Intelligent Transportation Systems (ITS)

Plan Update

for Miami-Dade County

Intelligent Transportation Systems Plan Update for Miami-Dade County

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Table of Contents

Executive Summary			5
Glossary of Terms			7
Stakeholder Charts			10
1.0	History of ITS Planning in Miami-Dade County		13
	1.1	Role of the MPO	13
	1.2	Review and Assessment of the Previous Miami-Dade MPO ITS Plan	15
2.0	Purpose of This Report		17
3.0	Local Transportation Needs vs. ITS User Services		18
	3.1	Transportation Issues and Concerns in Miami-Dade County	19
	3.2	Miami-Dade County Themes for ITS Deployment	23
	3.3	ITS Project Priorities in Miami-Dade County	26
4.0	ITS Regional Architecture for Miami-Dade County		28
	4.1	Conformity to TEA-21 Interim Guidance on National ITS Architecture and Standards	28
	4.2	ITS Considerations in the Transportation Planning Process	30
5.0	ITS Enabling Projects for Miami-Dade County		33
	5.1	SunGuide	33
	5.2	Southeast Florida Regional Traveler Information System	35
	5.3	Miami-Dade County Advanced Traffic Management System	38
	5.4	SunPass and Miami-Dade County (*Causeway Pass)* Electronic Toll Collection	41
	5.5	Miami-Dade Transit Agency Automatic Vehicle Location	44
	5.6	Fiber-Optics Communication Network	46

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6.0 ITS Enhancement Project Descriptions 49
6.1 Existing Projects 49
6.2 Planned and Programmed Projects 50
6.3 Planned, but Not Programmed Projects 51
6.4 Not Currently Planned, but Needed Projects 51

7.0 Financial Plan for ITS Deployment 52
7.1 Current Funding Sources 52
7.2 Anticipated New Funding Opportunities 53
7.3 Role for Public-Private Partnerships 53

8.0 ITS Performance Measures 55
8.1 Countywide Operational Goals 56
8.2 Planning Success Indicators 58
8.3 Monitoring and Reporting Responsibilities 58

9.0 Public Awareness/Education Program 60
9.1 Program Objectives 60
9.2 Past, Current, and Future Activities 61

10. Conclusions and Recommendations 64

References 65

Appendix A: Projects Details for Enabling and Enhancement ITS Projects 68
Appendix B: Directory of Local Facility and Transportation Agency Contacts 82
Appendix C: Directory of ITS Vendors and Consultants 85
Appendix D: ITS Publications 96

List of Tables, Figures, and Photos

Tables:

1:	Available ITS Market Packages and Services	19
2:	Congestion Index and Cost Values, 1994 and 1996	20
3:	Fastest Congestion Growth Areas	21
4:	Vehicle Miles Traveled by County	21
5:	Regional Commute Demographic Profile	23
6:	Passenger Transit Trips per Capita	25
7:	SunGuide Project Elements	33
8:	Areawide Distribution of ITS Infrastructure Elements	56

Figures:

1:	Recommended Program Organization	16
2:	Commuter Behavior by Mode in Miami-Dade County	21
3:	Interconnection Relationship of Architecture Subsystems	29
4:	Standards Supporting Architecture Standards Packages	30
5:	Existing Traffic Control System Network	40
6:	Cover of ATMS Brochure	62
7:	New SunGuide Logo	63
8:	Location of the MIC Core	79

Photos:

1:	Intermodal Activity at the Port of Miami	24
2:	Tourism Activity at Miami Beach	26
3:	FDOT District 6 Traffic Management Room	34
4:	Major Traffic Incident of S.R. 826	36
5:	Existing Toll Plaza Configuration on Eastbound S.R. 836	42
6:	Existing Toll Plaza at the Venetian Bridge	44
7:	The MDTA OMNI Transfer Center	44
8:	Reversible Lane System at Pro-Players Stadium	51

ITS Plan Update for Miami-Dade County
Executive Summary

Purpose of Plan Update

The initial ITS Plan for Miami-Dade County was approved by the Miami-Dade MPO Governing Board in February 1997. That plan primarily served as a general introduction to ITS, and provided an inventory of ITS-related projects and activities in the area. The Plan Update identifies ITS "enabling" projects that are most critical in deployment of a regional ITS system, as well as other ITS "enhancements" to traditional transportation improvement projects and services that are location specific.

Need for an ITS Regional Architecture

Most importantly, the Plan Update stresses the importance of a regional architecture for ITS, and provides a series of questions (or tasks) that recommends a process for development of an architecture. Basically, an "architecture" clearly defines what the needs are for ITS user services, how these user services fit together, and what information is to be shared. ITS must represent integrated services in order to maximize benefits to the region. In October 1998, the Federal Highway Administration and the Federal Transit Administration jointly issued Interim Guidance related to conformity with the National ITS Architecture. In order to be eligible for federal funding of ITS projects, local governments are now being strongly encouraged to develop a suitable regional architecture for their area based on the menu of ITS user services and information sharing established in the National ITS Architecture. Since the greater Miami area does not have a regional ITS architecture, it now becomes critical to begin the development process.

Mainstreaming ITS

The initial ITS Plan identified a process for integrating ITS project selection into the traditional transportation planning process. Even though this process has not been formally adopted, it did emphasize that ITS needs to be mainstreamed into existing planning activities; not conducted as a separate process. Traditional funding sources for ITS should also be considered, as well as matching federal dollars to support ITS integration. TEA-21 now allows (and encourages) state and local jurisdictions to use federal-aid funds to support the capital, operations, and maintenance management costs of ITS highway and transit projects. However, as stated previously, for ITS projects to be eligible for federal-aid funds it is strongly encouraged to show evidence how a particular ITS project fits into the regional transportation architecture. Also, successful mainstreaming of ITS throughout the planning and decision-making process must also be

demonstrated. Since federal funding for ITS is very competitive, it is also becoming critically important for the public sector to establish an ITS market for the private sector to leverage funding opportunities that are secured. Two examples of private sector participation are emerging in the Miami-Dade area; the South Florida Advanced Traveler Information System and the Advanced Traffic Management System upgrade for Miami-Dade County Public Works. Both of these vitally important ITS projects could not be fully developed without the participation of the private sector.

Performance Monitoring

The traveler has to be able to realize that transportation services are improving with ITS deployment. However, quantifying benefits of ITS investment is difficult because performance monitoring is usually not included with most transportation improvement projects. Performance goals, previously recommended, have been re-emphasized in the Plan Update. TEA-21 recommends performance monitoring of the transportation system, and the ITS Deployment Analysis System (IDAS) for modeling ITS benefits developed by the Oak Ridge National Laboratory will be tested in three locations, including Miami, during the Summer of 1999.

More Focused Public Awareness and Education

A detailed three-year plan for public education and marketing of ITS in Miami-Dade, Broward, and Palm Beach counties has been initiated since the initial ITS Plan was developed. The South Florida ITS program named SunGuide contains a public relations program to educate stakeholders, media, elected officials, and the traveling public about ITS to foster its growth. The plan includes the creation of special videos of ITS technologies and local projects, tabletop displays, newsletters, public workshops, preparing press kits, project brochures, and conducting other awareness events to a variety of community and civic groups.

What's Next?

ITS projects must be integrated into a single transportation system, or architecture. The ITS Standing Committee must begin to shift its focus to elements of regional transportation significance, and structure its membership to include more of the regional stakeholders in ITS. This will be the first step toward defining a suitable regional ITS architecture for the tri-county area, and increase the area's ability to attract federal funding for ITS.

Glossary of Terms

AMPO- Association of Metropolitan Planning Organizations
This association provides MPOs around the country with the latest information and guidance regarding the roles and responsibilities of local government in transportation planning.

APTS - Advanced Public Transportation Systems
ITS technologies applied to public transportation providing information to system operators and users, increasing productivity of high occupancy vehicles.

ATIS - Advanced Traveler Information Systems
Vehicle features and other media that give drivers information about traffic and transit conditions to help them plan trips.

ATMS - Advanced Traffic Management Systems
Institutional, human, hardware, and software components designed to monitor, control, and manage traffic.

AVI - Automatic Vehicle Identification
The use on onboard transponders and roadside receivers to identify individual vehicles. Applications include electronic toll collection and vehicle recovery.

AVL - Automatic Vehicle Location
A system that senses, at intervals, the location of vehicles carrying special electronic equipment that sends a signal back to a central control facility.

Causeway
Pass - The electronic toll collection system (C-Pass) used by the Miami-Dade County Public Works Department for Rickenbacker and Venetian Causeways.

CMAQ - Congestion Management and Air Quality
A U.S. Government program that funds air quality improvement projects.

CVO - Commercial Vehicle Operations
ITS technologies applied to commercial vehicles to increase operational safety, reduce the amount of time spent in weigh stations, reduce labor costs for states, and minimize red tape for commercial operators.

ETC - Electronic Toll Collection
ITS technologies applied to toll plazas for automatic toll collection without personal interference increasing safety and capacity at toll plazas

ETTM - Electronic Toll and Traffic Management
Uses automatic vehicle identification to electronically collect tolls and gather information about road and traffic status.

FHWA - Federal Highway Administration
A component of the U.S. Department of Transportation that seeks to coordinate highways with other modes of transportation under cohesive federal policies.

FTA – Federal Transit Administration
A component of the U.S. Department of Transportation that assists in the development of improved mass transportation facilities, equipment, techniques, and methods. They help state and local governments finance such systems.

HAR - Highway Advisory Radio
Dedicated radio stations advise travelers of conditions along various routes.

HOV - High Occupancy Vehicle
In a broad sense, any vehicle with more than one person in it.

IDAS - ITS Deployment Analysis System
An FHWA computer simulation model currently in the development stage to be used to estimate ITS benefits before actual deployment.

ITI - Intelligent Transportation Infrastructure
The infrastructure upon which ITS user services will be based. An example would be fiber optic cables to carry traffic information from the surface streets to traffic control centers so that the traffic signal timings can be computer controlled.

ITS - Intelligent Transportation Systems (formerly Intelligent Vehicle Highway Systems-IVHS)
The use of advanced technologies to enhance the existing transportation infrastructure. Examples include computerized traffic control signal timing and electronic toll collection.

ITS America – A non-profit, public-private scientific and educational corporation working to advance an improved national program for highway travels in the United States.

Kiosk – An information center, usually with interactive computers to provide traffic and travel data, frequently located in areas of high pedestrian use.

LOS - Level of Service
A term that indicates the productivity level or ease of mobility on a highway, ranging from A to F.

LRP - Long Range Plan
A transportation plan developed by regional Metropolitan Planning Organizations guiding transportation investments in the metropolitan area during the next 20 years.

MIC - Miami Intermodal Center
A planned facility east of Miami International Airport serving as a central connecting point for Tri-Rail, Metrorail, Amtrak, buses, private automobiles, bicycles, and pedestrians.

NTCIP- National Transportation Communications for ITS Protocol
ITS standardization to assure interoperability and interchangeability for ITS integration developed by national and local transportation agencies.

SCRITS- An FHWA spreadsheet analysis tool (SCReening for ITS) for estimating the user benefits of ITS. Not intended for detailed analysis, this tool is to intended as a sketch-level analysis tool for simplified estimates in the early stages of ITS-related planning.

SOV - Single Occupant Vehicle
A vehicle with only one person, the driver, in it.

SunGuide - The new name given to the Intelligent Corridor of the Southeast and is the "umbrella" symbol for all new ITS activities in Southeast Florida.

SunPass - Statewide ETTM program for Florida's Turnpike, deployed beginning in April 1999.

TMC - Traffic Management Center
A central building, or location, where local traffic information (voice, video, and data) is received and analyzed to improve the management of traffic and transportation in real-time, usually by multiple agencies all responsible for providing safe and efficient traffic flow.

TCS - Traffic Control System
The existing methodology of retrieving traffic information to the TMC.

TEA-21 - Transportation Equity Act for the 21st Century, federal transportation legislation signed into law on October 21, 1998.

TIP - Transportation Improvement Program
A major document of the MPO specifying proposed transportation improvements to be implemented over the coming five years.

UPWP - Unified Planning Work Program
A document that describes all transportation planning activities being conducted in an MPO area.

VES - Video (sometimes Violation) Enforcement System
A system using video cameras to enforce toll payment in ETC tollbooths.

VMS - Variable Message Signs
Overhead or roadside signs used in ATIS and ATMS to display real-time information to drivers. Often referred to as dynamic message signs or changeable message signs.

VMT - Vehicle Miles Traveled
A popular method to measure highway use by combining the number of vehicles on the roadway with how many miles each one travels.

Miami-Dade County ITS Standing Committee

Aviation Department/Landside Operations- Miami Int'l Airport
Broward County MPO
Center for Urban Transportation Research (CUTR)
Environmental Resources Management
FDOT District 4
FDOT District 6
FHWA – Florida Division
Florida International University
FDOT District 8 (Florida's Turnpike)
Information Technology Department
Miami-Dade Transit Agency
Miami-Dade County Expressway Authority (MDX)
Miami-Dade County League of Cities
Miami-Dade County MPO
Palm Beach County MPO
Port of Miami
Miami-Dade County Public Works
University of Miami
Tri-County Commuter Rail Authority

Miami-Dade County

Mayor
Alexander Penelas

Metropolitan Planning Organization Governing Board

Chairperson
Gwen Margolis

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Betty T. Ferguson	Javier D. Souto
Richard N. Krinzman	Raul Valdes-Fauli
Natacha Seijas Millan	*School Board representative pending appointment*

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Gary Dellapa	Miami-Dade Aviation Department
Gary Donn	Florida Department of Transportation
John Martinez	Florida Department of Transportation
Dennis Newjahr	Tri-County Commuter Rail Authority
Bruce Offord	Florida Department of Environmental Protection
Guillermo Olmedillo	Planning Development and Regulation
Servando Parapar	Miami-Dade County Expressway Authority
John Renfrow	Environmental Resources Management
Ana Rijo-Conde	Miami-Dade League of Cities
Ari Rivera	Miami-Dade County Public Works Department
Charles A. Towsley	Miami-Dade County Seaport Department
Kathryn Wilbur	Miami-Dade County School Board

1.0 History of ITS Planning in Miami-Dade County

In February 1997, the Miami-Dade MPO Governing Board approved the first Intelligent Transportation Systems (ITS) Plan for Miami-Dade County. The significance of this event was that it marked the first formal action in Miami-Dade County to acknowledge the value and importance of ITS as a tool to solve transportation problems. However, this was only the first of many remaining steps to maximize ITS project deployment coordination and planning efforts throughout the metropolitan area, particularly among all those organizations responsible for providing safe and efficient movement of people and goods.

Over the last two years, the ITS focus has been on defining and implementing projects of regional significance (or, what this Plan Update refers to as ITS "enabling" projects) and achieving integration among ITS projects. Also, a major effort has been undertaken to establish a regional public information campaign for ITS.

The MPO will now be playing a significant role in the formal creation of a regional ITS architecture. This architecture will define the regional strategy for transportation system operations and management by seeking to build a consensus on ITS system needs and information sharing between these systems.

1.1 Role of the MPO

According to the National Program Plan for ITS,

> *"MPOs are responsible for deploying ITS infrastructure based on local needs, priorities, and decisions, particularly in the areas of congestion management and air quality standards management. These broad new assignments place MPOs, working together with state and local governments, in a strategic position to advance ITS."*

This responsibility is also carried through TEA-21 federal legislation approved in 1998. Among the most significant continuing provisions from ISTEA are the following:[1]

[1] Transportation Equity Act for the 21st Century *Fact Sheet* for Metropolitan Planning

- Local officials, in cooperation with the State and transit operators, remain responsible for determining the best mix of transportation investments to meet metropolitan transportation needs.

- MPOs are responsible for adopting the ITS plan: Governor and MPO approve transportation improvement program.

- 20-year planning perspectives, air quality consistency, fiscal constraint, and require public involvement established under ISTEA.

- A Congestion Management System is still required in larger metropolitan areas over 200,000 population.

- Requires DOT certification of the planning process in larger metropolitan areas over 200,000 population.

- An emphasis on alternatives to capacity additions is retained through the Single Occupant Vehicle (SOV) project in larger metropolitan areas that are nonattainment areas for air quality.

The Association of Metropolitan Planning Organizations (AMPO) has recently completed a survey of MPOs on the use of ITS.[2] Some interesting results are that two-thirds of large MPOs have ITS task forces and 61 percent have ITS staff. Most of them are considering the National ITS Architecture during their planning. The large MPOs regard themselves as being more active in their involvement of ITS than are small MPOs. The top three role descriptions for large MPOs were facilitator (60.7 percent), participant (60.7 percent), and funding agent (50.8 percent). Of the other organizations involved in ITS, state DOTs are considered by far the most active. Over half of the large MPOs felt that transit also played a significant role in ITS.

More than 60 percent of large MPOs indicate that they have a staff person specifically assigned to ITS; however, only 10 percent of these employees were hired to work exclusively on ITS. A large majority of these employees felt that they spent about one-quarter of their time on ITS. Only 5 percent of the total respondents have more than one staff person working on ITS. Of these people working with ITS, a sizeable majority (84 percent) of the large MPOs work on ITS projects with state DOT staff, and about half work with ITS consultants.

[2] Full Report on AMPO's ITS Survey: *MPOs Getting Active in ITS*, September 1998.

Two thirds of the large MPO regions have ITS task forces, the majority of which was established by the MPO. The Miami-Dade MPO established an ITS Standing Committee almost three years ago. The large majority of these task forces bring together operators (94 percent), planners (98 percent) and representatives from the private sector (69 percent). More than one-third of the respondents include elected officials in their ITS working groups.

The Miami-Dade metropolitan area has not yet formally defined a regional architecture through a consensus-building process, although the ICS (Intelligent Corridor of the Southeast) project conducted by FDOT District 6 established the foundation for this regional ITS architecture. In order to be eligible for federal funding of ITS projects, the development of a regional ITS architecture is now encouraged by FHWA. The MPO must continue to lead a regionally-based forum (the ITS Standing Committee) comprised of state and local governments, elected officials, and stakeholders in reaching consensus on the most suitable ITS architecture. This approach will assure that the best and most economically-sound decisions can be made to help mainstream ITS in southeast Florida. A recommended regionalized ITS program organization is illustrated in Figure 1 on the next page.

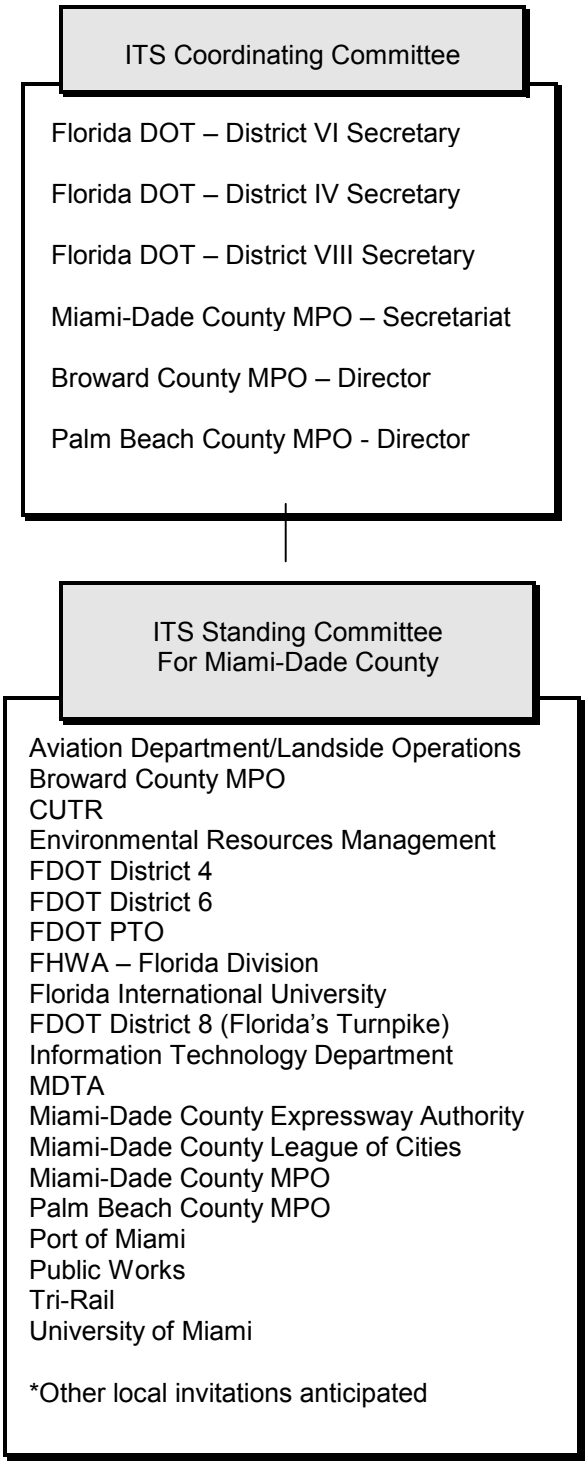
1.2 Review and Assessment of the Previous Miami-Dade MPO ITS Plan

The objectives of the previous (and original plan) were to:

- *Establish a general planning process for ITS.*
- *Coordinate and integrate ITS project planning with the area's overall transportation planning process.*
- *Provide a means for education and accountability for ITS investment to the general public.*
- *Seek and sustain overall support for ITS, particularly by facilitating partnerships with the private sector.*

Not all of these objectives have been met, but progress is being made. The previous plan included a comprehensive background on ITS that did initiate awareness and establish general recognition of ITS as a new tool for solving transportation problems. However, the time now has come to stress project integration, regional coordination, and a cooperative effort in ITS deployment.

Figure 1
Recommended ITS Program Organization



2.0 Purpose of This Report

The purpose of this ITS Plan Update is primarily to provide detailed ITS project information, and also distinguish and highlight those projects that are most critical in deployment of regional ITS systems. ITS projects described in this Plan Update are categorized as either “enabling” or “enhancement” type projects. Enabling projects are large-scale, stand-alone ITS deployments, intended to build the foundation for an integrated, regional system of ITS. Enhancement projects are smaller scale (isolated or corridor specific) deployments of ITS, or ITS services that are typically part of a larger conventional transportation improvement project. Project details are located in Appendix A in an easy-to-read format.

This Plan Update also summarizes the new focused activities for public education and awareness that are now underway and planned for the near future. These activities are now being developed and delivered on a regional basis to encourage greater awareness and cooperation. Most importantly, this update stresses the importance of a regional ITS architecture and provides a series of questions (or tasks) that outline a planning process for development of a regional ITS architecture.

Finally, it is important to recognize that this ITS Plan Update is referenced in terms of May 1999 information and project status.

3.0 Local Transportation Needs vs. ITS User Services

Miami-Dade County needs to seek federal assistance to aid in improving its transportation network. In order for a local government to receive federal funding, that local government must have its own source of revenue matching dedicated for transportation projects as well. Miami-Dade has no such fund; therefore, other cities with transportation funding projects have a priority. Most recently, a proposal was rejected to raise roughly $240 million per year through a one-penny sales tax increase. Three times since 1976, the County has rejected a sales tax increase for transportation. Transportation has now surpassed crime as the number one issue facing the region.[3] Currently, Miami-Dade County is proposing another effort for an additional one-penny sales tax dedicated for transportation improvements, and is scheduled for a July 1999 referendum vote.

With many of the larger expressways and major arterials already built to maximum size, a new alternative will need to be addressed to meet the increasing traffic volumes in the region. Residents of the Miami-Dade area have been reluctant to use transit as an alternative mode. Much of the original Metrorail plans were never built to completion, and many of the low density developments are not easily accessible to transit. This is not to imply that ITS is necessarily the single solution to all of Miami-Dade's transportation problems. Miami-Dade is one of the true intermodal cities in Florida with Metrorail, Metromover, and Tri-Rail. One user service, traveler information, is one of the enabling projects described in this Plan. If there is to be integrated ITS deployment in Miami-Dade, an ITS system needs to consider the appropriateness of each of the user services available in Table 1 on the next page. A system is developed through a regional architecture in particular market packages. A market package defines a particular criterion upon which to improve, such as traffic management and traveler information.

[3]Bruce Taylor Seeman "Highways Going Nowhere," *Miami Herald*, March 14, 1999.

Table 1
Available ITS Market Packages and Services

Traffic Management

- % Network Surveillance
- % Freeway Control
- % Incident Management System
- % Dynamic Toll/Parking Fee Management
- % Standard Speed Railroad Grade Crossing
- % Probe Surveillance
- % Regional Traffic Control
- % Traffic Information Dissemination
- % Emissions/Environmental Hazards Sensing
- %Virtual TMC and Smart Probe
- % Surface Street Control
- % HOV/ Reversible Lane Management
- % Traffic Network Performance Evaluation
- % Railroad Operations Coordination Operation

Traveler Information

- % Broadcast Traveler Information
- % Dynamic Route Guidance
- % Dynamic Ridesharing
- % In Vehicle Signing
- % Interactive Traveler Information
- % ISP Based Route Guidance
- % Yellow Pages and Reservation
- % Autonomous Route Guidance
- % Integrated Transportation Management/Route Guidance

Transit Management

- % Transit Vehicle Tracking
- % Transit Security
- % Multi-modal Coordination Management
- % Transit Fixed-Route Operation
- % Transit Maintenance
- % Demand Response Transit
- % Transit Passenger and Fare

Advanced Vehicles

- % Vehicle Safety Monitoring
- % Longitudinal Safety Warning
- % Driver Visibility Improvement
- % Advanced Vehicle Lateral Control
- % Driver Safety Monitoring
- % Intersection Safety Warning
- % Intersection Collision Avoidance
- % Automated Highway System
- % Lateral Safety Monitoring
- % Pre-Crash Restraint Deployment
- % Advanced Vehicle Longitudinal Control

Commercial Vehicles

- % Fleet Administration
- % Electronic Clearance Enrollment
- % Roadside CVO Safety
- % CVO Fleet Maintenance
- % Freight Administration
- % International Border Electronic Clearance
- % HAZMAT Management
- % Electronic Clearance
- % Weigh-In Motion
- % On-board CVO Safety

Emergency Management

- % Emergency Response
- % Emergency Routing
- % Mayday Support

ITS Planning

- % ITS Planning

3.1 Transportation Issues and Concerns in Miami-Dade County

There are numerous transportation issues that need to be addressed in Miami-Dade County. The foremost issue is congestion. As of 1996, the Miami-Hialeah area had 75 percent and 70 percent congestion rates of person-miles of travel for freeways and principal arterial streets, respectively.[4] This was the highest rate of congested travel for large urban areas in the United States. Overall, based on the roadway congestion index developed by the Texas Transportation Institute

[4] Texas Transportation Institute, "Mobility Study," 1998

(typically used as the national benchmark for relative congestion) the Miami urbanized area is the third most congested metropolitan area in the United States based on 1996 indicators for the following variables:

- *Travel rate index* - amount of extra travel time
- *Delay per eligible driver* - annual time per driver
- *Delay per capita* - annual time per person
- *Wasted fuel per eligible driver* - extra fuel due to congestion
- *Wasted fuel per capita* - extra fuel due to congestion
- *Congestion cost per eligible driver* - annual taxation per driver
- *Congestion cost per capita* - annual taxation per capita

Table 2
Top-Ten Roadway Congestion Index Locations in the United States

Urban Area	1996 Roadway Congestion Value
Los Angeles, CA	1.57
Washington, DC-MD-VA	1.43
Miami-Hialeah, FL	**1.34**
Chicago, IL-Northwestern, IN	1.34
San Francisco-Oakland, CA	1.33
Seattle-Everett, WA	1.27
Atlanta, GA	1.24
Detroit, MI	1.24
San Diego, CA	1.23
San Bernardino-Riverside, CA	1.22

Source: Texas Transportation Institute Mobility Study, 1998.

Another important congestion indicator is that the Miami area has experienced the eighth fastest growth rate of traffic congestion in the country, as shown in Table 3. With the exception of Detroit, no other urban area has a top-ten ranking in both current roadway congestion and rate of roadway congestion growth.

Table 3
Top-Ten Roadway Congestion Growth Rate Areas in the United States

Urban Area	% Increase in Congestion, 1988-1994
Salt Lake City, UT	31
Columbus, OH	20
Cincinnati, OH	19
Charlotte, NC	17
Detroit, MI	16
Minn.-St. Paul, MN	16
Baltimore, MD	15
Miami-Hialeah, FL	**12**
Fort Worth, TX	11
Kansas City, MO	11

Source: TTI Mobility Study Summary, 1998

In 1997, the tri-county region (Broward, Miami-Dade, and Palm Beach counties) experienced almost drove 593 million vehicle-miles of travel, or about a 23 percent growth increase as indicated since 1990 in Table 4. This is consistent with total growth rates in the state of Florida.

Table 4
Vehicle Miles Traveled by County
(In thousands of miles)[5]

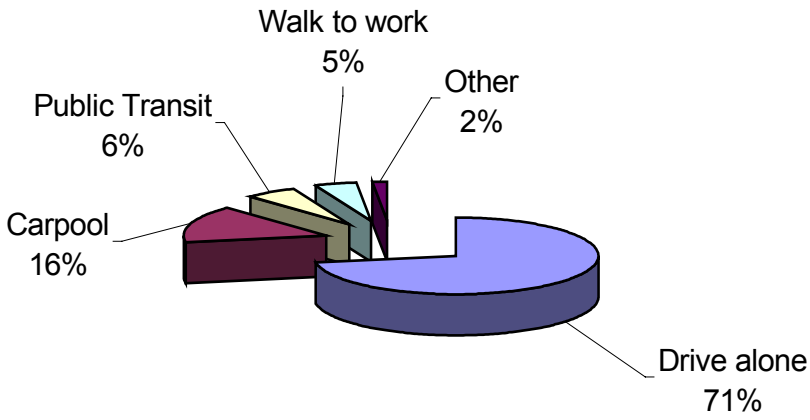
County	1990	1997	%Change
Broward	13,960.6	21,164.4	+51.6
Palm Beach	11,418.7	14,000.3	+22.6
Miami-Dade	23,061.7	24,112.0	+ 4.6
State Total	188,009.5	231,215.6	+23.0

[5] *Florida Transportation Almanac,* Center for Urban Transportation Research, June 1998.

The extent of inter-county commuting for the work trip is also important to highlight. At least at the beginning of this decade, over 71 percent of the Miami-Dade County commuters were driving alone (see Figure 2). Since the county's population is expected to grow by more than 12 percent by the year 2005 and by 45 percent by the year 2020[6], single-occupant vehicle commuting could rise even higher.

Figure 2

Commuter Behavior by Mode in Miami-Dade County



Data Source: 1990 US Census

According to Table 5, overall more than one out of ten commuters in the tri-county area work outside of their county of residence. The most significant example of inter-county commuting is between Miami-Dade and Broward counties, where over 13 percent of Broward workers commute from Miami-Dade County.[7]

One other issue the increase in VMT creates is an increase in vehicle crashes. In 1997, Miami-Dade County reported almost 48,000 vehicle crashes, an increase of 33 percent since 1994. These 48,000 crashes is almost twice the number of reported crashes for the second highest county total in the State of Florida with 27,000 in Broward County.[8]

[6] "ITS Systems: Miami-Dade County's Road to the Future," FDOT District 6 and Miami-Dade County MPO, 1996.
[7] *Florida Transportation Almanac,* Center for Urban Transportation Research, June 1998.
[8] Department of Highway Safety and Motor Vehicles, Florida Crash Data compiled in 1998.

Table 5
Regional Commute Demographic Profile

COUNTY	WORKERS	WORK OUTSIDE OF COUNTY
Miami-Dade County	887,996	31,561 – Broward County 2,909 – Palm Beach County 1,801 – Monroe County 7,003 – Elsewhere
Broward County	588,089	77,285 – Miami-Dade County 31,809 – Palm Beach county 8,215 – Elsewhere
Palm Beach County	380,260	25,462 – Broward County 3,483 – Miami-Dade County 8,215 – Elsewhere

Source: Florida Transportation Almanac, CUTR, 1998.

3.2 Miami-Dade County Themes for ITS Deployment

An initiative in Miami-Dade County is required to establish the future role of ITS. Creating themes for ITS deployment will help illustrate attainable regional goals. The first ITS "theme" for Miami-Dade County is preserving mobility and safety. Despite the fact that the area is already the third worst congested location in America, the transportation network will continue to become even more congested.

Stated earlier, Miami-Dade County is expected to experience rapid growth over the next few years and simply maintaining the current level of congestion will be very difficult. Thus, ITS projects for the area should attempt to preserve mobility and safety.

Miami is one of the few truly intermodal cities in Florida. Thus, the second theme focuses on strengthening intermodalism. The Port of Miami and Miami International Airport are two transportation hubs that can benefit from improved communication. For example, improved intercommunication from MIA can alert the Port of a delayed airplane carrying many passengers for a particular cruise ship. The same scheduling information can be electronically
sent for arriving freight ships to unload cargo to waiting trucks. Currently, all data retrieved by the Port of Miami are used only internally.

Photo 1: **The Port of Miami is the world's busiest cruise port and Florida's largest container port. All data retrieved is kept internally.**

When an airplane is late, the Port of Miami depends on special notification from the particular airline involved. This is an important point considering the size of the Port of Miami; in 1998 there were over 2.9 million cruise passengers, the most in the world. However, the option of convenient public transportation service between the airport and cruise port does not exist.

With Tri-Rail and MetroRail (both conventional rail passenger trains), MetroMover (automated guideway transit) and a fleet of more than 600 public buses, the Miami-Dade area is Florida's only true multi-modal location. One of the goals of ITS must be to make these other modes more attractive to passengers. One way ITS can contribute is to give travelers real-time information on the status/location of the public transit vehicle they may be interested in taking. Accordingly, "choice" ridership in public transportation, along with carpool/TDM techniques away from single occupant vehicles can be anticipated to increase. This will help alleviate traffic congestion within Miami-Dade County. The information should be readily available wherever transit users find it most convenient, be it in their homes, offices, at transit stops, or on the transit vehicles themselves.

The third theme is again focused on public transportation. Table 6, comparing Miami and its peer transit agencies, shows one of the primary measures of effectiveness of transit -- passenger trips per capita per year. "Peer" transit systems are based on many factors, including population of the area, density of the population, size of the transit system, modes available, and route miles.

From the table, it is clear that the Miami-Dade transit system has a large potential for ridership growth. ITS improvements to the system must attract new users by

making the system better through such things as real time transit information and personalized transit.

Table 6
Passenger Transit Trips per Capita

City Passenger Trips (per Capita per Year)	
Atlanta	59.49
Detroit	57.70
Portland	55.37
Pittsburgh	42.55
Baltimore	40.36
Miami	**36.44**
Dallas	24.78
Average	***45.24***

Source: 1994 Performance Evaluation of Florida Transit Systems

The final theme is focused on a significant part of Miami's economy--tourism. In 1996, more than 7.2 million passengers arrived at Miami International Airport, an 11.6 percent increase from the year before.[9] This represents about half of all the yearly visitors to Southeast Florida. These tourists spent an estimated $4.47 billion in Miami-Dade County alone.[10] With the large number of tourists it is important to make their travel as safe and efficient as possible because of their impact. This will encourage them to return in the future while continuing to improve overall traffic flow. ITS can make their travels easy by informing them of the most direct routes to reach their destinations, preventing the hazardous driving maneuvers often performed when the driver is lost or not familiar with the area. This can be accomplished through the use of in-vehicle navigation devices, some of which are available now at car rental agencies in the Miami and Ft. Lauderdale International Airports.

[9] Florida Tourism Industry Marketing Corporation, 1996 Florida Visitor Survey (1997).
[10] Florida Tourism Industry Marketing Corporation, 1996 Florida Visitor Survey (1997).

Photo 2: **Miami Beach continues to be one of the most popular places for conventions and tourists and should be a focal point for ITS planning.**

3.3 ITS Project Priorities in Miami-Dade County

This section introduces the projects that are considered to be priorities to achieve the themes described in the last section. The projects discussed in detail in Section 5: **ITS Enabling Projects for Miami-Dade County**.

The first project is SunGuide, the "umbrella" ITS program in southeast Florida. This is the broad-based successor to the Intelligent Corridor System (ICS). Under the program an array of cameras, road sensors, and remote-controlled message boards are coordinated to help reduce traffic congestion, and improve driver awareness and relieve travel frustration. There are many other sub-projects integrated into SunGuide program that will be discussed later.

The first of the enabling projects under SunGuide is the Southeast Florida Regional Traveler Information Services. The basis for this project is to provide travelers with real-time travel condition information through a variety of communication mediums. This way travelers will be able to alter their routes or modes as necessary to avoid congestion. This new strategy will help in

minimizing delays caused by both recurring and non-recurring congestion by using any excess capacity available on other routes and modes of travel.

The third large-scale ITS enabling project is the Advanced Traffic Management System for Miami-Dade County. This project will replace the inefficient, existing Traffic Control System (TCS). Eventually, with all the tools in place, every signalized intersection within the county will be monitored to implement improved timing plans and respond to incidents in a timely coordinated manner. This project is separated into two phases, the Interim ATMS and the Ultimate ATMS. The Interim ATMS will be able to overcome many of the computer control inefficiencies and improve communications through fiber optics. Also, the new database will be able to monitor and control the vast majority of traffic signals in the county. The Ultimate project should be completed in 2012. These three projects, combined with the other projects noted in Sections 5 & 6, will begin to make Miami-Dade County truly a large-scale ITS region.

4.0 ITS Regional Architecture for Miami-Dade County

The full benefits of ITS investment cannot be realized if the "system" characteristics of ITS are disregarded or minimized. Very simply, a regional architecture defines what the ITS systems (needs) are and what information is to be shared. It also defines the regional strategy for transportation system operations and management.

Since most ITS-related projects involve real-time transportation information of some degree, opportunities and requirements for information sharing and dissemination to users, beyond just that of the implementing agency, must be defined. The "system" characteristics describe all of the areawide components (individual devices and separate projects that address particular user services) and what/how information is to be collected, stored, disseminated, and exchanged among all of the components. The common way to identify "system" characteristics is through the development of a regional architecture plan. The regional architecture plan also establishes the staging of ITS improvements and the level of commitment required among implementing agencies (i.e., Memoranda of Understanding). Unfortunately, an ITS regional architecture plan has not been fully developed for the Miami-Dade area. It is imperative to establish the regional architecture at this time, and this section of the ITS Plan Update outlines the suggested approach to begin the process.

4.1 Conformity to TEA-21 Interim Guidance on National ITS Architecture and Standards

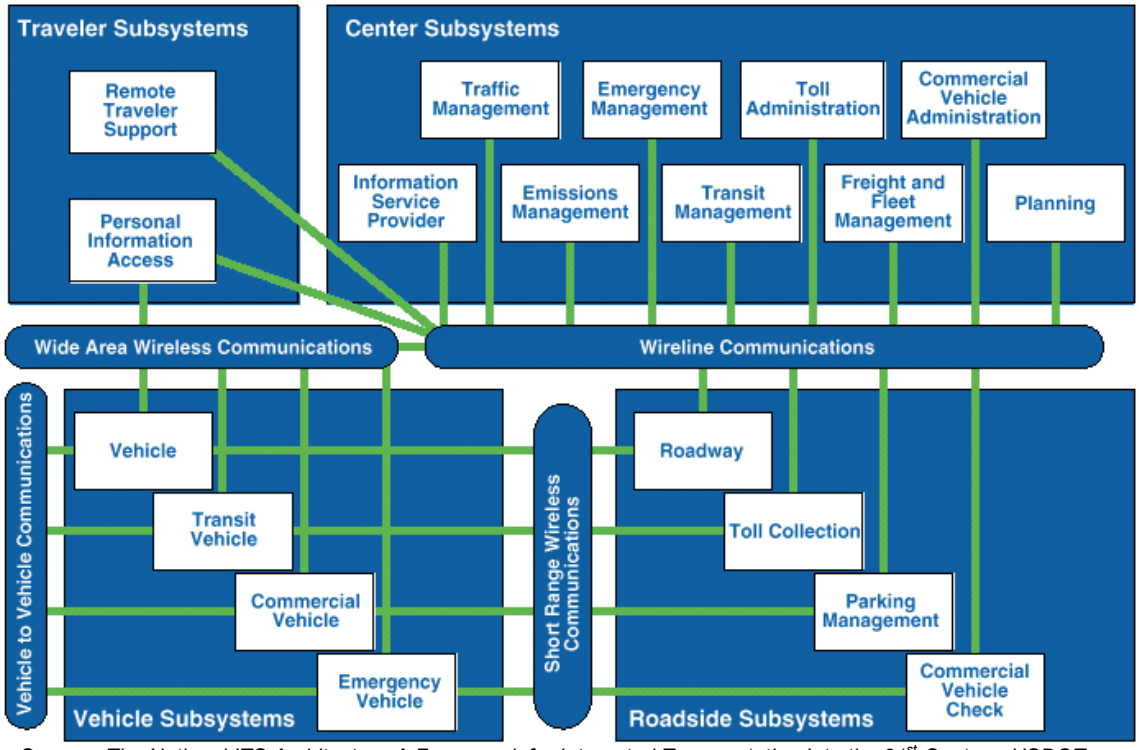
In October 1998, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) jointly issued Interim Guidance related to conformity with the National ITS Architecture and Standards. The intent of the Interim Guidance is to foster ITS integration, encourage the incorporation of ITS into the transportation planning process, and focus on projects with the greatest potential for affecting regional integration. The Interim Guidance applies to all ITS projects using funds from the Highway Trust Fund.

A series of questions, as reminders of key issues that must be addressed during ITS planning and project development, have been developed by FHWA to assist agencies in meeting the intent of the Interim Guidance. This "checklist" of questions also represents the first step for implementing the TEA-21 conformity with National ITS Architecture provision. The questions are not intended to serve as criteria for approval of conformity; however, a policy is anticipated for development through formal rulemaking by the end of 1999. For example, when a regional ITS architecture has not yet been developed (as is the case for Miami-

Dade County) the following checklist of questions should be addressed as a minimum:

- √ ***Which subsystems and information flows from the National ITS Architecture are applicable to the project? (see Architecture Subsystems Interconnect Diagram below)***

Figure 3: **Interconnection Relationship of Architecture Subsystems**



Source: The National ITS Architecture-A Framework for Integrated Transportation Into the 21st Century, USDOT, Version 2.0

- √ ***Does the design documentation illustrate subsystems and information flow between specific agencies that are to be provided by the project?***

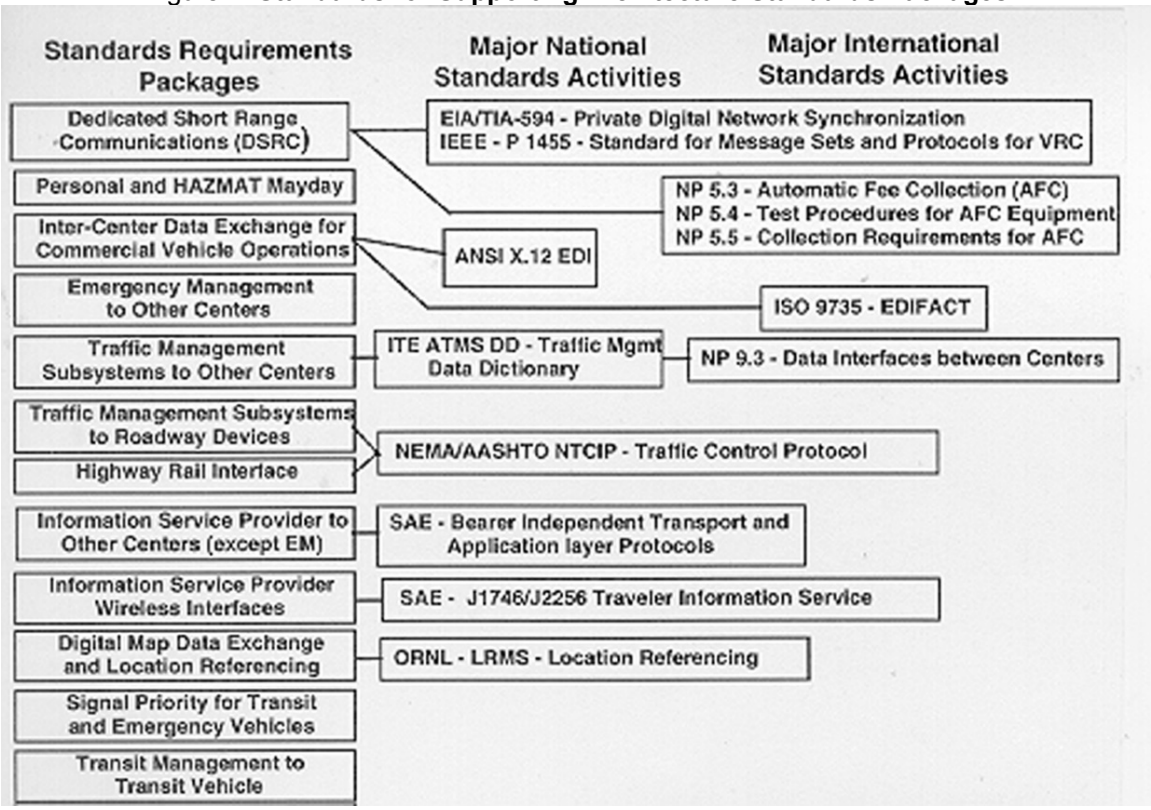
- √ ***Has consideration been given to incorporating additional information flows, as appropriate to the project, in anticipation of future needs? If so, which information flows?***

- √ ***What technology and operating agreements have been reached between the affected parties?***

√ ***How has the potential for future expansion and information sharing opportunities been kept open through the project design strategy?***

√ ***Which standards and protocols, as appropriate for the project, have been identified? (see Standards Supporting Architecture Diagram below).***

Figure 4: **Standards for Supporting Architecture Standards Packages**



√ ***Are the standards that are being used in the project clearly identified in the project design documentation and specifications?***

√ ***Has the project design process included the participation of all relevant stakeholders?***

4.2 ITS Considerations for the Transportation Planning Process

Statewide and metropolitan planning activities should include consideration of the efficient management and operation of the transportation system. This can best be accomplished through regional implementation and integration of ITS services (see ITS Market Packages), and development of a regional ITS architecture.

A “region” is locally determined based on the needs for sharing information and coordinating operational strategies. For a metropolitan region, it is recommended that the size of a region not be smaller than a metropolitan

planning area boundary. In the case of the Advanced Traveler Information System (ATIS) enabling ITS project described in the next section of the ITS Plan Update, the "region" for this ITS project has been defined as the entire three-county area of West Palm Beach, Broward, and Miami-Dade counties.

The FHWA Interim Guidance also provides a checklist of questions to assist agencies in the early planning stages of ITS projects. The following questions should be addressed as a minimum:

- ***√What activities have been initiated to engage regional ITS stakeholders?***
- ***√What non-traditional, public and private partners need to be brought into the process?***
- ***√What system management and operational needs have been identified through regional planning activities?***
- ***√What existing and planned ITS enhancements have been identified or are under consideration in the region?***
- ***√Has a regional ITS architecture been developed? (see questions noted above in Section 4.1)***
- ***√Have operating requirements for planned ITS enhancements been identified?***
- ***√How will planned ITS enhancements be coordinated with other "conventional" transportation improvements?***
- ***√Has a deployment-phasing schedule been developed?***
- ***√Have regional technology agreements been established where needed?***

Lastly, the Florida Department of Transportation, through its current development of a Statewide ITS Strategic Plan, has prepared an issue paper on the Integration of ITS into the MPO Transportation Planning. This issue paper has reached several very important conclusions as follows:

- Each MPO must begin to integrate ITS planning and programming into their Long-Range Transportation Planning Process. Depending on where each MPO is in the plan update process, ITS may initially have to be pursued as a separate process until the next plan update, by which time a single and fully-integrated planning process must be in place.

- Leadership roles must be assumed to overcome the institutional challenges in the deployment of ITS technologies. The overall program

leadership can best be provided by FDOT working in close partnership with Florida's MPOs in the planning, prioritization and programming of ITS.

- The ITS Project planning process must recognize that the technical skills required to design, operate, and maintain ITS are inherently different from those basic skills required for "conventional" infrastructure improvement projects. Therefore, it is crucial that planning for ITS deployment include provisions for acquiring or improving skills in emerging technologies and systems management.

- Each MPO, working with local governments, should consider the benefits of ITS to growth management and concurrency in the development of their regional ITS architecture. For example, local governments should consider allowing developers to contribute individual components of the areas ITS architecture in lieu of traditional capacity enhancement projects.

As an initial measure to mainstream ITS into the traditional transportation planning process, the list of questions provided within the Interim Guidance should be addressed. Gradually, the planning process should recognize that ITS is another tool to consider in identifying solutions to travel mobility and safety problems.

5.0 ITS Enabling Projects for Miami-Dade County

As stated earlier, Miami-Dade County is deploying significant projects that will improve traffic flow and enable ITS technologies throughout the County. Three of these foundation projects were briefly mentioned in Section 3.3 (SunGuide, Southeast Florida Regional Traveler Information Services, and the Miami-Dade County Advanced Traffic Management System) for large-scale ITS deployment in Southeast Florida. This section gives a brief description of each project and the latest status information provided, along with an additional three smaller scale project underway. Detailed descriptions of each project, along with phasing and involved agencies are all provided in Appendix A.

5.1 SunGuide

Project Description: SunGuide is the name for South Florida's overall highway ITS program in the tri-county area. Until recently, this project, the largest ITS effort within the state was named the Southeast Florida Intelligent Corridor System (known as ICS). Now, a new identity, SunGuide, was created encompassing all of the ITS activities. This initial program was formed after FDOT District 6 conducted a feasibility study on using ITS in South Florida. That study completed in 1994 recommended the creation of a regionally coordinated ITS program for Miami-Dade, Broward, and Palm Beach counties. In 1998, ICS was transformed into SunGuide to establish a more universal ITS program within the tri-county region to include the following elements listed in table 7.

Table 7
SunGuide Project Elements

Some projects are initially discrete elements, but will ultimately be integrated into a regional sub-system. The infrastructure now in place, or being deployed includes:

- Automated vehicle location (AVL) systems used with service patrols and transit systems
- Transit information databases
- Geographic information systems (GIS)
- CCTV for traffic monitoring
- Emergency and dispatch management centers
- Freeway service patrols
- Variable message signs and trailblazers
- Publicly owned and leased fiber optic and wireless communication systems
- Automated Vehicle Identification (AVI) systems
- Highway Advisory Radio (HAR)
- Advanced traffic signal systems
- Dedicated computer hardware, software, and personnel

Current SunGuide Activities: The Interim Operations Center (IOC) has recently been completed and is located in Room 6203 of FDOT District 6 headquarters as of July 1999. This will remain the center for SunGuide until the expected construction of the SunGuide Control Center (South) begins in fiscal year 2001/02. The 30,000-sq. ft. control center will provide about 10,000-sq. ft. to the Florida Highway Patrol, which will participate in the operation. The control center design will provide office space for key SunGuide participant agencies such as MDTA, Tri-Rail, Miami-Dade Co. Signals, Florida's Turnpike, FDOT District 4, and other public sector agencies, if these agencies share the responsibility of operation with FDOT District 6. The IOC is managing the ATIS/ATMS for the Golden Glades Interchange, which are now operational, as well as the service patrol program.

The SunGuide Manager (the system management software) for the I-95 program not only coordinates the highway monitoring and control devices, but also will be designed to grow and coordinate the systems in the entire tri-county area. Eventual coordination will process data for automated incident detection and regional intermodal information. The system hardware installation is expected to begin soon and continue through mid-2000. There are issues regarding the interface between the I-95 ramp metering, and the arterial signal system. All the software is Year 2000 compliant.

Photo 3: **The existing FDOT District 6 Traffic Management Room is considered inadequate for monitoring current traffic conditions throughout Miami-Dade County.**

The Variable Message Signs at the Golden Glades Interchange are now in acceptance to provide local traffic conditions. The operating signs provide dynamic messages to motorists traveling throughout the interchange. Information is provided with the aid of CCTV located only around the Golden Glades Interchange. Currently, it is not possible to display advisories on the overhead signs regarding incidents anywhere on I-95, Florida's Turnpike, or SR 826. Expansion for the CCTV is planned and discussed in Section 6: "ITS Enhancement Projects." These signs give location-specific information without the driver having to make any adjustments while driving. Much of the information provided is complementary to Highway Advisory Radio (HAR).[11]

The SunGuide Service Patrols are already in existence on I-95 and SR 836 in Miami-Dade County. This service provides assistance to stranded or distressed motorists free of charge. The patrols also help remove debris, make minor auto repairs, and assist the Florida Highway Patrol when necessary. Expansion is currently planned for the program. The next goal is to provide 24-hour coverage on I-95. And as of July 1999, the contract for the SR 826 Service Patrols has been awarded and will operate similarly to those on I-95 and SR 836. The six trucks assigned to SR 826 will operate a 13-hour day, five days a week. Currently, MDX has authorized money and is advertising service patrol bids for its freeways: State Roads 874, 878, 112, and 924. One contract is to supply five trucks on these four roadways.

Assuming there are no complications, the tri-county region will have service patrols on almost all of its freeways by 2000. FDOT District 4 offers free service on I-95, I-595, and I-75 in Broward and Palm Beach Counties. Florida's Turnpike also contains service patrols at a charge upon motorists' request.

The SunGuide Newsletter was first published in the winter of 1998/99. Future newsletters are issue-based and have no fixed schedule for publication, but are planned to be published roughly 2-3 times per year to help raise ITS technology awareness in the community.

5.2 Southeast Florida Regional Traveler Information Services

Project Description: The partners of SunGuide are working in a regional effort to bridge all sources of information, equipment, personnel and expertise to

deliver uniform, multi-modal, real-time information to Southeast Florida in a cost-effective manner. Under this project, all public sector transportation agencies in Miami-Dade, Broward, and Palm Beach counties will work cooperatively within the tri-county area and with the private sector. FDOT District 6 has been seeking various ways to involve the private sector and help supply the wide range of communication media in order to bridge the gap between existing and needed resources. For example, non-recurring congestion due to crashes similar to Photo 4 can be lessened through advanced warning to motorists by way of VMS or Internet services. Following is a list of other issues being discussed that are related to providing Traveler and Transportation Information Services:

- A list of services currently being provided by an interested vendor
- Quantified benefits of identified services for the Southeast Florida Region
- The expected time frame to implement these services dependent on the cost
- Detailed identification of existing and planned infrastructure improvements to provide the information services
- A Business Plan with any possible Public/Private Partnerships to identify the costs, as well as show where the funding will come from while defining a target market.
- Any legal, technical, or institutional hurdles that may be encountered
- The ability to share all public records under Chapter 119 of the Florida State Statutes on Public Records.

Photo 4: **Detecting incidents in real-time can relieve non-recurring congestion in a more timely manner. Here, two rolled Sport Utility Vehicles located on the photo's right side on S.R. 826 (Palmetto Expressway) back up traffic for miles in both directions in the background, while vehicles stop along frontage road in the foreground to warch.**

Project Status: The Traveler and Transportation Information Service moved from the Request For Information (RFI) toward advertising the Invitation to Negotiate (ITN) in March 1999. This opportunity of bringing vendors together is helping provide the required services. The MPO Kiosk Implementation Project is included in this project to avoid separate processes. This is the first time the ITN has operated in the new proactive format. The process is now more flexible with innovation and allows negotiation before execution of the contract. While the initial procedure takes longer in the beginning, time and resources from future modifications are expected to be less. Site visits to all the 12 participating agencies (listed in Appendix A) in the three county region were non-mandatory. The provider will be under contract for a five-year period. After the first three years, it is desirable the project becomes self-sustaining. Written within the project is a stipulation that revenues be shared with the public sector partners on the gross receipt basis. Revenue earned shall be put back into the project and eventually minimize the public sector expense. The due date for these proposals was June 24, 1999. Assuming no complications ATIS should be awarded by December 1999.

Here is a summary of what ATIS will provide to South Florida:

For Roadways:

- Gives the travelers any information they need to make any necessary stops; and
- Allows "yellow pages" type information to be accessed pre-trip or on-route, in-vehicle or at selected public locations;

For Transit:

- Metro conditions
- Conditions of other providers
- Schedules
- Contacts
- Commuter rail conditions
- Links

The *primary benefits* of this user service are:

- Removal of much of the guess work from driving, such as:
  - -Travel times
  - -Event location
  - -Construction
  - -Special events
  - -Next bus/train arrival time
  - -Parking information

As of mid-1998, at least 15 major U.S. regional sites have Advanced Traveler Information Systems applications in place, and each one is unique.[12] Currently, determining available transit service between Miami-Dade and Palm Beach Counties requires several phone calls, one to each of the transit agencies involved.[13] The problem is that one transit agency does not necessarily know current transit status in another county. This system can be enhanced through appropriate coordination and communications to the AVL transit information and traffic information, which is covered in the next section.

A study in 1998 surveyed the effects of incident information on travel choice.[14] The case study corridor was a 16-mile segment between San Francisco and San Jose on US 101. The corridor was chosen based on the high frequency of commuter travel and the availability of alternative routes and mass-transit options. Their findings were that commuters usually believe that their normal travel plans are faster than alternative travel plans such as changes in mode choice, route choice, and departure time. However, it was determined that commuters value traffic information more for the intangible benefits, such as the ability to reduce anxiety or stress. The vast majorities, over 75 percent, were informed of congestion through traffic reports on the radio.

This study can be related to Miami-Dade County for people with long commutes on freeways. Driver perception is what matters when it comes to whether commuters will change their travel plans. Providing accurate, real-time information in a timely manner is fundamental to commanding the attention of commuters, and being able to alter their travel behavior enough to significantly reduce congestion.

5.3 Miami-Dade County Advanced Traffic Management System

Project Description: This system will be able to provide the necessary tools for traffic engineers, operators, and maintenance personnel to monitor and control every signalized intersection within Miami-Dade County, to implement new and better signal timing plans, and to respond to incidents quickly.

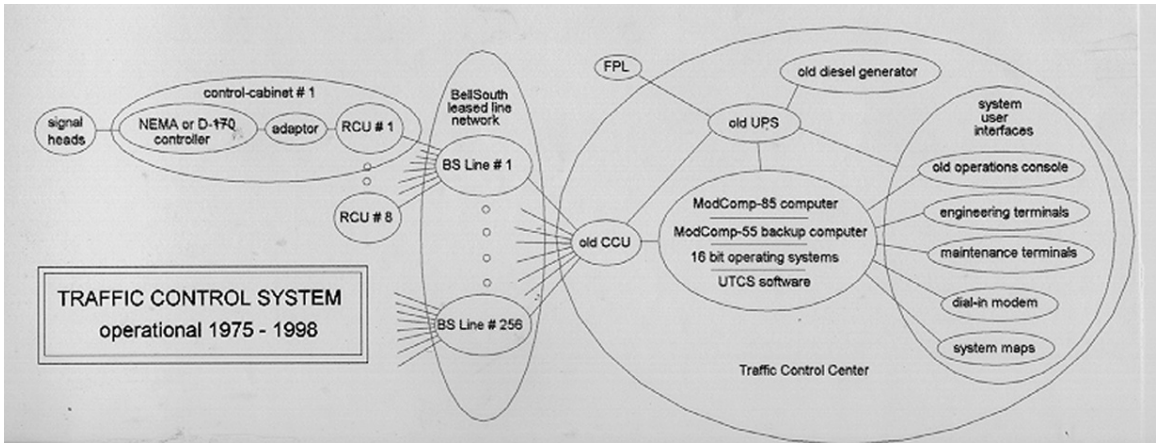
[12] ITS America, "Choosing the Route to Traveler Information Systems Deployment, 1998", page 12
[13] Ruby Adams, *Sun-Sentinel Newspaper*, "Commuter Aid for South Florida would by Centralized," November 27, 1998.
[14] "The Effects of Incident Information on Travel Choice," Ronald Koo and Youngbin Yim, The compendium of papers from Transportation Research Board Annual Meeting, January 1999.

Existing Problems: The outdated system in the Public Works Department of Miami-Dade County has been unable to meet the current highway demand in the current Traffic Control Center (TCC). Now Miami-Dade County will have the ability to link all of its traffic signals together and manage them from a new Traffic Management System (TMS), saving much time and many resources. The new ATMS center will alleviate some existing problems with the existing TCS, such as:

- Many traffic signal components will not survive through the next 10 years.
- Approximately 17% of the 2400+ traffic signals cannot be operated by the TCS, including ones related to the MIC and Busway Phase 2.
- Public access is currently not available via Internet.
- Modern workstation software is not accessed in the TCS, causing delays in operation and maintenance tasks.
- The current TCS is not NTCIP compliant and will not be able to communicate with other incoming systems with standard protocols.
- Vendors require three months to implement new signal modification and controller relocation. The ability to maximize benefits is limited due to many control and monitoring capabilities not in the current TCS. The existing network has a high recurring cost of $1.3 million/year.

Figure 5 illustrates the pre-existing Traffic Control System components and connections. This system lacks a high-speed communications backbone (now served by BellSouth telephone lines), user-interface server with on-site and remote workstations, an Internet connection, and new D170 or 2070 controllers. The aforementioned major components and other improvements will be added as part of the Interim or Ultimate ATMS.

Figure 5: **Existing Traffic Control System Network in Miami-Dade County**



Source: Miami-Dade County Public Works Department

Proposed ATMS Deployment Approach: Currently, this project is still very early in the development stage. However, instead of receiving the $81.6 million by fiscal year 2004, funding was prorated out to fiscal year 2010. The Public Works Department in December 1998 then divided the project into two steps (Interim and Ultimate).

The first step is developing an Interim ATMS that will be completed in the next couple of years and solve the first three problems listed above and connect half of the current signal system. There will be no significant interference to the operation of the existing system. The new TMS Center will be located at 9701 NW 58th Street on existing Miami-Dade County property. The communications infrastructure will be fiber optic, described in more detail in Section 5.6. There is heavy reliability on the design work and software completion by the System Manager to be useable for the Ultimate ATMS, arriving in 2012 with improved funding.

If ATMS cannot get the necessary funding from FDOT, the ATMS project may have to partner with other telecommunication providers and proceed without ITD to maximize cost reductions. This would be unfortunate since the ATMS fiber network creates enormous coverage many others could use.

The Interim ATMS will improve the existing system and prepare for NTCIP compliance. The Ultimate ATMS will then be built around the interim system. Much of the modification is currently in progress as of July 1999.

The ATMS Interim Plan will provide an Internet connection more adaptable for the common public. Currently, a single dial-up line exists for consultants and

other agencies with an approved password. A multi-media presentation and brochure of the ATMS project are expected in late 1999.

5.4 SunPass and Miami-Dade County (Causeway Pass) Electronic Toll Collection

Project Description: SunPass, not to be confused with SunGuide, is the Electronic Toll Collection System that will be compatible throughout Florida toll roads and bridges. Florida's Turnpike and the Miami-Dade County Expressway Authority (MDX) are two agencies getting SunPass started. Following is the list of the initial SunPass deployment:

- 67 toll lanes will be equipped with ETC on the Turnpike's Southern System.
- 63 toll lanes will be equipped with ETC on the Homestead Extension of Florida's Turnpike.
- Mixed-use ETC lanes on non-Turnpike expressways such as SRs 836, 869, 924, 112, and 874.

Phasing: Once Florida's Turnpike installs the SunPass system, use on SR 836, 869, 924, 112, and 874, will be operated and maintained by the Expressway Authority. The first mixed-use ETC lanes on SRs 924, 836, 112, and 874 began operation in July 1999. Initially, MDX has decided not to use dedicated lanes for SunPass on its roadways.

The Turnpike District is planning to invest approximately $8.5 million in SunPass equipment in Miami-Dade County to aid in alleviating toll plaza congestion similar to photo 5. During mid 1999, the Turnpike expects full-scale deployment of SunPass in Palm Beach and Broward Counties working its way south to Miami-Dade County. They are also experimenting with the use of Type IV transponders, known as Smart Cards. If this goes through, integration of the Smart Cards with Miami-Dade County's public transit system would allow Turnpike commuters to more easily use the Park-and-Ride facilities and transit for part of their commute.

Photo 5: **The toll plaza on Eastbound S.R 836 (Dolphin Expressway) in the non-peak period shows the current congestion that is quite common in Miami-Dade County.**

Project Elements: The communication infrastructure to support these ITS projects is anticipated to be fiber optics. The costs of deployment of fiber optics in the Miami-Dade County area, including installation, fiber and end equipment, are estimated at $10-15 million. The total ITS program investment by the Turnpike in Miami-Dade County is estimated at $39 million upon completion of both the SunPass and ATIS programs. Florida's Turnpike has started to examine the possibility of having a private company install fiber optic cable along 1,800 miles of their right of way. Several other states have done this and at minimal to no cost. The potential arrangement has yet to be developed, but in any agreement, the Turnpike will require some of the fibers for their own use. In Miami-Dade County, the Turnpike right of way runs very close (within 3 miles) to ITD's fiber optic line. When the Turnpike does have fiber optic cable installed along its right of way, it would be beneficial to connect it to ITD's fiber optic loop. Florida's Turnpike is not making any decision on fiber-optics until the outcome of the proposed Florida Fiber Network (FFN) explained in Section 5.6

Rickenbacker and Venetian Causeways

Miami-Dade County has installed an electronic toll collection system to replace manual toll operations at its Rickenbacker and Venetian Causeways. This

Causeway Pass allows users to pay the toll electronically. The Causeway Pass capability utilizes the AVI-equipped lanes for frequent users who establish prepaid accounts. A description of this system can be found in Appendix A as well under the SunPass heading. At this time there is no plan for interoperability between the Causeway Pass and the SunPass system.

The Causeway Pass has been fully operational since April 1998. Slight debugging is still occurring, but nothing that affects the overall operations. These software adjustments include complete financial statements, 90-character-long notes on the transponders, and complete address printouts. However, the Venetian Bridge is currently under reconstruction. The old toll plaza building is planned to open along with the bridge in July 1999, with ETC. Reconstruction of the toll plaza building schedule is not known at this time.

FDOT is responsible for construction on the Venetian Bridge. Once construction is complete, maintenance responsibilities will be with the Miami-Dade Public Works Department, similar to the Rickenbacker Causeway. Currently, there are 14,853 accounts with the Causeway swipe cards and 10,800 accounts with vehicle identification transponders between the two causeways.

Photo 6: **The current bridge construction at the Venetian Toll Plaza will be completed summer 1999 with ETC.**

5.5 Miami-Dade Transit Agency Automatic Vehicle Location (AVL) System

MDTA has just about completed the implementation of an AVL system on their fleet. Their AVL system helps the transit rider and the system manager with continuous tracking of their transit vehicles using Global Positioning Satellite (GPS) technology. Once MDTA finally installs this system they will be able to better manage their vehicles and provide more accurate service. The CAD-AVL system has not been meeting all performance specification standards, but the system is expected to be fully operational by the end of 1999 with all 610 buses, Metro-Rail, and Metro Mover. There are specifications for new buses to be equipped with devices when the complete system is operational, with devices such as voice enunciation for drivers to give and receive real-time information on route performance. The 800 MHz voice system is now fully operational. Also, MDTA is installing on-board cameras to digitally reconstruct any events on the transit vehicle. By the year 2003-2004, two-thirds of the bus fleet should be retrofitted to CAD-AVL with voice annunciation and on-board cameras.

Photo 7: **The CAD-AVL system will improve bus arrival and departure reliability, facilitating mode transfers here at the OMNI transfer center.**

The kiosk project sponsored by the Federal Transit Administration (FTA) and MDTA is a long way from being completed. Currently, a consultant has finished design specifications, but the three kiosks are not installed yet. The three kiosks at Miami International Airport, Dadeland South, and Government Center should

be installed by late 2001 with real-time information. Plans are to install thirty kiosks in the future around Miami-Dade County.

There are currently three kiosk deployment initiatives in Miami-Dade County. The first initiative is the $400,000 project above designed to deploy kiosks tailored towards the transit user. These will be located at major transit transfer points around the county. The second project involves the detailed study of kiosks designed for tourists. This study will examine potential locations for the kiosks, the information required to be placed on them, costs of kiosks, and possibly set up an agreement with a kiosk vendor to supply the kiosks. The third initiative is with the Florida Turnpike service plazas.

Eventually, colored icons will identify the status of the bus, indicating whether it is on time, early, or behind schedule. Dispatchers can adjust problematic route schedules quickly, reducing bus “bunching” and improving on-time service.

MDTA has no plans for any data information sharing outside of MDTA and its patrons. Currently, they are working on their own joint marketing agreement, but were not aware of the public relations project already in place by the ITS Standing Committee. Internet access is available through their web site at http://www.co.miami-dade.fl.us/mdta for route and schedule information on Metrobus, MetroRail, MetroMover, and Special Transportation Services (STS).

5.6 Fiber-Optics Communication Network (ITD)

Existing Network: Much of the communications for these projects will be using fiber optic technology. Once there is a viable fiber optic network, the involved agencies will be able to send and receive data much more efficiently and reliably. Miami-Dade County’s first fiber optic network was completed in December 1987, with two single-mode fiber optic cables (eight optical strands in each cable).

In 1989, the ITD entered into an agreement with Intermedia Communications of Florida, Inc. (ICI) to utilize existing county street conduits identified by the Public Works Department and the Metro-Dade Transit Department MetroRail and MetroMover guideways to deploy a fiber-optic network. With this public-private partnership agreement, the county received 12-fiber strands of the network in exchange for trading the public rights-of-way. This new network added five more

county government buildings. Four of the 12 fiber stands are supporting the old communications technology, and the remaining eight strands are reserved for a new SONET-based network. Eight county buildings were already linked to the existing fiber network.

Planned Network: ITD Upgrade

With the changes introduced in the Federal Telecommunications Act of 1996, ICI has entered into the local telephone business and is planning to expand the fiber optic network for subscribers. According to the agreement with ICI, Miami-Dade County receives 12 fiber strands in this new network. This upgrade is expected to save the County an additional $2.5 million in annual expense for leased circuits from BellSouth.

Other (Non-County) Networks: The importance of the proposed Florida Fiber Network (FFN) is undeniable. When and if the FFN becomes a reality, the current configuration plan is to have two “spare” fiber conduits in urban areas and one “spare” fiber conduit in rural areas along all of Florida’s Interstate and Turnpike rights-of-way (SR 836 will also be covered by the FFN in Miami-Dade County). User access to the “spare” fiber conduits is undetermined at this time.

The Florida Transportation Commission (FTC) is being very cautious regarding the FFN. At their meeting on May 13, 1999 the money was authorized to hire an independent consultant to advise on the issue of involving the telecommunications industry. The FDOT District 6 office is awaiting the FFN outcome, as well as the Florida Turnpike. Florida’s Turnpike schedule is on hold until the completed FTC review. However, District 6 has its own plan for installing a fiber-optic communication network to begin serving the needs of the SunGuide project. Major hubs are also under construction at the Golden Glades interchange and the SR 836/I-95 interchange. Conceptually, the District wants the FFN and SunGuide deployment (which is envisioned to link all the public sector development fiber lines, including that for the Miami-Dade County Signal System upgrade) to operate in a seamless fashion along the I-95 corridor.

The coordinated progress of fiber-optic application in the Miami-Dade County area is important because ITS infrastructure consists of components that send and/or receive information. The full benefit and effectiveness of ITS investments are not maximized until these components are linked and integrated together and provide real-time information (e.g., voice, video, and data). The fiber-optic network facilitates real-time information exchange and will serve as the key enabler for the planned ITS program in Miami-Dade County. The FTC is

researching innovative ways on how to take full advantage of the right-of-way – fiber strand partnership and avoid raising taxes. Without a complete fiber optic network, Florida is unable to provide economic development to certain companies, such as Internet companies, nor provide FDOT with a revenue source and fiber optic services.

6.0 ITS Enhancement Project Descriptions

This section describes ITS related projects that are not considered to be stand-alone, "enabling" projects for regional ITS deployment. They serve different site-specific and corridor-specific functions and purposes other than the enabling projects, and are listed in different categories (existing, planned and programmed, planned, and not currently planned but needed). The participating agencies feel that these projects are important for providing better service. This section gives the status for the enhancement projects. Project description, cost, and phasing on these projects is also listed in Appendix A under "Enhancement Projects."

6.1 Existing Projects

The enhancement projects are currently in service or are in deployment. Five existing enhancement projects have been identified are listed in Appendix A that relate to the Miami-Dade County ITS Plan Update.

The service patrol program is intended to assist stranded motorists on the roadway. Roving trucks are notified of a motorist in distress and respond. Also, the vehicles are responsible to pick up debris on the roadway and assist the Florida Highway Patrol in emergencies. Details of the projects are in Appendix A. This program began weekday operation in February 1995, on I-95 in Broward and Palm Beach Counties and then Miami-Dade County in December 1997. The Miami-Dade Expressway Authority adopted the program for SR 836, and FDOT expanded it to I-595 and I-75 in Broward County. The service contract is in its second year, and improved antennas for faster communications have been installed on all eight trucks. MDX reimburses the DOT for all the costs. These programs run from 6:30 a.m. to 7:30 p.m. weekdays in Miami-Dade County and 6:00 a.m. to 7:00 p.m. weekdays in Broward and Palm Beach counties. Trucks also serve the turnaround exit and entrance ramps.

FDOT District 6 is also in the process of adding CCTV cameras for the Variable Message Signs at the Golden Glades Interchange. This has been the first design-build contract for FDOT District 6. The contract has been awarded as well as the Notice-to-Proceed. The camera expansion project will be installed near the seven non I-95 VMSs around the interchange, allowing greater traffic monitoring for larger portions of SR 826, SR 441, SR 9, Florida's Turnpike, and NE 167 Street. The company awarded the project has four major responsibilities in addition to designing and building. They are:

- Providing Construction Engineering Inspection (CEI) services
- Integrating the new CCTV cameras with the existing ones
- Providing certification that the system is built to standards and functions at the expected level
- Maintaining the system for one year after final acceptance

6.2 Planned and Programmed Projects

These projects in Miami-Dade County are listed in Appendix A. They are listed in the planning documents including the Long-Range Plan for 2020 and the Transportation Improvement Program for 1999. The design and scope of these projects have been implemented, but construction has typically not yet begun. Many of them are in preliminary engineering phases. The most current phase, as well as the funding source, is included in Appendix A.

6.3 Planned Projects

Cost estimates of planned projects (not yet programmed) on the horizon are the focal point of this section. Involved agencies are given for each project description. The expansion of the SunGuide service patrols is an example of the projects listed in this section. Funding to support these projects is anticipated once the scope is formally developed.

A closed circuit television system (CCTV) at Pro-Player Stadium is planned in response to large traffic congestion before and after special events. The plan is to monitor critical sections via television and respond to situations appropriately. Currently, police officer feedback has been used to monitor traffic at the stadium. This has proven to be inefficient and an inaccurate way of retrieving data leading to the conclusion CCTV is necessary.

Photo 8: **The reversible lane system used at Pro Player Stadium on NW 199th Street alleviates congestion for special events.**

6.4 Not Currently Planned, but Needed Projects

This category is the most informal of all the project listings. Many of these are not much more than a "wish list" of particular agencies. Projects in their infant stages are being developed hoping to gain support in the future. Not many, if any, feasibility studies have been conducted regarding these proposed projects. That is not to understate the importance of the particular project, but to first gain attention of people not aware of the topic at hand. These projects are listed in Appendix A.

7.0 Financial Plan for ITS Deployment

According to a September 1998 survey of MPOs conducted by the Association of Metropolitan Planning Organizations, the vast majority of respondents (71 percent) indicated that less than 5 percent of the funds in their Transportation Improvement Plans are allocated to ITS projects. The FY 1999-2003 Miami-Dade MPO's TIP that was approved in May 1998, has 1.3 percent (just over $40 million) of the total budget allocated to ITS. This allocation is highlighted under a separate funding category (not imbedded) within the TIP.

In October 1998, the Miami-Dade MPO recommended another $2 million per year for a three-year cycle as an MPO priority project for the upcoming FDOT District 6 work program to fund the Regional ATIS. The Turnpike District is also committing another $500,000 per year for three years to the South Florida Regional ATIS project. Also, in May 1999 MDX approved a five-year work program to support ATIS for $500,000 per year.

From a federal perspective, the FY 98-99 appropriation for ITS under TEA-21 establishes $95 million for research, development and other related activities; and another $105 million for deploying 67 ITS earmark programs. Only two of these earmarks are for Florida, with one of the two coming to the Miami-Dade County Expressway Authority ($1 million) to facilitate integration of the National ITS Architecture. The $200 million total for ITS is less than ½ percent of the total FY 98-99 U.S. DOT appropriation. Most importantly, TEA-21 indicates that other Federal-aid highway and transit funds can and should be utilized to implement ITS strategies. Additionally, it is obvious that the level of federal support is diminishing because the guaranteed level of federal funding under TEA-21 will now be tied into the amount of revenue entering the Highway Trust Fund. It will be imperative now more than ever before to identify and pursue non-federal funding sources.

7.1 Current Funding Sources

According to the previously mentioned September 1998 AMPO survey, the most common funding sources for ITS projects among MPOs are Congestion Mitigation/Air Quality (CMAQ) funds and Surface Transportation Program (STP) funds. Some local agencies have used state and local general transportation funds for ITS projects. A few Florida transit agencies have used state and local transit funding for APTS projects. Only a few local agencies are using local or private funds for ITS, due primarily to the regional nature of ITS. TEA-21 now

allows state and local jurisdictions to use federal-aid funds to support the capital, operations, and maintenance/management costs of ITS highway and transit projects.

7.2 Anticipated New Funding Opportunities

TEA-21 contains many new funding sources for ITS deployment projects. The $8.1 billion CMAQ program has the most flexibility. The State Planning and Research (SPR) program, a two-percent set-aside of state funds, is available to spend up to 25 percent each on technology transfer and innovative research and development. Other multi-billion federal programs under TEA-21 for which ITS is eligible include the National Highway System, mass transit, safety, and innovative financing opportunities such as the State Infrastructure Bank program. ITS America has hosted several *"Show Me How to Get the Money"* seminars on this topic. However, initiatives to access these federal funds must come from the state and local level where successful mainstreaming of ITS throughout the planning and decision-making process must be demonstrated.

7.3 Role for Public-Private Partnerships

It is becoming critically important for the public sector to market and sell ITS programs to the private sector. Federal funding for ITS is available but very competitive, and local or state funding (at least at the present time) is fairly limited. Two examples exist in Miami-Dade County where public-private partnerships are emerging. First, Miami-Dade County Public Works is pursuing a Request for Interest (RFI) regarding a shared resource agreement with a private wireline communications system provider. The Federal Telecommunications Act of 1996 created this opportunity between local or state government and the private sector. This potential arrangement would allow private access to public roadway rights-of-way in exchange for dedicated optical fiber strands for county usage for its ATMS communications backbone network for the transmission of real-time video and data. Current Miami-Dade ITD expansion plans for fiber and ATMS project funding would otherwise not provide the necessary fiber network needs for the ATMS project.

Second, an Invitation to Negotiate (ITN) is soon to be advertised for the South Florida Regional ATIS. Under this procurement process, the first of its kind for South Florida, qualified vendors can be brought together to determine the best level of complex and innovative services (regarding traveler information). As needed, the ITN process would allow negotiation to reduce price or services to

match available contract funds, or increase price to meet a higher level of service to the public. The successful contractor must present a business plan identifying the costs, operational and administrative responsibilities, and partnership opportunities. Strategies to enhance the ability for the potential partnership to overcome expected legal, technical or institutional hurdles is also being welcomed during the ITN procurement process.

8.0 ITS Performance Measures

It is difficult to estimate the benefits of an ITS project that has not yet been deployed. A proactive means of performance evaluation on a regular basis will help determine the success of satisfying the goals (or themes) for ITS deployment previously identified in Section 3.2.

FHWA has been encouraging local government efforts toward a means of quantifying the benefits of ITS deployment. Benefits like reducing anxiety of drivers is difficult to quantify. Traditionally, benefits have been solely measured in terms of reducing crashes, increasing throughput or capacity, and reducing delays, travel times, and travel time variability. These same variables can be quantified following ITS deployment, but other intangibles need to be identified, as well as additional quantifiable factors. ITS deployment improves transportation operations and management. The traveler has to be able to realize or perceive that transportation services are improving with ITS deployment. Therefore, user forums and surveys will most likely become part of ITS performance monitoring.

8.1 Countywide Operational Goals

Before Miami-Dade County begins to deploy ITS regionally, it is important to have clear goals defined. ITS applications have proven greater success when overcoming a specific problem directly. This was described earlier in more detail in Section 3.0 – **Local Transportation Needs vs. ITS User Services,** but isolated projects alone will not improve an entire transportation network.

A recent nationwide survey estimated the *potential of basic ITS deployment* in the 297 largest metropolitan areas showed a value of benefits between $227 billion to $265 billion for the period between 1996 to 2015.[15] Currently the majority of basic infrastructure benefits have come in the form of travel and transportation management deployments. These are deployments such as traffic signal control, incident management, and ramp metering, among others.

[15] Apogee Research, Inc., ITS *National Investment and Market Analysis: Estimation of Benefits,* May 1997

Table 8
Areawide Distribution of ITS Infrastructure Benefits

Benefit Measure	% of Total
Accident savings	42
Time savings	41
Emissions/energy	6
Operating cost savings	6
Agency cost savings	5
Induced consumer surplus	<1

Source: Apogee Research, 1997

From Table 8, it is evident that the greater benefits are gained from reduced accidents and travel timesaving. But, this conclusion is somewhat skewed because much of the time lost in travel is due to congestion from accidents. So to a degree the two compliment each other. Therefore, it is important not to underestimate the benefits, reduced energy consumption and operating and agency cost savings from this chart.

It will be difficult to determine how much progress is directly attributable to ITS. Despite this difficulty it is important to measure and keep track of certain statistics (e.g. transit oriented themes, such as):

- Average number of passengers/ridership on various routes;
- Percent of mode transfers to transit;
- Average vehicle occupancy along the routes;
- Number of complaints stemming from vehicles not being on time;
- Park and ride lot usage; and
- Average daily traffic along the routes.

Analyzing statistical trends on transit routes that have installed ITS and comparing them to routes that have not installed ITS may be one way to track the success of any ITS improvements. However, growth in transit and automobile usage along a given route is influenced by many factors other than ITS--particularly housing and employment growth and density.

Despite the above difficulties it is important to measure and keep statistics on transit usage. This allows Miami-Dade Transit Agency (MDTA) and the Tri-County Commuter Rail Authority (Tri-Rail) to set goals and measure progress towards these goals. Two goals that this Plan would like to encourage for those routes are as follows:

- An increase in systemwide transit ridership of 15% over the next 3 years

- A systemwide decrease of 30 percent in the number of complaints from riders over the next 3 years.

AVL will increase MDTA's ability to track the location and corresponding arrival time of transit vehicles at specific stops. This, in turn, should improve scheduling abilities and improve "on-time performance."

Determining the exact impact of ITS on tourism will be difficult. Nevertheless, since detailed tourism figures are recorded and many tourists are surveyed it may be possible to determine if ITS is making an impact. The main source of information will be the Office of Tourist Research (in the Florida Department of Commerce). This office performs thousands of surveys on tourists every year and may have the capability to ask questions related to transportation and ITS. If this were the case, it would be possible to assess the general perception of visitors traveling in the greater Miami area over time and determining if the use of ITS (e.g. in-vehicle navigation, travel information kiosks, traffic information on hotel/cable TV, etc.) is making a positive impact on their travels.

Other ITS performance measure targets in Miami-Dade County could include:

- Significant reductions in queuing at all toll plazas that switch to ETC. This reduction will be dependant upon current toll plaza configurations and the ETC configuration chosen. Generally, a goal of **33% ETC usage** during rush hours within the first couple of years of use is obtainable. This can lead to a second goal of a **drop in average waiting time of at least 25%.**

- At least a **30% reduction in the total recovery time** between when an incident occurs and when the incident is entirely removed from the roadway. This will translate directly into saving travelers thousands of hours in congestion due to incidents. This clearance time can be recorded by the freeway incident management team and tracked over time. This goal will be realized in stages, as more real time information is available, but **should occur within 5 years**.

- A reduction in the overall traffic congestion in the county. This can be measured using vehicle travel times on various key roadways in the county. Although dependant on the current congestion of the road, growth and development along the road, and the ITS installed along the route (to name a few), it is critical to obtain these average travel times. This will be one of the best ways to measure the impact of ITS in an area. **A minimum of a 5% travel speed increase within 3 years of an ITS improvement on a specific roadway should be set as a goal.**

The goals outlined above are realistic and should be measured accurately and objectively over time. Reaching these performance measure targets and proving ITS has improved travel in the county is the key to future funding for ITS projects. It also helps the MPO become more accountable to the citizens as citizens can see, using hard numbers, exactly how their tax dollars are improving transportation.

8.2 Planning Success Indicators

Currently, the Oak Ridge National Laboratory is modeling ITS benefits in Tucson, Arizona with a program called IDAS (ITS Deployment Analysis System). It is a post-processor that uses existing outputs of existing transportation modeling processes as inputs, such as travel times, transportation networks, and zone-to-zone trip tables. The goal is to model ITS monetary and operational benefits before full-scale ITS deployment. Benefits will be measured quantitatively *before* deployment of ITS projects. After the Oak Ridge National Laboratory completes IDAS testing in Tucson, they are scheduled to test IDAS in Miami, Florida, Oakland, California and Chicago, Illinois during the summer of 1999.[16], [17]

In January 1999, Federal Highway Administration's Office of Traffic Management and ITS Applications offered a new analysis tool known as SCRITS (SCReening Analysis for ITS). SCRITS was developed in response to the need for simplified estimates in the early stages of ITS-related project planning and benefits evaluation. Not intended for detailed analysis, SCRITS is a computerized spreadsheet for sketch-level estimating of user benefits for ITS. This spreadsheet and user's guide can be downloaded from http://www.ota.fhwa.dot.gov/steam/scrits.htm.

8.3 Monitoring and Reporting Responsibilities

In order to gauge current monitoring and reporting activities across the country, a survey of twenty-three state DOTs and other ITS agencies around the country.[18] The high majority of agencies were responsible for:

[16] Russell Lee, Oak Ridge National Laboratory.
[17] Inside ITS, "MPOs Test Prototype of ITS Cost/Benefits Modeling Software," March 8, 1999.

- *ITS planning and programming*
- *ITS design and specification*
- *ITS procurement (contracting agency or authority)*
- *ITS operations (with agency or contract persons)*
- *ITS maintenance (with agency or contract operators)*

The level of involvement varies considerably and is one of the first topics that needs to be addressed for Miami-Dade County. ITS Strategic Plans are relatively new with the Northeast U.S. I-95 Corridor Strategic Plan adopted in 1994 followed by the 1998 Business Plan. Many plans are updated annually or every few years. The wide majority of these agencies around the country report that the DOTs lead the regional planning and programming. In Florida planning has proven to be a cooperative effort between the MPOs and FDOT. This is something somewhat unique for many Florida cities.

As far as monitoring ITS performance (e.g., delay, LOS, travel time, transit on-time performance) on a routine basis, results have shown to be inconsistent. Many agencies do not even monitor their equipment. Only three agencies (Washington State DOT, Caltrans, and the Houston Priority Corridor) responded as conducting performance monitoring. Performance has been monitored in the way of loops to determine speed and travel time, toll tag readers to monitor speed, or using different equipment at site specific locations. This is one area where Florida DOT has not made a formal process for monitoring ITS performance, but is left to individual DOT districts for individual projects. Miami-Dade County needs to monitor effectiveness on a routine basis. From the national survey, nearly every agency has been using both federal and state funds of various sources to fund ITS activities because local funds are focused on initial implementation.

If the goal is to obtain federal funding, the recommendation is to set up a long-term and consistent performance measurement of ITS since TEA-21 legislation recommends performance monitoring of the transportation system.

[18] PB Farradyne, Inc., *Final Survey Report* Florida Statewide ITS Plan, November 1998.

9.0 Public Information/Education Campaign

The previous ITS Plan for Miami-Dade County recommended several policy measures in order to involve and educate the public. First, public agencies need to develop a coordinated effort for public involvement and education. Second, methods for disseminating information must be flexible and selective since there is little understanding and appreciation of ITS among community groups, associations, and the public agencies. Third, the multidisciplinary aspects of the subject should be advantageously used to cross technical and social boundaries.

In 1997, the firm of David Fierro & Associates was contracted through the FDOT District 6 office to develop a three-year plan of public education and marketing of ITS in Miami-Dade, Broward, and Palm Beach counties. This public relations effort is serving as the focal point for increasing regional awareness of ITS. The Intelligent Transportation Systems program in the 3-county south Florida area is now known simply as *SunGuide.*

9.1 Program Objectives

The primary objective of the *SunGuide* public relations plan is to educate stakeholders, media, elected officials, and the traveling public about ITS in order to encourage its growth. The plan will evolve as a phased approach, following the development and deployment of ITS projects in South Florida. As awareness increases and ITS project milestones are achieved, the plan will expand and adapt accordingly.

The plan outlines an overall communications approach that includes elements of education, publicity, public involvement, and marketing. The objective of educational outreach is to educate the traveling public, other municipalities, agencies, and corporations about the benefits and efficiencies gained with the *SunGuide* program. Publicity will include such activities as development of stock photos and video of ITS technologies, ITS tabletop displays, creation of special videos and publications, preparing press kits for key media, and conducting special media events when major ITS project milestones are achieved. FDOT recently registered the Internet site name of SUNGUIDE.ORG. This web page will grow into a reliable central information source on SunGuide projects and activities.

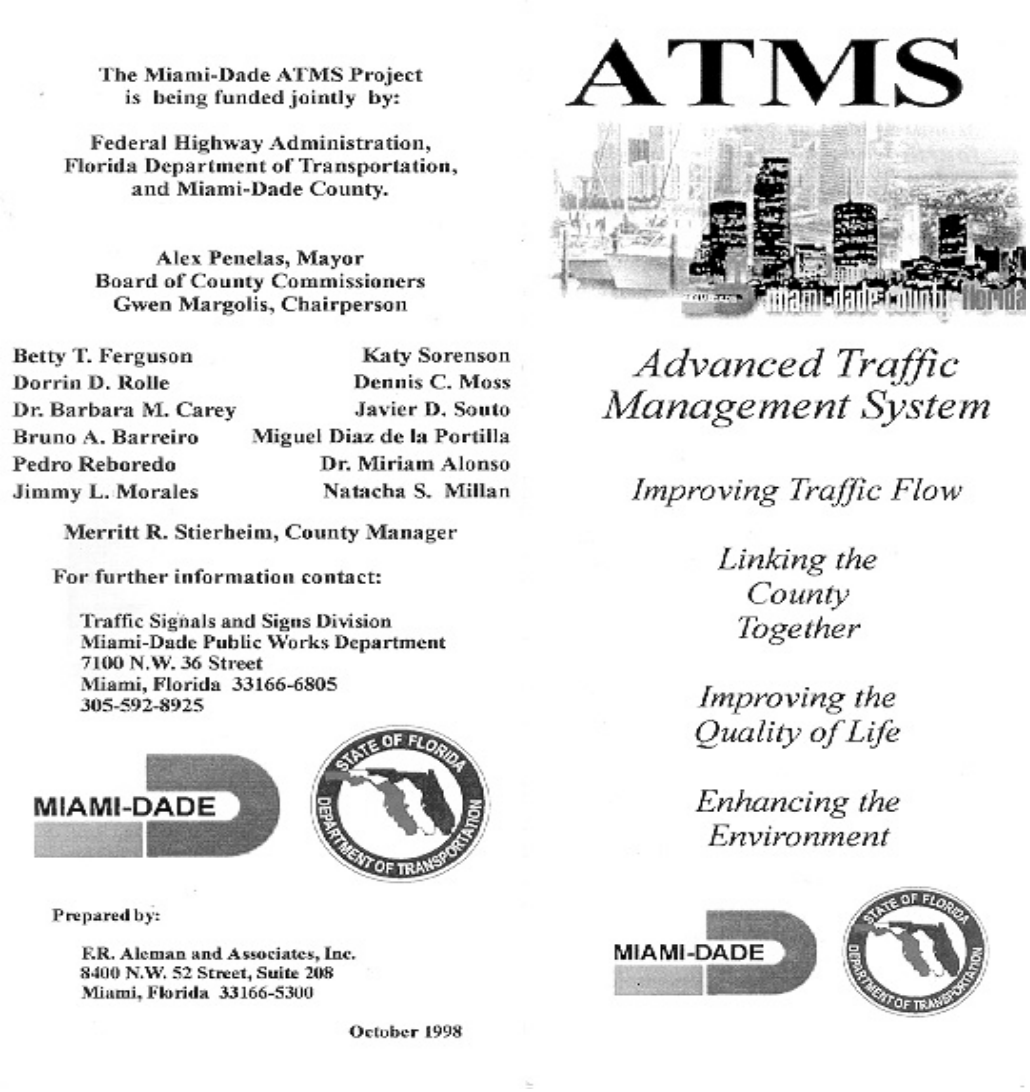
Public involvement will include a series of public workshops on current projects (e.g., ramp metering) and a series of presentations to community and civic

associations. Marketing information on *SunGuide* will be distributed to FDOT/MPO employees (brochures with paychecks), young drivers (driver education curriculums), and tourists (car rental agencies, hotels, and various visitor information centers). Market research tools will be recommended at the end of each phase to assess the growth in ITS awareness, and determine the most appropriate future public relations measures.

9.2 Past, Current, and Future Activities

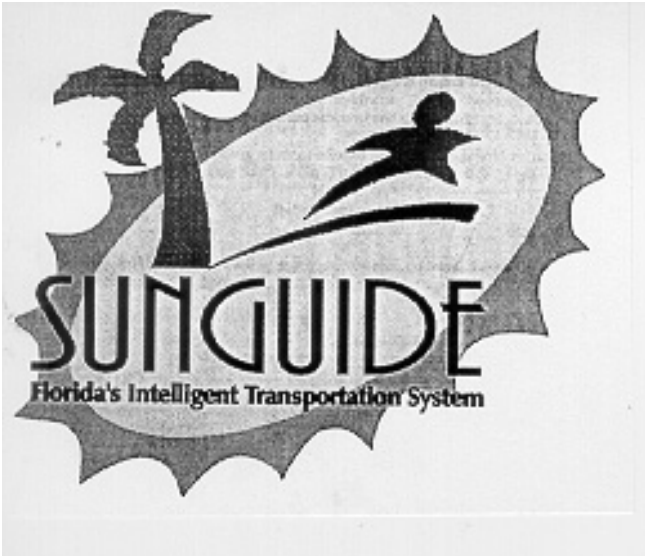
Over the last three years, the Miami-Dade MPO has continued facilitating the growth of the local ITS Standing Committee. The Committee, consisting of approximately 33 individual members (representing 21 organizations involved with or interested in transportation) generally has continued to meet on a monthly basis to discuss and update Committee members on ITS progress primarily in Miami-Dade County. Over the last year, however, the Committee agenda has gradually shifted to also include discussion of regional issues and needs beyond the boundaries of Miami-Dade County (e.g., South Florida Advanced Traveler Information System and the *SunGuide* public relations program). During 1998, the *SunGuide* identity for South Florida ITS was created. This “umbrella” image, shown in figure 7, has established the regional ITS identity of common purpose. Also, one of the most active ITS projects in the area, the Miami-Dade Advanced Traffic Management System, developed a project awareness brochure (front and back cover identified on the following page in figure 6) that has been distributed throughout the area to gain awareness of this very important project.

Figure 6: **Cover of ATMS Brochure**



This year the *SunGuide* public relations effort includes an ITS video (locally produced) for use in educating the public on ITS initiatives in South Florida. The video content will be similar to a general ITS brochure being developed for elected officials, business groups, and chambers of commerce aimed at educating the public on ITS initiatives in south Florida. Also, public awareness campaigns for the existing SunGuide service patrols and future Interstate 95 ramp metering are expected to kick off this year.

Figure 7: **New SunGuide Logo**



The future *SunGuide* public relations efforts will be geared toward a broadening of the ITS audience in South Florida through directed messages to more specific constituency groups such as the elderly, tourists, and the Spanish speaking population. Success in expanding awareness and education in ITS will be measured on true areawide recognition of the *SunGuide* regional identity to all pubic agencies involved with transportation, decision-makers, the media, and the traveling public. Other barometers of public relations success in ITS will be the successful deployment of the South Florida Advanced Traveler Information System, and positive media coverage of the emerging *SunGuide* program.

10.0 Conclusions and Recommendations

ITS projects must be integrated into a single transportation system, in order to maximize the potential benefits of ITS. The Miami-Dade ITS Standing Committee must now work to define a suitable regional ITS architecture for the tri-county area that will provide for full integration of the “enabling” projects previously mentioned, and allow for other ITS enhancements, as needed, to be efficiently incorporated into the regional transportation operations and management plan.

For the current ITS Standing Committee to assume the leading role in development of an ITS architecture, it must shift its focus to elements of regional significance and re-structure its membership to include more of the regional stakeholders in ITS. Initial steps toward defining a regional ITS architecture can be made by following the guidance illustrated in Section 4.0 of this ITS Plan Update.

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Appendix A:

Project Details for Enabling and Enhancement ITS Projects

SunGuide – The new identity to South Florida's umbrella ITS program and activities. An array of cameras, road sensors, and remote controlled message boards easing congestion across the tri-county area, beginning with I-95. The other ITS projects will be considered to fall under the SunGuide program.

SunGuide Description

Lead Agency	Agency's Role	Costs	Phases and Description (as of July 1999)
FDOT 6	Coordinate	$13.1 mil. $5-10k per workstation	I – 95 *Phase A* –34.8km total long fiber optic trunk, 44.4km of electrical conduit, Servers and hardware procured, 4 VMSs, 2 communication hubs, 27 CCTV cameras, 13 detector stations, detectors every 1/3 mile. An Interim Operations Center (IOC) in Room 6203 of FDOT District 6 holds the SunGuide Manager system software until SunGuide Control Center (South) built in FY 2001/02. *Phase B* – Deployment of Phase "A" and construction funding for Phase "C" (SunGuide Control Center) available in 2001-2002. Remaining Field Installations: 9 freeway and 9 arterial VMSs, 53 detector stations with 22 ramp metering sites, 200 loop assemblies, 22 emergency stop sites, total of 3-mile fiber line extensions, 28 trailblazer signs. *Phase C* – SunGuide Control Center (South)
Participating Agencies			
FHP	Operation		
Broward MPO	Planning		
FDOT 4	Operation		
FDOT Turnpike	Operation		
MDX	Operation		
Miami-Dade MPO	Planning		
Palm Beach MPO	Planning		
Tri-Rail	Operation		

Southeast Florida Regional Traveler Information Services –

The SunGuide partners and FDOT are working towards a real-time traveler and transportation information to the tri-county area. This information will be provided using both new and existing infrastructure. This includes traffic control devices, CCTV cameras, fiber optic cable, VMSs, and vehicle detection devices. Users will be able to get the latest travel information for the roadway, rail, transit, airport, and seaport modes as it occurs via almost all forms of communication, i.e. World Wide Web, cellular and landline telephones, pagers, television, printed media, in-vehicle navigation systems, radios, and kiosks. This new multi-modal information provider will share a common computer screen to ease input from all

agencies. The first project is along 17.26 miles of I-95 between US-1/State Road 5 to the Broward County Line at a cost of $11.65 million through 2003.

Southeast Florida Regional Traveler Information Services

Lead Agency	Agency's Role	Private Sector	Phases and Descriptions
FDOT 6	Coordinate		*Phase 1* – From 11/1/99 through 3/30/00 delivery between 5:00 am to 12:00 midnight of real-time ATIS information on highway and rail.
Participating Agencies			*Phase 2* - Beginning 4/1/00 through 11/1/00 24-hour services on highway, rail, aviation and seaport.
MDX	ETC on their facilities		NavTech is mapping entire area for use with in-vehicle navigation devices for new and rental automobiles.
FDOT Districts 4 and 7	Coordination and technical scope		
Broward, Miami-Dade, and Palm Beach MPO	Legal and procurement management review		
Broward, Miami-Dade and Palm Beach Traffic Operations	Technical input and management		
Airports and Seaports of Broward, Miami-Dade and Palm Beach County	Information providers		

Miami-Dade County Advanced Traffic Management System – The current hub of the Miami-Dade County ATMS is the Traffic Control System (TCS), which was designed and built at 7100 NW 36th Street in Miami in 1974. Its 5,000 square feet include a system control room, engineering offices, power and back-up power supply rooms, and a communications room. A professional staff is employed to operate the TCS that includes the Traffic System Manager, Assistant System Manager, Computer Programmer, five Signal Operation Engineers, and four Computer Operators. A maintenance crew consisting of one foreman and four technicians maintains the system interface equipment in the

local control-cabinets, the communication modems, and the central hardware excluding computers and their peripheral equipment.

The Interim ATMS is intended to connect roughly half of the current signal system, instead of connecting the entire system at the outset. Eight million is set aside for field and hardware upgrades, while the $2 million CMAQ funding will setup the ModComp 9250 computer.

Tentatively ITD will be the provider for the 1000-mile long fiber optic network. The Interim ATMS proposed a system with new CPUs, a PC based Local Area Network (LAN), Geographical Information System (GIS) map interface, and Uninterrupted Power Supply (UPS) units.

Miami-Dade County Advanced Traffic Management System

Lead Agency	Agency's Role	Phases and Description
Miami-Dade County Public Works	Technical scope and management	Phase 1 – Design, construction, and alpha testing Phase 2 – Coordination of 500 traffic signals Phase 3 – Coordination of 1000 traffic signals Phase 4 – Coordination of 1000 traffic signals
Other Agencies ITD	Communications operator (tentatively)	**Interim ATMS** - $2 million and about two years to complete - Purchase ModComp 9250 computer for TCS as primary system computer with UTCS software - Replace operation console and upgrade all system interfaces for staff with new hardware and windows based operating systems - Transfer system databases to interim system - Modify UTCS into a 32-bit operating system and re-dimension database to monitor and control 4080 signals - Purchase UTCS field system modules to replace failing ones
FDOT 6	Coordinate -only with new intelligent controller board	**Ultimate ATMS** - Time frame depends on available funding - Assure Interim ATMS development is adaptable - Continue pursuing private sector partnering services for design and construction of fiber optic communications - Refurbish NW 199th St. Reversible Lane Control System - Replace pre-NEMA and old NEMA traffic control cabinets with D170E or 2070 control cabinets

SunPass and Miami-Dade (Causeway Pass) Electronic Toll Collection

- An ETC system can handle up to 1,800 vehicles per hour, 300 percent more than conventional manual toll lanes. This system will greatly reduce the traffic queuing at the tollbooths along the Turnpike and highways operated by MDX in Miami-Dade County. The operating frequency is at 915 MHz.

Motorists can purchase a toll tag reader for $25 and an opening minimum balance of $25. The first 2000 subscribers to MDX receive a $5 rebate. This all comes with a 45-day money back guarantee. For more information one can contact the SunPass Customer Service Center at 1–888-TOLL-FLA.

Miami-Dade County Expressway Authority

The Miami-Dade County Expressway Authority is a self-sufficient agency whose funding comes from the toll revenues. They receive no federal funding. Their responsibilities are to coordinate, maintain, and operate all the non-FDOT ETC systems in the region. An initial $1 million grant from the FHWA was provided to construct ETC on SR 836. The Automatic Vehicle Identification (AVI) subsystem which reads the identity of passing vehicles equipped with transponders through a special antenna will be installed in the lane. Currently, the SR 836-toll plaza handles 120,000 vehicles per day. This exclusive AVI lane would have allowed motorists to maintain regular highway speeds while paying the electronic toll. The design included a ten-foot shoulder on each side and separated by a barrier wall one-half mile before the toll plaza. However, due to the concern of queuing by removing toll lanes from manual and automatic use, MDX has now decided to mix SunPass in to these lanes initially.

Beginning in mid-1999 the Expressway Authority will increase tolls on SRs 836, 112, 924, and 874 from 25 cents up to 50 cents. This is expected to raise between $10 million to $15 million in annual revenue which will be used for future construction and improvements these roads. Also, this new revenue may go toward some possible projects like the Central Parkway and a possible four-lane tunnel through downtown toward the Port of Miami.[19]

The Expressway Authority is contracting out the responsibilities for the toll operations and maintenance. FDOT District 6 receives all the toll plaza data that is gathered.

[19] Bruce Taylor Seeman Miami Herald, "Expressway tolls will double," Feb 24, 1999.

These ETC systems will, of course, pay strict attention to the privacy principles set out by ITS America. These principles include recognizing and respecting the individuals interest in privacy, being visible to the public, only collecting the data necessary, ensuring the data is secure and protected, and balancing all these with the legislation set out in the freedom of information act.

SunPass and Miami-Dade Electronic Toll Collection

Leading Agencies	Agency's Role	Description
FDOT Turnpike	Implementation of ETC on Florida's Turnpike	$8.5 million in SunPass equipment in Miami-Dade County Supply fiber optic communication
Miami-Dade County Expressway Authority	Coordinate, maintain, and operate ETC on non-FDOT highways	SunPass installation on SR 836, 924, 112, and 874 by July 1999 Eventual SunPass installation on SR 869
Other Agencies		
FDOT District 6	Receives all toll plaza data that is gathered	

Rickenbacker and Venetian Causeways

The ETC systems on the two causeways contain the listed hardware:

- Central computer equipment in the Rickenbacker Toll Plaza Administration Building,
- Computer equipment at Venetian plaza, equipment in toll lanes
- Equipment at Government Center for remote control
- A communication infrastructure of fiber optic data lines and conventional phone lines linking elements.

The entire system is monitored with surveillance via video cameras located in each lane comprising a video enforcement system (VES). Violators are automatically issued citations as the system is networked to the Florida Department of Highway Safety and Motor Vehicles (FDHSMV). This department controls the database on drivers' license and tag information.

Within the 14 lanes, conventional attendant operations, unmanned Automatic Coin Machines, Causeway Cards, or a Causeway Pass may collect tolls. When a transponder-equipped vehicle is automatically detected as it approaches a toll plaza, the appropriate toll transaction charge is debited against the user account. Cards are issued to vehicle fleets such as county vehicles that will use swipe card readers in the lanes to debit accounts. Since lanes can have one or several different configurations, Variable Message Signage is provided above each lane to direct patrons to the proper lane of payment. Toll charge is based on the number axles detected by the vehicle preclassification system.

Lane controller software contains interfaces for the Causeway Pass (AVI) system, the preclassification system, the Video Enforcement System, the automatic coin machines and variable message signs. Toll collectors interact with the system through the lane controller using a touch screen terminal in booths. The screen is used to initiate a work shift (log on), input the method of payment (cash, card, pass, or account replenishment), to issue receipts, to print directions for motorists, to alert the system of unusual occurrences and trigger a VES event (insufficient funds, emergency vehicles, U-turns, etc.). Interfaces to the lane controller are also provided to control the card readers, receipt printers, patron fare display, traffic control gate and traffic signal/violation alarm.

Miami-Dade Transit Agency Vehicle Location System - The AVL described in Section 5.5 system will have the ability to help the transit management through:

- computerization, automation and enhancement of transit operations and maintenance
- improved intermodal switching
- improved response to delays
- Excellent records for improving maintenance scheduling.

This system is beneficial to the transit rider because now the user has access to real-time transit and traffic information on vehicles and at terminals. This helps assist planning and modifying trip plans after they have already begun. With real time information on transit, the service can become more accommodating for people who currently use their private automobile. The service can improve vehicle arrival times, especially in between modes, becoming more accessible for longer transit trips.

This system has the ability to track a vehicle within a 50-ft accuracy. MDTA will be able to integrate the system between rail, people vehicle, and buses. The CAD-AVL will also be equipped with voice recognition for scheduling and time until the next stop. This is an ADA requirement for new buses, buses that cost $300,000 each. There is no capability to count the boarding at specific stops.

MDTA Vehicle Location System

Lead Agency	Agency's Role	Phases and Descriptions
MDTA	Coordination and Implementation	$16 million for system design, Automated Data Processing (ADP) equipment and software, communication lines, CCTV, miscellaneous equipment and Rail/Mover Central Control System 1999 – CAD-AVL system fully operational 2004 – Two-thirds of bus fleet retrofitted with CAD-AVL system 2002 – Install 3 kiosks for MIA, Dadeland South, and Government Center

Fiber-Optics Communication Network (ITD) - For the high-speed data communication described in Section 5.6 Time Division Multiplexing (TDM) network architecture was implemented. TDM is a communications protocol that allows several different messages to be integrated into a single light waveform or light impulse. Running along the MetroRail lines, this network connected the ITD, MDC, and Justice Buildings. Four of the sixteen strands were used to connect the TDM point-to-point network equipment to support the ITD, MDC, and Justice Buildings. Savings from this network implementation amounts to about $200,000 per year in recurrent charges to the local telecommunication provider, BellSouth.

The TDM technology currently supports communications for a remote host terminal access, voice response unit (VRU) interfaces, private branch exchange (PBX) switch tie-line interconnection, voice mail, office automation services,

mainframe channel extensions, Geographical Information System (GIS) applications, LAN to LAN bridging, and a link between the 800Mhz radio system.

Also, the fiber network from Section 5.6 contains nine (9) nodes at these County government locations:

- ITD Headquarters at 5680 S.W. 87 Avenue
- Miami-Dade Police Department Headquarters at 9105 N.W. 25 Street
- DPW S&S Division at 7100 N.W. 36 Street
- TGK Correctional Facility at 7051 N.W. 41 Street
- MDTA's MetroRail Maintenance Yard at 6601 N.W. 72 Avenue
- MDTA's Bus Maintenance Year at 3300 N.W. 32 Avenue
- Aviation Department at Miami International Airport
- SPCC Downtown Government Center at 111 N.W. 1 Street
- Civic Center at 1351 N.W. 12 Street

Fiber-Optics Communication Network (ITD)

Lead Agency	**Agency's Role**	**Private Sector & Description**
ITD	Coordination and Development	Intermedia Communications of Florida, Inc. (ICI) – Used existing County street conduits to lay fiber-optic network. In planned network County receives 12 strands in exchange for free right-of-way BellSouth – currently leases circuits to Miami-Dade County
Participating Agencies		
MDTA	Coordinate with ICI	
Miami-Dade Public Works	Coordinate with ICI	

ITS Project Enhancement Descriptions
(From Section 6)

The Service Patrol operation described in Section 6 is monitored at the Golden Glades Interchange Control Center. The purpose is to help stranded automobiles with a tow truck carrying gasoline, car jacks, tire irons, cell phones and jumper cables. This service is provided free of charge to motorists. Also, their responsibilities are to help remove roadway debris, make minor auto repairs, and assist the Florida Highway Patrol during large incidents and

emergencies. Non-recurring incidents such as auto crashes are responsible for 50 to 70 percent of the delays motorists encounter. Incident response crews helps clear the roadway and restore traffic flow 10 to 45 percent faster by detecting and responding to a variety of incidents.

The roving trucks are equipped with AVL system to allow tracking of the truck positions as they travel their beat. The control center operators get a dedicated communication links to the truck operators through the system computer. Also, the truck operators get a panic button to seek necessary assistance. Having the patrols managed from the GGI Control Center assures operational compatibility for the service, thus providing infrastructure savings and lower operating costs. This information can be eventually used to estimate average travel speed, but still more work needs to be done to transform AVL database to ASCII format.

Project Description	Involved Agencies	Cost (millions)
CCTV expansion project at the Golden Glades Interchange	DOT 6	NA
Service Patrols	DOT 6, MDEA	NA
Gateway-Automatic customs And tariff clearance	FDOT 6, Port of Miami	3
I-595 Variable Message Signs 22 total between I-75 and US 1	FDOT 4	NA
Broward County ATMS Master Plan	BCPW, FDOT 4	NA

Planned and Programmed Projects

Project Description	Involved Agency	Cost ($ millions)	Funding	Phase
TIP 3 year Federal funding				
MIC Access Improvement	MPO, DOT 6, MIA MDTA, MDPW	5.273	ACXU	PE, CST
ITS Information System I-95/SR 9A	FDOT 6, MDX	1.239	NH	PE
Park and Ride Multimodal Center I-95/ Golden Glades	FDOT 6	0.646	NH	PE
ITS Information System I-75/SR 93	FDOT 6	0.908	NH	PE
Miami-Dade County Corridor Modal Systems Planning	NA	0.3	XU	PE
TIP 5 Year Project Listing				
Miami Intermodal Center (MIC)	MPO, DOT 6, MIA MDTA, MDPW	71.0	DIH, ACXU DDR, DIRS	PE, ROW CST
ITS Information System I-95/SR 9A	DOT 6, MDX	12.12	NH	CST
Miami-Dade County Park and Ride Multimodal Terminal I-95/Golden Glades	DOT 6	7.159	NH, ACNH	CST
Miami-Dade Corridor Modal Systems Planning	NA	0.5	XU	PE
Expand Park and Ride Lots	MDTA	1.7	DS, FTA	MSC
Miami-Dade East-West Corridor Environmental Impact Statement and preliminary engineering for local preferred alternative (LPA)	MDTA	6.4		PE
%11.8 mile fixed heavy rail guideway from SR 826 to Port of Miami				
%Multi-mode improvements on SR 836				

Project Description	Involved Agency	Cost ($ millions)	Funding	Phase
Miami North Corridor project % EIS for 9.5 miles of fixed guideway % Existing Metrorail line on NW 27th Ave to NW 215th Street	MDTA	5.9		PE
Purchase of new buses % 18 40-foot replacement buses	MDTA	4.8		
SunPass Installation on: % Westbound 836 (one) % Southbound 874 (one ramp plaza)	MDX	5.0	Toll revenue	PE
I-95 Ramp Metering % Begin with ramps in downtown Miami	FDOT 6	$40,000/ramp		PE
Highway Advisory Radio (HAR) % Each Turnpike service plaza by July '99 % RFP already issued	Turnpike	NA		
Variable Message Signs % 18 VMSs along Turnpike by mid- 1999 % RFP in development	Turnpike	NA		
Pompano Traffic Operations Center Fifteen year agreement % In design, operation by mid-1999	Turnpike	NA		

Figure 8: **Location of the MIC Core. The Miami Intermodal Center (MIC) will provide rail rapid transit linking together Miami International Airport and the Port of Miami. It will also serve as the central connecting point for Tri-Rail, Metrorail, Amtrak, buses, private autos, bicycles and pedestrians. The MIC will also serve as a baggage claim for certain airlines. Currently initial planning has been approved and design is in progress on highway improvements for S.R 836 (Dolphin Expressway).**[20]

[20] FDOT 6, "Solving Miami-Dade County's East-West Transportation Needs," Vol. 2, No. 1, winter 1999.

Planned Projects

Project Description	Involved Agency	Cost ($000s)	Phase
Service Patrols Expansion (accepted) SRs 826, 836, 112, I-95, I-75	FDOT 6, MDX	12,700	MSC
Technical Consultant SR 826, 836, 874, 112, I-95, I-75	FDOT 6, MDX	3,500	PE
Red Light Camera Enforcement % Project study in Northwest Miami on ten intersections	Miami-Dade MPO, Police, FDOT 6 MDPW	NA	
CCTV at Pro Players Stadium	MDPW	NA	

Funding Source Legend

Code	Name	Source of Funds	Participation(%)
ACNH	Advanced Construction- National Highways	Federal/State	80/20
ACXU	Advanced Construction- Surface Trans. Any Area	Federal/State	80/20
DDR	District Dedicated Revenue	State	100
DIH	State in – House Product Support	State	100
DIRS	Advanced Acquisition of Interstate Corridors	State	100
DS	State Primary – Highways and PTO	State	100
FTA	Federal Transit Administration	Federal	100
NH	Principal Arterials/National Highway	Federal/State	80/20
XU	Surface Transportation Areas >200k	Federal/State	80/20

Work Phase Description Legend

Abbreviation	Phase Description
CST	Construction
MSC	Miscellaneous Grant
PE	Preliminary Engineering
ROW	Right of Way Support

Not Currently Planned Projects

Project Description

- **Ramp Metering on Arterials –** This proposal was informally discussed with the Miami-Dade Public Works (MDPW) on large arterial roadways with unusual traffic flows, like South Dixie Highway (U.S. 1). The feasibility of this concept is currently unknown, and has not been formally endorsed by MDPW. In 1978, South Dixie Highway was a reversible lane facility, but was not well accepted due to a large number of accidents, and then later abandoned.

- **Input by Freight and Truck Committee –** This committee feels the need to provide input into the TIP to improve freight efficiency for truck routes. The involved agencies would be the MPO, Port of Miami, and FDOT District 6. The Freight Movement Study of December 1996 addresses this concern.

- **Downtown Intersection Improvements –** This improvement would also be guided for improved freight movement as well, as discussed in the Freight and Movement Study. The specific intersections listed are:
    - NE 2nd Avenue and NE 5th Street
    - NE 1st Avenue and NE 6th Street
    - Eastbound ramp at I-395 and NE 2nd Avenue

- **Transit Rider Signs -** This recommendation by an interview with MDTA identifies the need for time and arrival information at Park and Ride Lots for possible riders to be notified ahead of time. Currently long unknown wait times for transit vehicles is one of the largest reasons for lower ridership.

Appendix B:

Directory of Local Facility and
Transportation Agency Contacts

Organization	Section	Phone Number
Association of Metropolitan Planning Organizations (AMPO) 1700 K Street, NW Suite 1300 Washington D.C. 20006	Developed in 1994 by the National Association of Regional Councils to serve the needs of MPOs across the United States.	202-457-0710
Broward County MPO 115 S. Andrews Avenue Room 329 Ft. Lauderdale, FL 33301	MPO Administrative Assistant	954-357-6641
ITS America 400 Virginia Ave, S.W. Suite 800 Washington, D.C. 20024-2730 (202) 484-4847	Executive Director	202-484-2904
	Publications	202-484-2909
	Clearinghouse	202-484-4582
	ITS library	202-484-2907
	Legislative affairs	202-484-4589
	State and local government outreach	202-484-4665
	Legal and institutional issues	202-484-2895
	Committee on communications and outreach	202-484-2893
	State Chapter Program	202-484-4669
FHWA (ITS) **Joint Program Office**	Director	202-366-9536
	ATIS/ATMS	202-366-8028
	Technical Program Coordinator	202-366-2199
	Program Assessment	202-366-2202
	Systems Architecture	202-366-8048
	Legal and institutional issues	202-366-9536
	Regulatory and Legislative Coordinator	202-366-2202
FHWA Regional Office 120 Peachtree Road N.W. Suite 200 Atlanta, GA 3036	ITS Engineer	404-347-4075
FHWA Division Office 227 N. Bronough Street Room 2015 Tallahassee, FL 32301	ITS Engineer	850-942-9693

Florida DOT Traffic Engineering Office 605 Suwannee Street, M/S 36 Tallahassee, Florida 32399	State's Strategic ITS Plan Turnpike District's ITS Director District 6 ITS Director District 4 ITS Director	850-414-7619 850-921-0973 305-470-5341 954-777-4353
ITS Florida P.O. Box 116585 Gainesville, FL 32611-6585	Executive Director Membership	352-392-7575 813-974-9815
Miami-Dade County MPO 111 NW 1st Street Suite 910 Miami, FL 33128	ITS Planner	305-376-1886
Miami-Dade County Public Works Traffic Signals and Signs Division		305-592-3680
Palm Beach County MPO 160 Australian Avenue, #201 West Palm Beach, FL 33406	Central office for all MPO activities and responsibilities	561-684-4170
Public Technology Inc.	A program that links local government with ITS	202-626-2465

Appendix C:

Directory of ITS Vendors and Consultants

(Note: This list is far from comprehensive, and is designed to help readers find some initial contacts in the ITS industry)

Technology: Travel and Traffic Info			
Company Name	**Phone Number**	**Address**	**Description**
American Automobile Association (AAA)	407-444-4137	Heathrow, FL	Advanced Driver and Vehicle Advisory Navigation Concept, TravTeck, Kiosks.
Maxwell Laboratories, Inc. S-Cubed Division	619-453-0060	California	Advanced Traveler Information Systems. Maintains a World Wide Web server.
Metro Traffic Control	305-621-6387	Miami, Florida	Provides real-time traffic and transportation information for use in projects and commercial ventures
SmartRoute Systems, INC	617-494-8100	Cambridge, MA	Public and private sector traffic operations centers including digital databases.

Technology: Navigation and Route Planning			
Company Name	**Phone Number**	**Address**	**Description**
Motorola	708-714-7307 305-475-5766	Northbrook, Illinois Plantation, FL	Developed a prototype in-vehicle navigation/route guidance system, GPS and dead reckoning map matching.
Rockwell International Corporation	714-762-8111	Anaheim, California	Rockwell addresses a broad range of transportation electronics markets including mobile communications systems, on-board computers, automatic location systems, automotive electronics, etc.
Siemens ITS America	810-253-1000	Auburn Hills, Michigan	Vehicle Navigation/ Advanced Traveler Information System (ATIS), Advanced traffic management system (ATMS).
Zexel USA Corporation	810-553-9930	Farmington Hills, MI	In-vehicle navigation technology software and algorithms, electronic and computer architecture including position sensors.

Technology: Map Data			
Company Name	**Phone Number**	**Address**	**Description**
Etak Inc.	415-328-3148	Menlo Park, California	Map databases for GPS/navigational software
GeoSystems	717-293-7500	Lancaster, Pennsylvania	Core mapping, locating and directional software, automated, cross country travel planning system, custom cartography
Navigation Technologies Corp (NavTech)	408-737-3200	California	Creation of comprehensive, navigable, value-added map databases.

Technology: Vehicle Positioning			
Company Name	**Phone Number**	**Address**	**Description**
ACCQPOINT Communications Corporation	800-982-5861	Irvine, California	Differential Global Positioning System (DGPS), Universal Receiver.
PacTel Teletrac	714-897-0877 305-484-1300	Garden Grove, California Ft. Lauderdale, Florida	Offers a variety of location and data messaging service products, including "MayDay".
Spectra Systems	407-998-3160	Boca Raton, Florida	Supplier of laser-based traffic sensors, GPS/DGPS products.
Technology: Fleet Management			
Company Name	**Phone Number**	**Address**	**Description**
PacTel Teletrac	714-897-0877 305-484-1300	Garden Grove, California Ft. Lauderdale, Florida	Commercial fleet management product for location and two-way data Messaging, automatic roadside assistant, stolen vehicle recovery, nearest yellow pages information.
Auto-Trac, Inc.	214-392-1300	Dallas, Texas	Provides real time fleet tracking and management systems utilizing GPS as a navigational aid.
Marconi Communications Inc.	703-620-0333	Reston, Virginia	Vehicle location and fleet management system, ETC technologies.
Motorola	305-475-5766	Plantation, Florida	AVL, real-time vehicle maintenance monitoring
Technology: Communications			
Company Name	**Phone Number**	**Address**	**Description**
AKL Group, Inc.	1-305-567-0084	Miami, Florida	Communications Consultants
ARN Communications Group	1-305-820-9223	Miami, Florida	Communications Consultants
AT&T Telecommunications	305-232-2730	Miami, Florida	Smart cards, telephone information systems, passenger information displays.
Aptek Communications Products	407-883-4424	Palm Beach, Florida	Personal service communicator, wireless computer terminals.
BellSouth	1-305-820-8800	Miami, Florida	Communications Consultant
GTE International	1-305-470-7511	Miami, Florida	Communications Consultants
Motorola	407-739-3880	Boynton Beach, Florida	Communications products, paging technology, OEM transmitters and receivers, RF data communications, prototype in-vehicle navigation/route

			guidance system.
PacComm Packet Radio Systems, Inc.	813-874-2980	Tampa, Florida	Designs and manufactures packet radio modems and custom systems use in telemetry, GPS tracking, DGPS transmission, point-to-point data links, etc.
Racal-Datacom	305-846-1601	Sunrise, Florida	Fiber backbone system for many communications applications, including highway traffic monitoring.
Telecom Engineering Consultants	1-305-592-4328	Miami, Florida	Communications Consultants
Telecommunications Advisory Service, Inc.	1-305-442-2600	Miami, Florida	Communications Consultants

Technology: Vehicle Control

Company Name	Phone Number	Address	Description
Delco Electronic Corporation	317-451-1921	Kokomo, Indiana	Develops and market Forewarn radar-based object detection systems and side detection systems.
Eaton VORAD Technologies, L.L.C.	619-674-1200	San Diego, California	Eaton VORAD EVT-200 Collision Warning System, adaptive cruise control, automatic breaking
Laser Atlanta Optics, Inc.	404-446-3866	Norcross, Georgia	Provide laser optics system for commercial use, collision avoidance systems, vehicle classification and navigation industries.
PJT Highways Systems, Inc.	407-998-0060	Boca Raton, Florida	Vehicle control systems, roadside-to-vehicle communications, AVL, AVI, AHS.

Technology: ETC Integrators

Company Name	Phone Number	Address	Description
Amtech Systems Corp.	214-733-6600	Dallas, Texas	Intellitag 2000 ETC system, ETTM, congestion pricing, smart cards
Lockheed Martin IMS	305-377-1899	Miami, Florida	ITS systems integrators for a variety of applications, including ETC.
MFS Network Technologies, Inc.	402-233-7700	Omaha, Nebraska	Integrator for ETC, electronic payment, and ETTM
Science Applications International Corporation (SAIC)	703-821-4468	McLean, Virginia	Wholly-owned subsidiary of JHK & Associates and Syntonic.
Syntonic Technology, Inc.	717-561-2400	Harrisburg, Pennsylvania	ETC, video traffic/safety enforcement, worked on Advantage I-75

Technology: AVI Vendors			
Company Name	**Phone Number**	**Address**	**Description**
Amtech Systems Corp.	214-733-6600	Dallas, Texas	Intellitag 2000 ETC system, ETTM, congestion pricing
Intellitag Products	602-441-7116	Scottsdale, Arizona	A Motorola-Amtech Partnership, produces the K-TAG for the Kansas Turnpike ETC system.
LazerData Corporation	407-324-1230	Sanford, Florida	Optical bar code labels and laser-based line scanners for AVI.
Mark IV Industries Ltd.	905-624-3025 305-670-6907	Mississauga, Ontario Miami, Florida	Design and manufacture tags and readers for AVI and variable message signs.
Technology: Smart Cards			
Company Name	**Phone Number**	**Address**	**Description**
Cubic Automatic Revenue Collection Group	619-268-3100	San Diego, California	Designs and manufactures automatic revenue collection systems for rail and bus transit, tollway and major parking facilities; toll collections systems, automated fare collection (AFC). Provide security, reliability, cash accountabilitymanagement reports and passenger flow data..
Digital Equipment Corporation	305-262-4817	Miami, Florida	Smart cards, telephone information systems, passenger information displays
Novus Services, Inc.	708-526-3095	Riverwoods, Illinois	Provides a low-cost method of payment and the ability for patrons to pre-pay amounts on their toll tags in ITS applications..
Technology: Traffic Management			
Company Name	**Phone Number**	**Address**	**Description**
3 M Traffic Control Systems	612-736-2588	St. Paul, Minnesota	Optical communication offers temporary control over traffic signals to public safety vehicles to improve emergency response times.
Peek Traffic-Transit	904-562-2253	Tallahassee, Florida	Focuses on traffic and field data systems, adaptive traffic control systems (SCOOT), incident detection, parking management systems, etc.
Signal Service Industries, Inc.	305-254-7702	Miami, Florida	Traffic signs and signals.
SmartRoute Systems, Inc.	617-494-8100	Cambridge, MA	Public and private sector traffic operations centers including digital databases.

Traffic Control Devices, Inc.	305-592-7096	Miami, Florida	Traffic signs and signals.
TRW Transportation Systems	619-592-3000	San Diego, California	ATMS, ATIS, APTS, advanced vehicle safety systems

Technology: Variable Message Signs

Company Name	Phone Number	Address	Description
American Electronic Sign	800-727-9111	Spokane, Washington	Light-emitting, retro-reflective changeable message signs
Lake Technology Products, Inc.	800-771-1799	Tavares, Florida	Design, manufacturing and maintenance for traffic control systems, surveillance systems, and visual information systems.
Skyline Products, Inc.	800-759-9046	Colorado Springs, Colorado	Variable and changeable message signs.

Technology: Traffic Detectors

Company Name	Phone Number	Address	Description
Peek Traffic-Components	800-245-7660	Sarasota, Florida	Detect: speed, occupancy, headway, incidents, queue detection system, classification, and weigh in motion.
Schwartz Electro-Optics, Inc.	407-298-1802	Orlando, Florida	Designed Autosense I, II, and III - a pulsed laser range finder for vehicle detection and classification.
Spectra Systems, Inc.	407-998-3160	Boca Raton, Florida	GPS, laser-based sensors for vehicle and pedestrian detection, analysis and control.

Technology: Advanced Transit Systems

Company Name	Phone Number	Address	Description
American Automated Transport Systems Corp.	904-335-3967	Gainesville, Florida	Developing a fully automated transit system using a dedicated roadway.
Digital Recorders, Inc.	919-361-2155	Research Triangle Park, North Carolina	Manufactures digital audio products for use in highways and mass transit. Talking Bus, traveler information stations, and HAR.
International Business Machines Corporation (IBM)	301-564-2535	Armonk, New York	Advanced Public Transportation Systems (APTS), Commercial Vehicle Operations (CVO), Electronic Toll Collection (ETC) and Advanced Traffic Management Systems (ATMS).
Mark IV Industries	305-670-6907	Miami, Florida	Traffic signal preemption for transit vehicles, in-vehicle information systems.

Modular Computer Systems, Inc.	305-974-1380	Ft. Lauderdale, Florida	Advanced passenger transportation systems.
Transcomm	407-729-3672	Melbourne, Florida	AVL and computer aided dispatch for commercial and transit fleets. Developing MDTA's AVL system.

Consultants/Engineers Firms

Company Name	Phone Number	Address	Description
Automatary, Inc.	407-575-0773	Tequesta, Florida	CVO, TDM, ETC, emergency management, advanced vehicle controls , safety systems.
Boca Technology Group	407-479-1493	Boca Raton, Florida	Automatic toll collection and interstate permit issuance via radio frequency collection devices. 2way satellite messaging.
Control Technologies of Central Florida	407-330-2800	Sanford, Florida	
David Fierro and Associates	305-245-9267	Homestead, Florida	Public information and public education programs.
F.R. Aleman and Associates	305-591-8777	Miami, Florida	Advanced traffic control and communication system design.
HNTB	407-592-5930	Orlando, Florida	ITS Early Deployment Studies, traffic management systems, commercial vehicle operation.
ICF Kaiser	813-281-5909	Tampa, Florida	Updated version of Caltran's DTIM (Direct Travel Impact Model). Mass transit systems.
JHK & Associates	407-422-8813	Orlando, Florida	Advanced traffic management, ISTEA management systems, traveler information systems.
J. D. Gerdeman Associates	305-753-5358	Coral Springs, Florida	Radio frequency identification systems and high technology gate systems. Installed fleet management applications and access control monitoring systems.
Kimley-Horn & Associates	305-739-2233	Ft. Lauderdale, Florida	Transportation management, communication hardware/software, traveler information systems.
Lockheed Martin IMS	305-377-1899	Miami, Florida	CVO operations including work with the HELP project, ETC systems integrator, automated highway system work, ATMS, National ITS Architecture, kiosks, ITS strategic plans.
PB Farradyne, Inc.	954-714-8081	Ft. Lauderdale, Florida	Consulting and engineering service in Highway Advisory Radio (HAR) and transportation communication.

Positive Identification, Inc.	305-274-7841	Miami, Florida	Onboard computer systems for commercial and transit vehicles. Location management services and communications management systems.
Post, Buckley, Schuh & Jernigan, Inc.	407-647-7275 305-592-7275	Winter Park, Florida Miami, Florida	Engineering and consultancy services in fields of: Electronic toll and traffic management, highway advisory radio, security and surveillance, etc.
Vanasse, Hangen, Brustlin, Inc.	407-839-4006	Orlando, Florida	Focus on traffic control, ATIS, incident management and travel demand management.

Research Facilities

Name	Phone Number	Address	Description
Air Force Development Test Center (AFDTC)	904-882-8096	Eglin AFB, Florida	Electronic test & evaluation, measurement testing, modeling & simulation, environmental replication, hardware-in-the-loop simulation.
Associate Testing Laboratories	201-628-1363	Wayne, New Jersey	Simulations of environments in test lab to which ITS equipment will be exposed during actual use.
General Motor Research & Development Center	810-986-2990	Warren, Michigan	Spearheaded the integration of in-vehicle navigation system used during the TravTek project in Orlando.

Universities

Name	Phone Number	Address	Description
Florida International University - Lehman Center	305-348-3055	Miami, Florida	Advanced transit systems, traffic management systems, institutional and societal issues, human factors.
University of Florida - Transportation Research Center	904-392-0378	Gainesville, Florida	ITS State of the Art Report, video-imaging applications, software distribution, technology transfer center.
University of Miami-Gerontological Institute	305-284-3391	Miami, Florida	Human factors, traffic management, and market research.
University of South Florida, Center for Urban Transportation Research	813-974-3120	Tampa, Florida	Objective independent evaluation of ITS technologies, examination of application areas for ITS technologies, client needs assessment, and market research.

Automakers/ Vehicle Manufacturers			
Company Name	**Phone Number**	**Address**	**Description**
Chrysler Corporation	810-583-5238	Auburn Hills, Michigan	ITS needs definition committee, electronic clearance and payment, collision warning systems.
Ford Motor Company	313-594-3700	Dearborn, Michigan	ADVANCE, DIRECT, ENTERPRISE, TRILOGY, all weather night vision systems, obstacle detection warning, active involvement in SAE, open system architecture for ITS.
General Motors Corporation	810-986-2916	Warren, Michigan	ITS base technologies, products and systems on a worldwide scale.
Honda R&D North America, Inc.	310-781-5500	Torrance, California	Performs research and development of new automotive products. Directs ITS activities.
Nissan Research & Development, Inc.	810-488-4123	Farmington Hills Michigan	Navigation system, traffic-eye laser radar warning system, head-up display, guide light system, road vehicle lighting integration.
Local Government			
Name	**Phone Number**	**Address**	**Description**
City of Orlando	407-246-2281	Orlando, Florida	Operation of Traffic Management Center for Metropolitan Orlando Area, TravTek.
Miami-Dade County Public Works Department	305-592-8925	Miami, Florida	The Miami-Dade Traffic Control System, monitoring and controlling over 2000 signalized intersections.
MPO for the Miami Urbanized Area	305-375-4507	Miami, Florida	ETC, ATMS, ICS, AVL for transit, ITS comprehensive plan
Orlando-Orange County Expressway Authority	407-425-8606	Orlando, Florida	E-Pass (ETC) System in operation since 1994.
Orlando Urban Area Metropolitan Planning Organization (MPO)	407-623-1075	Winter Park, Florida	Travel and trip management, incident management, traffic control, electronic payment services, emergency management, safety, public transportation management.
Tampa Bay Regional Planning Council	813-577-5151	St. Petersburg, Florida	Keep local officials aware of new technologies that effect transportation.
Toll Authorities			
Name	**Phone Number**	**Address**	**Description**
Florida Department of	904-488-4671	Tallahassee,	FDOT operates Florida's Turnpike and

Transportation, Turnpike District		Florida	expects to gradually install an electronic toll collection system.
Lee County Department of Transportation	941-335-2111	Ft. Myers, Florida	Operates three toll bridges in Lee County. Currently developing implementation plan for ETC and congestion pricing.
Miami-Dade County Expressway Authority	305-637-3277	Miami, Florida	Self-sufficient expressway authority created in 1994 that generates its own funding from tolls to operate Miami-Dade County's expressways.
Miami-Dade County Department of Public Works	305-375-2962	Miami, Florida	The Miami-Dade County Department of Public Works (DCPW) has initiated one Electronic Toll Collection (ETC) procurement since 1992.
Orlando-Orange County Expressway Authority (OOCEA)	407-425-8606	Orlando, Florida	OOCEA operates toll facilities on three different expressways in Florida, and says it has almost completed replacement of its existing toll collection equipment with AVI.

Software Tools

Company Name	Phone Number	Address	Description
Berkeley Speech Technologies, Inc.	510-841-5083	Berkeley, California	Speech synthesis software for navigation systems and other driver information systems.
J.D. Gerdeman Associated	305-753-5358	Coral Springs, Florida	Radio frequency identification systems and high technology gate systems. Installed fleet management applications and access control monitoring systems.
Trident Systems, Inc.	703-273-012	Fairfax, Virginia	Graphical object-oriented software examining ITS architecture (Cascade), touch screens, system integration, software development, simulation.

Appendix D:

ITS publications

(These publications refer to information regarding ITS architecture and ITS planning)

Local Publications

1) FDOT District 6, "Quarterly Status Report on the SUNGUIDE Program,". Distributed to:
   Distribution A, B, and C, FDOT D-VI
   Miami-Dade County ITS Standing Committee
   Traffic Operations, FDOT, D-VI

2) FDOT District 6, "SunGuide, South Florida's ITS Newsletter,"
   -First edition in winter 1998/99
   -An issued based newsletter with no fixed publication schedule

3) Miami-Dade Public Works Department "The Miami-Dade ATMS Project, Executive Status Report," January 25, 1999.

4) David Fierro & Associates, "South Florida Intelligent Transportation Systems Public Relations Plan," October 1998.

Statewide Publications

1) Florida DOT Intelligent Transportation System Semiannual Progress Report, January-June 1998.

2) "Florida Statewide ITS Strategic Plan," FDOT Systems Planning & Traffic Operations Departments-Tallahassee, Summer 1999 (anticipated)..

3) Florida DOT District 4 and District 6, "Southeast Florida Intelligent Corridor System, December 1994.

National Publications

1) Federal Register, "Transportation Equity Act for the 21st Century; ITS Standards; Proposed Criteria and Draft Lost of Critical ITS Standards", Volume 63, No. 245, December 22, 1998.

2) Federal Highway Administration, "Interim Guidance on Conformity with the National ITS Architecture and Standards," October 1998.

3) USDOT, ITS Joint Program Office, "Developing Intelligent Transportation Systems Using the National ITS Architecture, An Executive Edition for Senior Transportation Managers," July 1998.

4) Inside ITS, “State and Local Groups Urged to Make Use of TEA-21 Funds for ITS,” October 19, 1998.

5) Joint Program Office, FHWA, U.S. DOT, “The National Architecture for ITS: A Framework for Integrated Transportation into the 21st Century.”

6) Ginger Daniels and Tim Star, Texas Transportation Institute, “Guidelines for Funding Operations and Maintenance of ITS/ATMS,” January 1996.

7) MITRE Corporation and Joint Program Office, “Intelligent Transportation Infrastructure Benefits: Expected and Experienced,” 1996, FHWA-JPO-96-008.

8) ITS Joint Program Office, “ITS Procurement Resource Guide,” 1997, FHWA-JPO-97-0025.

9) ITS Joint Program Office, “ITS Information Security Resource Guide,” 1998, FHWA-JPO-98-011.