will be construction from SW 117 Ave. to SW 88 by 2007.	Comment noted
The entrance from SW 88 Street to SR 878 will be reconstructed in 2006 and will impact the outside shoulder.	Comment noted
MDT	
The report addresses the issues that need to be addressed.	Comment noted
Page 1-10 “this route stars” correct to Starts	Will fix typo.
Figure 2-3 SW 107 Ave. should be NW 107 Ave.	Will correct typo
Page 4-1 Delete the word Dadeland	Will modify sentence.
Page 4-4 Route 175 is already operating	Will modify text.
Page 4-6 Palmetto construction is to be complete in the Summer of 2006.	Comment noted
Figure 4-2 Florida Turnpike graphic is in the wrong panel	Will check map labeling
Page 6-2 mention should be made of the existing bus pull out near Kendall Dr.	It is mentioned on page 6-7
There are three routes on SR 878: 204, 272 and 288	That is what the text states.
The MDX letter sys that the shoulders are usable on 874 and 878	We did not feel that a ten foot section next to a barrier was usable, however if the owner and the operator feel it is usable then you should test the ease of driving.
There is no planned bus service where exhibit 6-2 was taken.	The report does not state that there is any planned bus service in that location.
Page 7-4 Bus service on SR 836 may not have to move from the shoulder th the left to exit at NW 42 Ave. Access to the MIC may be made via NW 57 Avenue/Perimeter Rd.	Will put that option in the report.
Page 7-25 Rte 175 has been implemented.	Will update the report to reflect its implementation
Figure 7-25 shows the incorrect bus route	Will modify graphic.

MDX	
Relocation of rumble strips to the center of shoulder is a safety concern	Rumble strips only occur in one location (Turnpike and Bird) Comment will be placed in report.
MDX is concerned about liability. MDX attorney will have to review proposed action.	The report will recommend that step be taken.
Correct reference photo relation with Exhibit 2-5 and 2-6.	Will comply.
The reference to the Exhibit 2-7 does not match the figure	The graphic represents LOS F traffic with an empty shoulder which is what the text is referencing. Will remove "near the Airport."
Westbound 836 /Turnpike Connection is now complete.	Will insert status in report.
Upcoming construction on the Palmetto needs to be coordinated with FDOT.	The report states that repeatedly.
What are the plans for areas without usable shoulders	Immediate plans are for the bus to rejoin traffic. Long term plans could include rebuilding the shoulder, but this report is only looking at immediate opportunities.
Who is going to pay for improvements? It is my understanding that it may qualify for TRIP funds.	MDT will finance the program during the pilot project. The project has been submitted to the State for consideration for use of the TRIP funds.
Continued use of shoulders by buses could lead to base failure and increase the cost of the project.	Again this project is intended to provide immediate relief. If the project proves successful then the soulders could be rebuilt, if needed.
There are very extensive construction projects planned on the routes. This needs to be considered in route planning and time savings.	If routes are implemented on the freeways they will stay on the freeways. IF shoulders are loss during construction then the bus will not use them for by-pass. The day the construction is is complete the bus can resume using the shoulder for by-pass. The report frequently references the need for flexibility and coordination during construction.
Park and Ride lots are in conflict with MDT's east west rail project.	IF MDT acquires a park and ride lot for this type of project it could always reuse it for a station at a future date.
Page 1-3 Cannot recommend movement from shoulder to LeJeune Exit. The schedule for this LeJeune Interchange could change	The Executive Summary does not present the details of the report. Chapters 2 and 7 present this same issue. Comment noted.

There are many conflict points along the shoulders of SR 836 making the corridor not feasible for this project.. There are planned construction projects including the toll plaza at NW 97th Avenue	Comment noted
The Florida Statutes should include the MDX and say how the shoulders are to be used.	The Florida Statues were not introduced the project will be implemented through an Interagency agreement. FDOT recommended implementing this project through a Pilot project to avoid the need for an amendment to the Statute.
If shoulders can be resurfaced periodically the project should not be a concern	Comment noted.
Safety problems are significant due to weaving.	Comment noted
It appears that once the buses pass congested areas on SR 836 then the lane is not needed	Buses will only use the lane when speeds drop below 35 MPH. So if the lane is not needed it is not used. We are not recommending an exclusive bus lane.
It appears that there is not a great advantage west of the Palmetto due to the number of weaves.	Comment noted.
The parking area at NW 87th has access problems and needs to be coordinated with the Palmetto improvement program.	Comment noted
Construction on SR 836 will impact the usable shoulder.	This is an issue on all of the freeway segments and must be dealt with on a daily basis during operations.
Comments provide a lengthy list of construction projects.	Comments are noted but as the report states if shoulders are used for by-pass future construction projects will have to be closely coordinated at the time of the work.
Do not need acceleration and deceleration criteria. Need signs warning the bus driver that the shoulder ends.	The acceleration/decoration standards are mentioned to determine what the shortest usable segment should be. The bus drivers do not need signs as they will drive the route repeatedly and will quickly learn the shoulder locations. The signing is for the general public –not the bus drivers.
The area between 107 and LeJeune should look at the feasibility of buses operating in the general use lanes in greater depth. The shoulders are not needed east of Le Jeune.	Comments noted.
Turnpike Enterprise	

The report left out a TIP project the widening of the HEFT from Kendall Drive to SR 836	That project will be added to the list.
What liability issues has MDT and the MPO discovered?	The Turnpike Authority needs to discuss this issue with the County Attorney.
Who is responsible for the design construction, operation, maintenance and enforcement costs.	MDT is the responsible agency during the pilot project.
Where do you anticipate the buses going when the shoulder is unavailable	The bus will operate in the main line lanes.
What will be the requisite roles and responsibilities of the various agencies moving forward through the project phases.	The MPO will assist in developing the interlocal agreements and seeking funding. MDT will operate and fund the project. The Owners will construct and maintain the project, with funding from MDT. The County and the State are responsible for enforcement.
Who is responsible for shoulder repairs due to bus traffic?	MDT will fund repairs during the pilot project.
How will the 35 MPH threshold be determined and who will make the determination.	The bus driver will make the determination using the speedometer on the bus.
Is the 2006 time frame realistic	Route 175 is already implemented. The routes operating on SR 878 and 874 can use the shoulders once an agreement is in place with MDX. Other projects can be implemented as they are ready with agreements, signs and vehicles.
What is the timetable for implementing the Park and Ride lots.	There is no timetable. The report identified potential sites that MDT could examine for lots at such time the service warranted acquiring lots. FDOT is currently undertaking a detailed park and ride study.
What are the proposed headways by direction and time period.	The report states that information under proposed transit routes in each Chapter.
What is the anticipated ridership and will the service be discontinued if certain levels are not met.	This is a pilot project that will be evaluated during operations. Real ridership data will be obtained to determine the success of the project. This will be used as a tool to continue and to expand the project.