

ACCIDENT AHEAD

2 MILES

Mining of Florida ITS Data for Transportation Planning

**North American Travel Monitoring
Exhibition and Conference 2002**



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ITS Office Background

- **FDOT Established ITS Office – July 2000**
 - **To Support Coordinated Deployment Of ITS On A Statewide Basis**
 - **Four Major Program Areas:**
 - **Telecommunications**
 - **ITS Architectures and Standards**
 - **ITS Program Management**
 - **Commercial Vehicle Operations (CVO)/
Electronic Toll Collection (ETC)**
 - **ITS Office Initiatives:**
 - **Communications Backbone**
 - **Corridor/Systems Engineering Approach**
 - **Statewide Standards And Specifications**
 - **Statewide Central Data Warehousing**
 - **CVO/CVISN/Electronic Payment Systems**
 - **Technical Support**
 - **Professional Capacity Building**

Current Situation

		Existing Coverage (% of Miles)				Dynamic Message Signs	Highway Advisory Radio***
Mainline Corridors	(1)	CCTV*	Vehicle Detection**	Road Rangers	Call Boxes		
I-4		34.2%	28.0%	64.3%	29.0%	22.9%	0.0%
I-10		2.6%	1.6%	6.0%	99.1%	0.7%	0.0%
I-75		0.0%	0.0%	36.4%	98.1%	0.0%	0.0%
I-95		4.6%	3.0%	29.7%	70.5%	5.2%	0.0%
Florida's Turnpike		0.0%	0.0%	47.8%	100.0%	0.2%	4.9%
Total		4.5%	3.4%	32.1%	86.4%	3.3%	0.8%

Source: PBS&J

- (1) Mainline only; does not include other FIHS limited-access routes.
- (2) Does not include closed-circuit television cameras (CCTV) at tollbooths.
- (3) Does not include telemetered traffic monitoring sites (TTMS).
- (4) Does not include the Traveler Information Radio Network (TIRN).
- (5) The Turnpike currently has three operational highway advisory radio stations. Six others are programmed. (Source: Turnpike District)

Note: The range of influence considered is: 1 mile in each direction for a closed-circuit television cameras, 0.5 mile for a vehicle detection station, 1 mile in each direction for a call box, 0.5 mile for a dynamic message sign and 3 miles in each direction for a highway advisory radio.

Current Situation



Florida's Major Intelligent Transportation Systems (ITS)

Cities With Computerized Traffic Control Systems:

Auburndale
 Bartow
 Belle Glades
 Boca Raton
 Bradenton
 Brooksville
 Cape Coral
 Clearwater
 Cocoa
 Cocoa Beach
 Daytona Beach
 Eglin Air Force Base
 Fort Myers
 Fort Pierce
 Gainesville
 Jacksonville
 Jacksonville Beach
 Key West
 Kissimmee
 Lake City
 Lakeland
 Lynn Haven
 Maitland
 Marathon
 Melbourne
 Miami
 Naples
 Ocala
 Orange Park
 Orlando
 Orlando
 Panama City
 Pensacola
 Plant City
 Port St. Lucie
 Punta Gorda
 Sarasota
 St. Augustine
 St. Petersburg
 Tallahassee
 Tampa
 Venice
 Winter Haven
 Winter Park

Counties With Computerized Traffic Control Systems:

Brevard
 Broward
 Charlotte
 Citrus
 Clay
 Collier
 Columbia
 Dade
 Duval
 Escambia
 Highlands
 Hillsborough
 Indian River
 Lake
 Lee
 Manatee
 Martin
 Okaloosa
 Orange
 Palm Beach
 Pasco
 Pinellas
 Sarasota
 Seminole
 St. Johns
 St. Lucie
 Volusia

Interstate Highways, Turnpike, and Expressways (Limited-Access Routes) ITS Services:

- Cities with Computerized Traffic Control
- Counties with Computerized Traffic Control
- Electronic Tolls
- Service Patrol
- Motorist Aid Call Boxes
- Freeway Management Systems
- Other ITS
- Florida Intra-state Highway System



SunGuide ATIS

Provides real-time information to travelers via phone (1-866-914-3838), fax, radio, web page (<http://www.smartroute.com>), and television in Miami-Dade, Broward, and Palm Beach Counties.

Existing Major Advanced Public Transportation (APTS) Systems:

- Miami-Dade Transit Agency (MDTA)
- Tri-County Commuter Rail Authority (Tri-Rail)
- Miami Intermodal Center Program
- Airport Traveler Information at Miami International Airport
- Hillsborough Area Regional Transit Authority (HART)
- Jacksonville Transit Authority (JTA)
- Palm Beach County Transportation Agency (Palm Tran)
- LYNX (Transit Orlando)

Information Service Providers

Mobility Technologies (www.traffic.com), a private information provider, supplies coverage for the Tampa area.

TiRN (a public/private provider) supplies coverage for the Orlando area.

Metro Networks supplies traffic information for Southwest Florida.



Mission, Vision And Goals

- **Assessment Of Needs, Issues, Problems And Objectives**
 - Used To Define Program Mission, Vision, Goals And Objectives
 - Linked To Florida's Transportation Plan
 - In Alignment With The Department's Overall Mission
- **Goals**
 - Move People And Goods Safely
 - Preserve And Manage The System
 - Enhance Economic Competitiveness
 - Enhance Quality Of Life And The Environment
 - Deploy An Integrated, Effective System

Advanced Traveler Information Systems

- **ATIS Feasibility Studies:**
 - I-4 ATIS - 13 Counties Along I-4 - Now
 - Jacksonville - 4 Counties Along I-95 And I-10 - Next
 - Southwest Florida - 4 Counties Along I-75 – Future
 - Included Market Analyses And Business Plans To Support ATIS
- **Statewide Road Weather Information System**
- **Statewide Highway Advisory Radio Network On Candidate One-Way Evacuation Routes**

Next Steps of Florida ITS Program

- **Proof of Concept Using I-4 Data Warehouse (underway)**
- **Statewide Central Data Warehouse for ITS Data**
- **Traffic Monitoring Data in Functional Requirements**
 - **Data Collection Standards For Vehicle Detection**
 - **RTMC Software**
 - **Data Warehousing**
 - **ATIS Data Collection/Reporting**
- **Leverage TTMS Investment in Rural ITS Projects**
 - **Evacuation Coordination/Monitoring**
 - **Major Incident Management and Travel Time/Speed Estimation**
- **Integrate Traffic Monitoring Needs in ITS Deployments**
 - **Communications and Field Elements**
- **Continued Partnerships To Ensure Public Resources Are Being Spent As Efficiently As Possible**
 - **Example is ITS & Statistics Office Cooperation to Mine ITS Data**

Mining of Florida ITS Data for Transportation Planning

Project Objectives

- **To determine what and how data are collected by ITS programs**
- **To mine ITS data by converting the data to transportation planning format**

Extent of ITS Data Collection in Florida

**Traffic Operations Centers (TOC) currently
collecting roadway data are located in:**

- **Orlando**
- **Miami**
- **Jacksonville**
- **Fort Lauderdale**

ITS Data Collection in Florida

Equipment Used

- Loop detectors
- Video Imaging Detection (VID)

A pair of loop detectors are mostly installed:

- In each lane (e.g. Orlando)
- In both directions
- are spaced approximately $\frac{1}{2}$ mile

ITS Data Collection in Florida

Type of Data Collected

- **Volume**
- **Speed**
- **Occupancy (as a measure of density)**
- **Classification (rarely)**

Polling Rate and Archiving

- **Equipment polled every 20 seconds**
- **Data aggregated on per minute basis**
- **Data are not archived**

Data for Transportation Planning

Data normally collected

- **Volume per hour for determining ADT and AADT**
- **Average Vehicle Speeds**
- **Vehicle Classification**

Data Requirements

- **Must be collected on all lanes**
- **Must be collected in both directions**

How Planning Data are Processed in Florida

Field data are processed by

- **Survey Processing Software (SPS) which require data to be input in a specific format**
- **The department conducts end of year processing**

Procedure of Accessing and Converting ITS Data to SPS format

Data Conversion

- **Data from several stations on I-4 corridor were downloaded from the server**
- **A computer program was written to pre-process the data for input into SPS software**
- **Only volume and speed data were mined**

Results

- **The project was successful in mining ITS data for use in transportation planning**
- **An example of volume and speed summaries is shown below.**

Volume Data

HOURLY VOLUME (DEVICE LOCATION 502:DATE 06/10/2001)							
TIME	EASTBOUND LANES			WESTBOUND LANES			ALL LANES
	01	03	EB TOTAL	11	13	WB TOTAL	
00-01	396	1,024	1,420	716	1,536	2,252	3,672
01-02	232	752	984	384	1,008	1,392	2,376
02-03	148	660	808	240	780	1,020	1,828
03-04	188	656	844	180	828	1,008	1,852
04-05	296	884	1,180	164	832	996	2,176
05-06	892	1,620	2,512	300	1,256	1,556	4,068
06-07	3,344	3,116	6,460	1,224	2,228	3,452	9,912
07-08	4,520	3,848	8,368	2,064	2,904	4,968	13,336
08-09	4,868	4,224	9,092	2,428	3,176	5,604	14,696
09-10	4,580	4,020	8,600	2,624	3,392	6,016	14,616
10-11	4,452	4,216	8,668	3,012	3,888	6,900	15,568
11-12	3,928	3,716	7,644	2,944	3,732	6,676	14,320
12-13	3,468	3,580	7,048	2,760	3,732	6,492	13,540
13-14	3,268	3,412	6,680	3,028	3,672	6,700	13,380
14-15	3,088	3,152	6,240	3,284	3,812	7,096	13,336
15-16	2,248	2,284	4,532	3,696	3,592	7,288	11,820
16-17	3,564	3,032	6,596	5,024	4,276	9,300	15,896
17-18	2,936	2,888	5,824	5,136	4,508	9,644	15,468
18-19	2,360	3,104	5,464	4,176	4,216	8,392	13,856
19-20	2,284	2,864	5,148	2,676	3,632	6,308	11,456
20-21	1,912	2,484	4,396	2,060	2,972	5,032	9,428
21-22	1,372	2,224	3,596	1,900	2,644	4,544	8,140
22-23	1,136	1,828	2,964	1,848	2,740	4,588	7,552
23-24	908	1,560	2,468	1,376	2,128	3,504	5,972

Speed Data

AVG HOURLY SPEED (DEVICE LOCATION 502:DATE 06/10/2001)							
TIME	EASTBOUND LANES			WESTBOUND LANES			ALL LANES
	01	03	EB AVG	11	13	WB AVG	
00-01	65	62	64	67	55	61	62
01-02	64	61	63	66	55	61	62
02-03	65	62	64	66	55	61	62
03-04	65	60	63	66	56	61	62
04-05	66	61	64	65	54	60	62
05-06	64	61	63	68	56	62	62
06-07	65	61	63	69	57	63	63
07-08	66	61	64	69	57	63	63
08-09	65	61	63	68	57	63	63
09-10	64	59	62	67	56	62	62
10-11	64	59	62	65	55	60	61
11-12	64	59	62	65	55	60	61
12-13	64	60	62	66	56	61	62
13-14	64	60	62	66	56	61	62
14-15	66	61	64	66	56	61	62
15-16	56	53	55	56	46	51	53
16-17	59	55	57	60	51	56	56
17-18	63	59	61	64	54	59	60
18-19	65	61	63	67	57	62	63
19-20	67	62	65	68	57	63	64
20-21	66	62	64	68	57	63	63
21-22	64	59	62	66	55	61	61
22-23	64	60	62	65	53	59	61
23-24	64	59	62	65	55	60	61

Future Project Directions

Data Access

- **In order to mine data automatically, a computer has been installed at Orlando TOC and is connected to the main server through a network cable**
- **A data query program will be written to enable the server to download the data to the computer through a data pump**
- **Transportation Planning personnel will access and query the data via a modem or the internet**

Future Project Direction

Replication

- **The Orlando pilot study will be replicated statewide**
- **The project required ITS and Planning Offices to work together to overcome bureaucratic and technical challenges**

Project Benefits

- Florida DOT will save money by not installing loops where ITS loops already exist
- The project is a win-win as Planning Office gets **data support** and ITS Office gets **maintenance support**
- Through data warehousing project both planning and ITS data will be displayed on the web for access by all stakeholders

Challenges

Data Quality Management

- **Establish installation and monitoring standards of ITS field equipment to insure collection of continuous and reliable data**
- **Editing and processing of data on daily basis**
- **Providing adequate and continuous maintenance of the loops**

Summary

- **Change culture of traffic monitoring and ITS community**
- **Make traffic monitoring and ITS community aware of each other's goals and needs**
- **Challenge vendors to be flexible but firm in meeting users' needs and cooperate for a greater cause**
- **Develop a team to achieve mutually inclusive goals for the Department**