

Technical Memorandum No. 3.11

Florida's 2003 Intelligent Transportation System Strategic Plan Update

Systems Integration, Tracking, and Reporting

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List of Acronyms

<i>CFP</i>	<i>Cost Feasible Plan</i>
CFR	Code of Federal Regulations
CVIEW	Commercial Vehicle Information Exchange Window
CUTR	Center for Urban Transportation Research
CVO	Commercial Vehicle Operations
EFP	Electronic Fare Payment
ETC	Electronic Toll Collection
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FIHS	Florida Intrastate Highway System
HAR	Highway Advisory Radio
HOV	High-Occupancy Vehicle
I-10	Interstate 10
I-75	Interstate 75
I-95	Interstate 95
ITS	Intelligent Transportation Systems
ITSA	Intelligent Transportation Society of America
LPR	License Plate Reader
<i>McTrans</i>	Center for Microcomputers in Transportation
ROO	Regional Operating Organization
RTMC	Regional Transportation Management Center
RWIS	Road Weather Information System
SEMP	Systems Engineering Management Plan
SR	State Road
TEOO	Traffic Engineering and Operations Office
USDOT	U.S. Department of Transportation

1. Purpose

This *Technical Memorandum* identifies new intelligent transportation system (ITS) trends, technologies, and initiatives that implement and fulfill the vision, goals, and objectives identified in *Florida’s Intelligent Transportation System Strategic Plan*, hereinafter referred to as the *Plan*.¹

The primary purpose of the *Plan* was to present a 20-year vision for ITS in Florida and to recommend strategies to achieve this vision. The *Plan* included four main ITS goals, which were consistent with the mission and goals of the Florida Department of Transportation’s (FDOT) *2020 Florida Transportation Plan*.² These goals include:

- Safe transportation for residents, visitors, and commerce;
- Protection of the public’s investment in transportation;
- A statewide, interconnected transportation system that enhances Florida’s economic competitiveness; and
- Travel choices to ensure mobility, sustain the quality of the environment, preserve community values, and reduce energy consumption.

The United States Department of Transportation (USDOT) has set a goal to deploy integrated ITS infrastructures in 78 of the nation’s largest metropolitan areas by the end of 2005. Specifically, the goal is for approximately two-thirds of these areas to achieve a “high” level of integration, and the remaining one-third to achieve at least a “medium” level of integration.

¹ PB Farradyne, *Florida’s Intelligent Transportation System Strategic Plan – Final Report* (August 1999). Available online at http://www.dot.state.fl.us/trafficoperations/its/its_default.htm.

² Florida Department of Transportation, *2020 Florida Transportation Plan* (2000). Available online at <http://www.dot.state.fl.us/planning/2020ftp/default.htm>.

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This *Technical Memorandum* proposes a long-term strategy for integrating Florida Intrastate Highway System (FIHS) ITS deployments with local ITS services so they function as a seamless system. It identifies issues and barriers to ITS integration in Florida; determines the impact of regional operating organizations (ROOs) on integration; and is consistent with the recommendations proposed in *Florida’s ITS Integration Guidebook*.³

Additionally, this *Technical Memorandum* presents an overview of the various ITS integration levels, and recommends actions for the development of an integration tracking and reporting process to fulfill the national goal for integration of ITS services. The FDOT’s current FIHS deployment tracking system is reviewed to determine if this application can be expanded to track existing and proposed ITS projects, and to measure integration at various jurisdictional levels beyond the FIHS, including tolling authorities and local agencies.

³ Center for Urban Transportation Research (CUTR), University of South Florida, *Florida’s ITS Integration Guidebook* (October 2002). Available online at http://www.dot.state.fl.us/trafficoperations/its/its_default.htm under the *Online Documents* link.

2. Background

Since 1996, the USDOT has maintained an ITS deployment tracking database that is updated on an annual basis. Initially, this database tracked ITS deployments in 78 of the nation’s largest metropolitan areas. In recent years, it has been expanded to include medium metropolitan areas and tourist cities, as well as rural areas. Florida metropolitan areas included in the database are classified below.

- **Large Metropolitan Areas**
 - Jacksonville
 - Miami/Fort Lauderdale
 - Orlando
 - Sarasota/Bradenton
 - Tampa/St. Petersburg/Clearwater
 - West Palm Beach/Boca Raton/Delray

- **Medium Metropolitan Areas**
 - Daytona Beach
 - Fort Myers
 - Pensacola

- **Tourist Cities**
 - Naples

In addition, the database tracks selected rural ITS deployments in Florida.

The database’s purpose is to track not just ITS deployments, but the level of integration associated with these deployments. The USDOT defines “ITS integration” as the bridging of technical or institutional systems across system or jurisdictional boundaries. Integration may range from a simple agreement to share information between two adjacent agencies to the deployment of linked, interoperable systems across a multistate region. The rationale for ITS integration is that systems can be more effective when they operate in concert than when they work separately. Integration results in the potential for a synergistic boost to overall performance and effectiveness. For example, the process of coordinating traffic signals across jurisdictional boundaries can be automated by integrating the systems. Automation may save time for users and save money for public agencies. It may also enable better traffic management during incidents, reducing secondary crashes and the costs associated with delays.

Integration can improve convenience and user satisfaction. Integrating multiple traveler information systems offers the potential to improve the quality of service and makes obtaining the information more convenient. This practice helps distribute traffic more evenly, thus reducing delays during incident conditions. In a similar manner, a more convenient system for paying fares entices more people to use transit services.

Integration can improve interoperability among systems and add flexibility when choosing which systems to purchase. As interoperability increases, public agencies are less likely to be dependent on a single vendor for equipment, such as traffic signal controllers. Increased competition is likely to result in better quality, lower equipment prices, and savings to the agency and the public.

In October 2002, the FDOT published *Florida’s ITS Integration Guidebook*. The *Guidebook* identifies a process for achieving ITS integration at the planning, institutional, and technical levels. It identifies the possible roles for a range of federal, state, and local players in leading, participating in, and regulating ITS integration. The *Guidebook* discusses six levels of integration, which is defined as: “The process through which technologies and services are planned, specified, designed, and assembled into a single and complete system to achieve the intended functionality.” The *Guidebook* makes recommendations addressing the role of implementers; the need for a funding and implementation program; identification of integration policies; the importance of regional architectures as part of the planning process; the role of ITS standards; encouragement of metropolitan consortia; the need for an ITS tracking methodology; and the formation of ROOs.

Overall, ITS integration offers benefits to both the traveling public and participating agencies. In the same way that most travelers do not recognize jurisdictional boundaries, an integrated transportation system takes a network view of travel conditions in which different jurisdictions share infrastructure, information, and control. Such an integrated system can make full use of the interoperability between components to help agencies achieve greater safety and efficiency goals, and to achieve economies of scale.

3. Potential Issues

The remainder of this *Technical Memorandum* highlights areas of potential concern that merit deeper research and status tracking, as well as prioritization for future consideration and possible action. No priority is implied by the order in which these issues are listed.

3.1 Long-Term Strategy for Integrating Florida Intrastate Highway System Intelligent Transportation System Deployments with Local Intelligent Transportation System Services

The nation’s transportation needs and challenges will be met in part through ITS integration, which will allow a higher level of benefit to the traveling public than stand-alone ITS components can provide. The ability to efficiently and effectively design and implement technical links between separate systems is a fundamental component of successful integration. To accomplish this goal, system managers should seek to employ commonly used interfaces and standards wherever possible. It is essential that a regional architecture be developed that allows different components to be integrated easily. For this purpose, the USDOT sponsored the development of the Turbo Architecture tool – an interactive software application – and made it available to transportation agencies and authorities.⁴ The USDOT reinforced this approach by stipulating compliance with the Federal Highway Administration’s (FHWA) *Rule 940*⁵ by April 8, 2005.

However, the extent of ITS integration is more a factor of institutional considerations than technological constraints. The willingness of different public and private entities to work cooperatively determines the extent of integration along a spectrum from shared information to coordinated control of system components. Integration occurs when those responsible for the management of transportation systems see value in integrating the systems. Those locations where integration has begun to make measurable progress have been able to promote its benefits.

At the national level, the basis for any successful, long-term integration strategy is a combination of regulatory controls and mutual benefits that are supported by appropriate processes, tools, and education. At the state and local level in Florida, the need for any additional regulatory control is most likely unnecessary. However, the need to identify, quantify, and explain ITS integration benefits is most likely greater. The core question that will need to be answered with respect to ITS integration is, “What’s in it for my agency?”

⁴ More information regarding the USDOT Turbo Architecture software application is available from the Center for Microcomputers in Transportation (McTrans) online at <http://mctrans.ce.ufl.edu/featured/>.

⁵ 23 CFR Parts 655 and 940, *Intelligent Transportation System Architecture and Standards – Final Rule* (January 2001). Available online at http://www.ops.fhwa.dot.gov/its_arch_imp/index.htm

The Central Florida Regional Transportation Operations Consortium has made great strides in the development of integration at the technical and institutional levels. By developing a regional goal to improve transportation, participating agencies can clearly see what each must do to support the “greater good” and the potential benefits that will follow. This collaboration was undoubtedly an important factor in Florida, led by the central Florida region, which secured a \$10 million grant from the USDOT to develop the Surface Transportation Security and Reliability Information System Model Deployment, known as *iFlorida*.⁶

A long-term strategy for integrating the FIHS ITS deployments with local ITS services so they function as a seamless system is therefore seen as a desirable step for the ITS Program in addressing Florida’s transportation challenges and fulfilling the national integration goal. A two-part approach to integrating state and local ITS deployments in Florida is suggested. Each part builds upon the foundation of previous work and associated successes.

The first step in the recommended integration approach requires the FDOT to embrace the USDOT’s ITS deployment tracking tool – the Turbo Architecture software – and expand it to include more metropolitan and rural areas, toll facilities, and statewide systems. Not only is this a ready-made tool that the largest areas are already familiar with, it will facilitate reporting of ITS deployments in the remaining years through 2005 and beyond if the tracking program is extended. Agencies in the respective subject areas are responsible for the completion of the tracking information surveys. It is suggested that, where they exist, ITS consortia such as the Central Florida Regional Transportation Operations Consortium take a leading role in the completion of the tracking information surveys to ensure participation across as many layers of government and functional areas as possible. These partnerships have demonstrated their key facilitation role in regional ITS deployments, and represent the core stakeholder groups whose individual ITS visions must be embraced as part of a greater regional vision.

The second step of the two-part integration approach recommends taking the lessons learned at the regional level to a statewide forum of similar regional consortia. (Refer to *Technical Memorandum No. 3.2, Regional Operating Organizations*.⁷) Such a forum should be held to exchange best-practice experiences in the development of integrated ITS deployments. In particular, this forum will bring together those at the forefront of Florida ITS deployments with those who are still developing their respective ITS strategies. The FDOT will probably have a major role in this forum, both as a statewide agency and as a regional partner. It is also envisioned that the state chapter of the Intelligent Transportation Society of America, or ITS America™ (ITSA),⁸ ITS Florida, will also have a prominent role in facilitating the forum.

⁶ More information regarding the FDOT *iFlorida* Project is available online at <http://www.iflorida.net/>.

⁷ Schuerger, Joe (PBS&J), *Technical Memorandum No. 3.2: Florida’s 2003 Intelligent Transportation System Strategic Plan Update – Regional Operating Organizations, Version 3* (February 2005). Available online at <http://floridait.com/StrategicPlan.htm>.

⁸ ITS America is a trademark of the Intelligent Transportation Society of America.

Given that there is currently ample opportunity for information exchange between FDOT staff in the Central Office and the Districts, the overriding goal of the forum is to achieve peer-to-peer type discussions and exchanges between local agencies and other statewide agencies, with the FDOT playing the role of a regional partner.

3.2 Issues and Barriers to the Integration of Intelligent Transportation Systems in Florida

While the rationale underlying ITS integration is understood and its potential benefits have been documented in recent years, there are, nonetheless, some issues and barriers associated with making ITS integration a reality. Even if the regional integration benefits are greater than the sum of the constituent parts, it may be difficult for individual agencies to justify funding for, and operational management of, systems that will have an impact beyond their respective jurisdictional boundaries.

One approach that has evolved in recent years is the development of ROOs, which are partnerships among transportation and public safety agencies to provide coordinated transportation operations on a regional basis. A variety of approaches have been adopted across the nation, reflecting differences in regional size and characteristics, organizational structures, and geography. Indeed, there is no mandate or requirement to form a ROO, which may or may not be an actual operating entity. Consequently, there is no cookie-cutter approach that can be adopted, even within a single state. However, what is clear is that the evolution of ROOs has led to localized examples of integration, including resources, personnel, systems, and institutional cooperation. Equally, a broad range of benefits associated with ROOs have been identified, including:

- Customer centered for transportation users;
- Single point of reference for user services;
- Efficiency and cost savings;
- Resource utilization and availability;
- Shared responsibilities;
- Specialization strengths of individual partners are available to all;
- Process improvements;
- Timely and creative problem solving;
- Broadened perspectives and regional outlook;
- Regional needs prioritization;
- Improved communications and working relationships;
- Interagency assistance;
- Coordination and information sharing;
- Extended hours of operation;
- Improved contingency options; and
- Information resources and archives.

While it is not the intent of this *Technical Memorandum* to suggest that the development of ROOs across Florida is required, or that all of these benefits will accrue in each region that does develop a ROO, it is likely that at least some of the issues and barriers to ITS integration may be addressed by a ROO-type approach. The underlying conditions in which a ROO may be an appropriate approach are where local agencies recognize a critical regional need; where there is an inability to meet that need through existing organizational processes; where visionary and influential leadership is in place; and where available funding exists. A ROO can take one of several forms, ranging from a virtual organization (not a legal entity), a private corporation (such as *TRANSCOM*⁹ in the north eastern United States), or a regional government or authority.

At the state level, the FDOT Central Office and selected Districts in northern Florida may choose to collaborate with their counterparts in Georgia and Alabama to address cross-boundary issues related to ITS integration. While this does not necessarily require a ROO approach, this may be desirable at the corridor level, such as with the Interstate 10 (I-10), Interstate 75 (I-75), and Interstate 95 (I-95) corridors. The I-95 Corridor Coalition, for example, provides a forum for state transportation officials with common concerns to exchange ideas and work toward broad-based solutions. Further, the post-September 11, 2001, emphasis on transportation security justifies an ongoing review of the potential value a ROO approach may provide. (*Note: Much of the USDOT’s approach to ITS integration was developed prior to the terrorist attacks on September 11, 2001.*)

3.3 Overview of the Various Intelligent Transportation System Integration Levels

The USDOT has characterized three levels of integration:

- Shared infrastructure, such as a communications backbone;
- Shared information, such as that between traffic management personnel and emergency responders; and
- Coordinated control, the most comprehensive form of integration, where different agencies can control the same component or system.

⁹ *TRANSCOM* is a service mark of the Transportation Operations Coordinating Committee. © 1999-2005 TRANSCOM Inc. All rights reserved. More information regarding *TRANSCOM* is available online at <http://www.xcm.org/transcom.html>.

Within its operational concept, the Southern California ITS Priority Corridor Showcase¹⁰ identified six possible levels of participation among stakeholder agencies, including:

- Independent operation;
- Shared video/data;
- Cross-jurisdictional coordination for special events;
- Day-to-day coordination;
- System redundancies; and
- Centralization of some or all traffic management functions.

While the Showcase adopted levels two through five, it allowed each agency or user to choose which level their operations or systems would participate at.

The FDOT’s *Florida’s ITS Integration Guidebook* discusses two integration types (i.e., intra-agency and interagency) and six integration levels:

- Intra-agency local integration;
- Intra-agency central integration;
- Interagency regional integration;
- Interagency statewide integration;
- Interagency multi-state integration; and
- Nationwide integration.

For each integration level, the *Guidebook* identifies implementers in lead, participatory, and regulatory roles. The extent to which integration occurs will depend on a combination of factors, including identified needs, the ITS “maturity” of respective agencies (which affects their comfort and competency), and available funding. Without doubt, the existence of a ROO and/or a long-term strategy for integrating the FIHS with local ITS services will also influence the direction and speed of ITS integration at the local, regional, state, and national levels.

¹⁰ More information regarding the Southern California ITS Priority Corridor Showcase is available online at <http://www.odetics-its.com/showcase/index.html>.

3.4 Expansion of the Current Florida Intrastate Highway System Deployment Tracking System

The FIHS, created in 1990 by the Florida Legislature, is composed of interconnected limited- and controlled-access roadways, including:

- Interstate highways;
- Florida’s Turnpike Enterprise;
- Selected urban expressways;
- Existing major interregional and intercity arterial highways to be upgraded to higher controlled-access standards; and
- New limited-access facilities.

The FIHS is a statewide transportation network that allows high-speed and high-volume traffic movements within the state. The system also accommodates high-occupancy vehicles (HOVs), express bus transit and, in some corridors, passenger rail service. Totalling 3,939 miles of existing and planned multimodal transportation corridors, the system’s primary function is to serve interstate and regional commerce, and long-distance trips. The FIHS carries 29 percent of the total traffic, though it represents only 3 percent of Florida’s roads.

State law requires that a status report on the FIHS be provided annually to the Legislature’s transportation committees. In the most recent report, which summarized activity through January 1, 2004, considerable detail is provided on the status and performance of the FIHS, and on future programs to improve the system.

While much of the FIHS status report focuses on traditional engineering, a section is devoted to ITS components. The FDOT Executive Committee adopted the *Ten-Year ITS Cost Feasible Plan*, hereinafter referred to as the *CFP*, on October 23, 2002.¹¹ The FDOT developed the *CFP* to coordinate the programming and deployment of ITS services along the five principal FIHS limited-access corridors through fiscal year 2012. During 2003, projects were programmed into the FDOT’s Work Program and Districts have begun to implement them.¹²

¹¹ Florida Department of Transportation, *Ten-Year ITS Cost Feasible Plan* (May 2004). Available online at http://www.dot.state.fl.us/trafficoperations/its/its_default.htm.

¹² More information on the FDOT’s Work Program is available online at <http://www.dot.state.fl.us/programdevelopmentoffice>.

The *CFP* includes freeway and incident management services for approximately 65 percent of the limited-access facilities, covering FIHS facilities in all urban areas in Florida, with the exception of I-75 in Gainesville and Ocala, and a small segment of State Road (SR) 9A in Jacksonville. Additionally, the *CFP* includes 511 traveler information services for the entire state and provides additional broadcast traveler information in major metropolitan areas, serving 78 percent of Florida’s population. Other programmed ITS services include statewide highway advisory radio (HAR) and road weather information system (RWIS) deployments; a regional transportation management center (RTMC) software library and configuration management process; and commercial vehicle electronic credentialing, automated routing software, and the Commercial Vehicle Information Exchange Window developed by Cambridge Systematics (CVIEW_{CS}TM).¹³

The *CFP* also provides funding to expand the number of RTMCs from the 5 that exist today to 12 by the year 2012. Current ITS Program initiatives include:

- Upgrading the FDOT’s microwave system to support ITS deployments;
- Assessing wireless solutions to telecommunication needs;
- Developing standards and specifications to provide a uniform basis for ITS design;
- Developing a systems engineering management plan (SEMP) as the standard process for design, construction, and acceptance of ITS deployments;
- Conducting probe data studies to determine the feasibility of utilizing transponders and license plate readers (LPRs) in determining travel times;
- Updating *Florida’s ITS Strategic Plan*; and
- Implementing initiatives to improve commercial vehicle operations (CVO).

Estimated benefits derived from the implementation of the *CFP* include saving 120 lives, preventing 11,000 traffic-related injuries, preventing 26,000 accidents, and saving 20 million hours lost in congestion over the next decade.

¹³ CVIEW_{CS} is a trademark of Cambridge Systematics, Inc., © 2005. More information regarding CVIEW_{CS} is available online at <http://www.camsys.com/cview03.htm>.

The FDOT Traffic Engineering and Operations Office (TEOO), in coordination with the FDOT Districts, tracks the FIHS ITS deployments and the associated devices. This database is updated on an annual basis; and is being expanded to include hardware make, manufacturer, and firmware specifications, and local agency ITS data as well. Additionally, the central and southeast Florida consortia are beginning to track ITS deployments in their respective regions.

Given the importance of the *CFP* to the FIHS, a deployment and integration tracking methodology based on that developed by the USDOT will provide an important tool to monitor the *CFP* in the context of statutorily required FIHS status reporting. Tracking deployments also offers the potential to maximize ITS deployments benefits on the FIHS, in the local communities with which it interacts, and in the state of Florida in general.

The USDOT’s methodology tracks deployment of the nine components that make up the ITS infrastructure, including freeway management; incident management; arterial management; emergency management; transit management; electronic toll collection (ETC); electronic fare payment (EFP); highway-rail intersections; and regional multimodal traveler information. Information is gathered through a set of surveys distributed to state and local agencies that are involved with these infrastructure components. The surveyors gather information on the extent of the infrastructure deployment, and on the extent of integration between the agencies that operate the infrastructure. Deployment is measured using a set of indicators tied to the major functions of each component. Integration is measured by assessing the extent to which agencies share information and cooperate in operations based on a set of defined links between the infrastructure components.

It is recommended that this methodology be adopted as the basis for tracking ITS deployments in Florida, and that the methodology be integrated with existing ITS deployment tracking databases at both the regional and state level.

4. Recommendations

This *Technical Memorandum* has reviewed the status of ITS integration, tracking, and reporting in Florida in the context of related national initiatives and local considerations, such as the FIHS. The rationale for ITS integration is that systems can be more effective when they operate in concert than when they work separately. Integration results in the potential for a synergistic boost to overall performance and effectiveness. The USDOT has placed great emphasis on tracking ITS deployment and integration in recent years, and has introduced regulations that encourage ITS deployers to move in that direction through ITS architecture efforts.

As the level of ITS deployment across the nation approaches the goals for 2005 established by the USDOT back in 1996, it is recommended that Florida address the need for similar goals to integrate ITS across the state, and to track and report such integration activities and the benefits derived. Therefore, the following recommendations are proposed for the promotion of ITS integration in Florida:

- Promote and facilitate the establishment of ROOs to advance integration at both the physical and institutional levels.
- With assistance from the ROOs and the FDOT District ITS programs, utilize the USDOT integration methodology and survey instruments to collect Florida integration information.
- Expand existing ITS deployment databases to include integration characteristics.
- Annually assess Florida’s integration levels based on the USDOT metrics.