

Technical Memorandum No. 3

Florida Statewide 511 Conceptual Design Plan:

Statewide 511 Advanced Traveler Information System (ATIS) –

Data Gathering Platforms and Practices

Version 2

Prepared for:

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List of Acronyms

ATIS.....	Advanced Traveler Information System
ATMS.....	Advanced Traffic Management System
C2C.....	Center-to-Center (Communications)
CAD.....	Computer-Aided Design
CCTV.....	Closed-Circuit Television
CDRL.....	Contract Deliverable Requirements List
CM.....	Configuration Management
DMS.....	Dynamic Message Sign
E-Mail.....	Electronic Mail
EOC.....	Emergency Operations Center
ETC.....	Electronic Toll Collection
FDOT.....	Florida Department of Transportation
FHP.....	Florida Highway Patrol
FIHS.....	Florida Intrastate Highway System
GIS.....	Geographic Information System
HAR.....	Highway Advisory Radio
HTML.....	Hypertext Markup Language
I-4.....	Interstate 4
I/F.....	Interface
ITN.....	Invitation to Negotiate
ITS.....	Intelligent Transportation Systems
IVR.....	Interactive Voice Response
LOS.....	Level of Service
MDT.....	Mobile Data Terminal
MWRD.....	Millimeter Wave Radar Detector
NTCIP.....	National Transportation Communications for ITS Protocol
PTMC.....	Portable Transportation Management Center
RTMC.....	Regional Transportation Management Center
RWIS.....	Road Weather Information System
STMC.....	Satellite (or Secondary) Transportation Management Center
STMCSLS.....	Statewide Transportation Management Center Software Library System
TGC.....	Telecommunications General Consultant
TMC.....	Transportation Management Center
VIDS.....	Vehicle Image Detector System
VTMC.....	Virtual Transportation Management Center
WWW.....	World Wide Web
XML.....	eXtensible Markup Language

1. Overview

The *Florida Statewide 511 Conceptual Design Plan* details issues, recommendations, and solutions for implementing 511 advanced traveler information systems (ATIS) in areas of Florida remaining outside of the areas covered by the regional 511 systems, such as Southeast Florida and Interstate 4 (I-4) through Orlando and the Tampa Bay area.

Previous documentation discusses the availability of data regarding the system's coverage area (e.g., roadways, segments, and transportation facilities), construction, restrictions, and incident information, as well as the current levels of service (LOS) offered by telecommunications companies doing business in Florida.

The purpose of this document is outlined in the following section and documentation follows recommending a call routing strategy for landline and wireless translations of the 511 code, as well as the functional requirements for the statewide 511 system and a budget estimate for providing the statewide 511 services. Finally, a complete, conceptual design for the statewide 511 system will be presented.

2. Purpose

The purpose of this *Technical Memorandum* is to describe the current data gathering platforms and practices that can be used to provide the information to propagate the statewide 511 ATIS. In responding to specific areas of the Task Work Order, this *Technical Memorandum* will:

- Recommend a platform or methodology for maintaining an updated database from each disparate area (i.e., district office); and
- Recommend modifications to current data collection practices and system improvements or new system implementations to generate required content.

Additionally, this *Technical Memorandum* contains recommendations to solve issues resulting from a lack of available data and raises new issues regarding data entry and data management.

Information contained in this *Technical Memorandum* was developed based on interviews with representatives from each Florida Department of Transportation (FDOT) district office, the Florida Highway Patrol (FHP), and Florida's Turnpike Enterprise. Additional information was developed as a result of discussions with FDOT officials regarding correlation of these findings with other tasks and projects currently being developed by the FDOT.

3. Data Gathering Practices

3.1 Current Data Gathering

The interviews with the FDOT district offices that were used to develop *Technical Memorandum No. 1, Coverage, Facilities, and Content*, resulted in the understanding that the FDOT district offices do not have a singular method of gathering, fusing, or delivering pertinent travel data. Construction and road closure or lane restriction information is gathered from construction offices, with real-time information coming from the FHP.

Information collected at the district offices is delivered weekly to the FDOT Intelligent Transportation Systems (ITS) Office for “coding” into the MyFlorida Major Highway Construction Web page located at <http://www.dot.state.fl.us/publicinformationoffice/construc/constmap/constmap.htm>. All data is delivered manually, via fax or electronic mail (e-mail), and follows no predetermined database structure.

The FHP collects and fuses incident data for delivery to a Web page located at <http://www.fhp.state.fl.us/traffic/index.html>. This Web page links to information within each district regarding active incidents under investigation by the FHP.

The FHP data is culled directly from the police dispatch computers, in a predetermined format, for delivery to the mobile data terminals (MDTs) in the police cruisers. The information is categorized by county, incident type, location, dispatch, and arrival times. However, the information presented only shows active incidents and does not list roadways or facilities where there are no current FHP activities.

3.2 Current Database Platforms

The above lends itself to the conclusion that there is no database or platform the FDOT can use as a foundation for a new database for implementing the statewide 511 ATIS.

The reports from the district offices are written free-form and, after delivery to the ITS Office, the details are entered into the FDOT Web site in hypertext markup language (HTML), not into a database for conversion to HTML.

Dispatchers follow a defined structure for entering FHP information, and this structure or format is visible when the information is viewed on the FHP Web site. However, the structure allows for only a high level of categorization. The information available for viewing includes the county in which the incident is located, the incident type (e.g., accident, disabled vehicle, etc.), the location where the incident is taking place, and the dispatch and arrival times.

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Missing from these requirements is a listing of the roadway that is affected by the incident (i.e., the location requirement does not follow a specific format when listing the roadway), as well as effected lanes or closures, and any additional detail.

Also notable is that the dispatch system is not a complete database. The system does not “hold a slot” for each roadway in the area. In other words, if there are no incidents in a district, there is no information available for the district, which is far different from presenting the information that conditions are normal because there are no incidents reported.

4. Data Gathering and Database Options

4.1 Background

On October 21, 2002, the FDOT released an Invitation to Negotiate (ITN) for the development and implementation of the Statewide Transportation Management Center Software Library System (STMCSLS). This system aspires to be “the most technically comprehensive advanced traffic management system (ATMS) software available and will establish a standard at all transportation management centers (TMCs) throughout the State of Florida.”

With this new system, each TMC will collect, assess, and manage real-time traffic data and video. The TMC can then deliver meaningful and accurate traffic management information to the public and commercial vehicle operators.

The concepts put forth in the ITN are well suited for providing and sharing data to propagate the statewide 511 ATIS. By implementing a new Florida Intrastate Highway System (FIHS) Conditions System for the collection and fusion of statewide ATIS information, the FDOT will be able to monitor and maintain a new database for propagating the statewide 511 system, as well as other dissemination platforms. The FIHS Conditions System will be implemented by confirming that the data structure aligns with and creates an output as a component of the STMCSLS. This new component will therefore be a part of the overall statewide database, thus maximizing the capabilities of the system.

However, the STMCSLS is not scheduled for full deployment until 2008 and should be viewed as a long-term solution only. An interim solution must be implemented for the statewide 511 ATIS.

4.2 Design / Build Recommendation

4.2.1 Near-Term Solution and Operational Approach

For the statewide 511 ATIS to be implemented, it is recommended that the FDOT contract with a consultant or independent service provider to implement the FIHS Conditions System for the collection and fusion of statewide ATIS information.

The FIHS Conditions System will ingest the available automated information for fusion with data entered manually, either by the FDOT district offices or by an independent service provider charged with gathering supplemental information for the purpose of fully propagating the statewide 511 ATIS database. The FIHS Conditions System will fuse automated information from the FHP data and any FDOT data that is (or may become) available prior to the STMCSLS becoming active.

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Information from the FDOT district offices will consist primarily of construction and road restriction information, as well as any pertinent emergency information (e.g., evacuation procedures or routes, etc.).

Data entered manually will be fused with automated data and then segregated into defined road segments, creating a cohesive data file. This data file will then be presented to users through the statewide 511 ATIS.

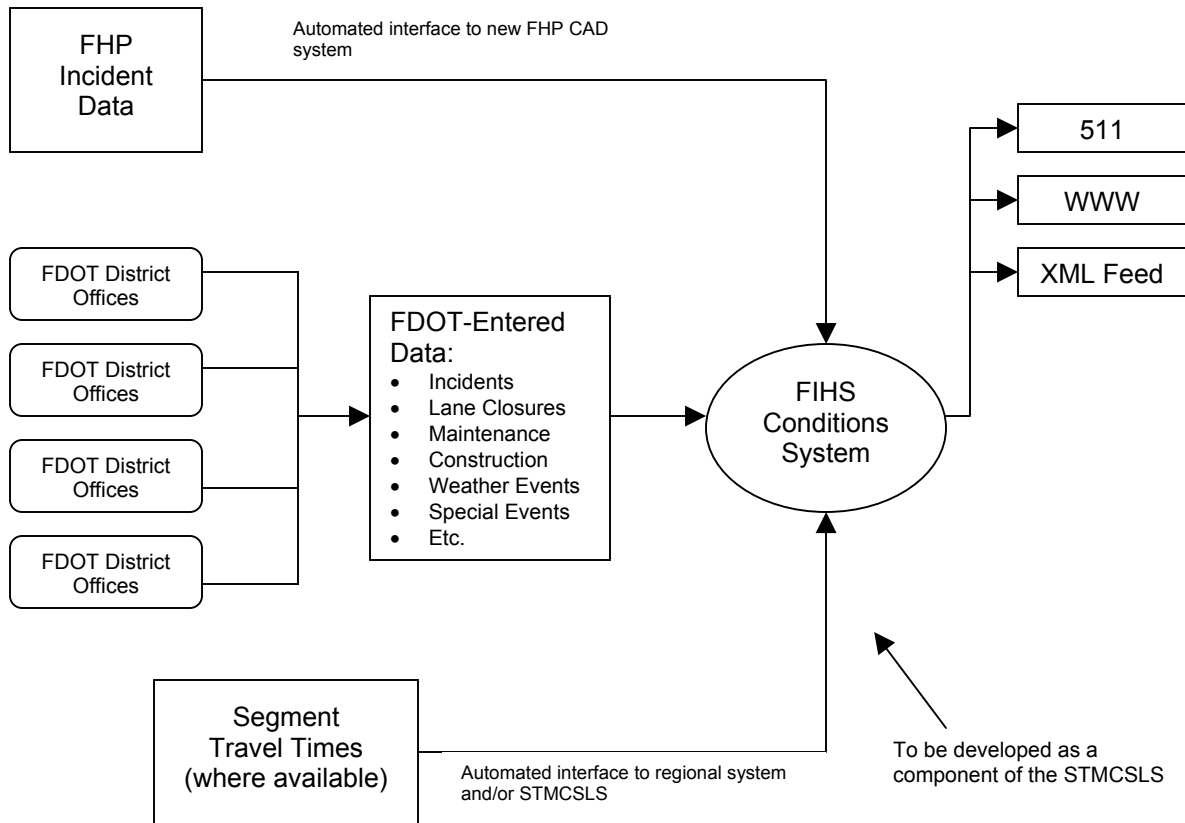
This solution will be explored in greater depth in *Technical Memorandum No. 6, Conceptual Design for the Statewide 511 Advanced Traveler Information System (ATIS)*.

In this recommended approach, the contracted independent service provider will be responsible for administration of the automated data feeds to the FIHS Conditions System, as well as management of the operators who are manually entering the information gathered from outside resources. This may also include supervision of data entered by the FDOT district offices.

The system will provide a database encompassing the roadways, segments, and facilities designated for the statewide 511 system. The FIHS Conditions System will allow for multiple data entry points (i.e., the FDOT district offices, the ITS Office, etc.) and will fuse the data into a cohesive structure that will be accessed by the 511 interactive voice response (IVR) system.

The independent service provider is responsible for the oversight of both the automated and manual entry systems, as well as the data feed to the statewide 511 ATIS. Regular data entry reviews and data maintenance are necessary to ensure that quality information is being delivered to end-users by verifying that the data existing in or being added to the system is current and correct.

Figure 4.1 – FIHS Conditions System

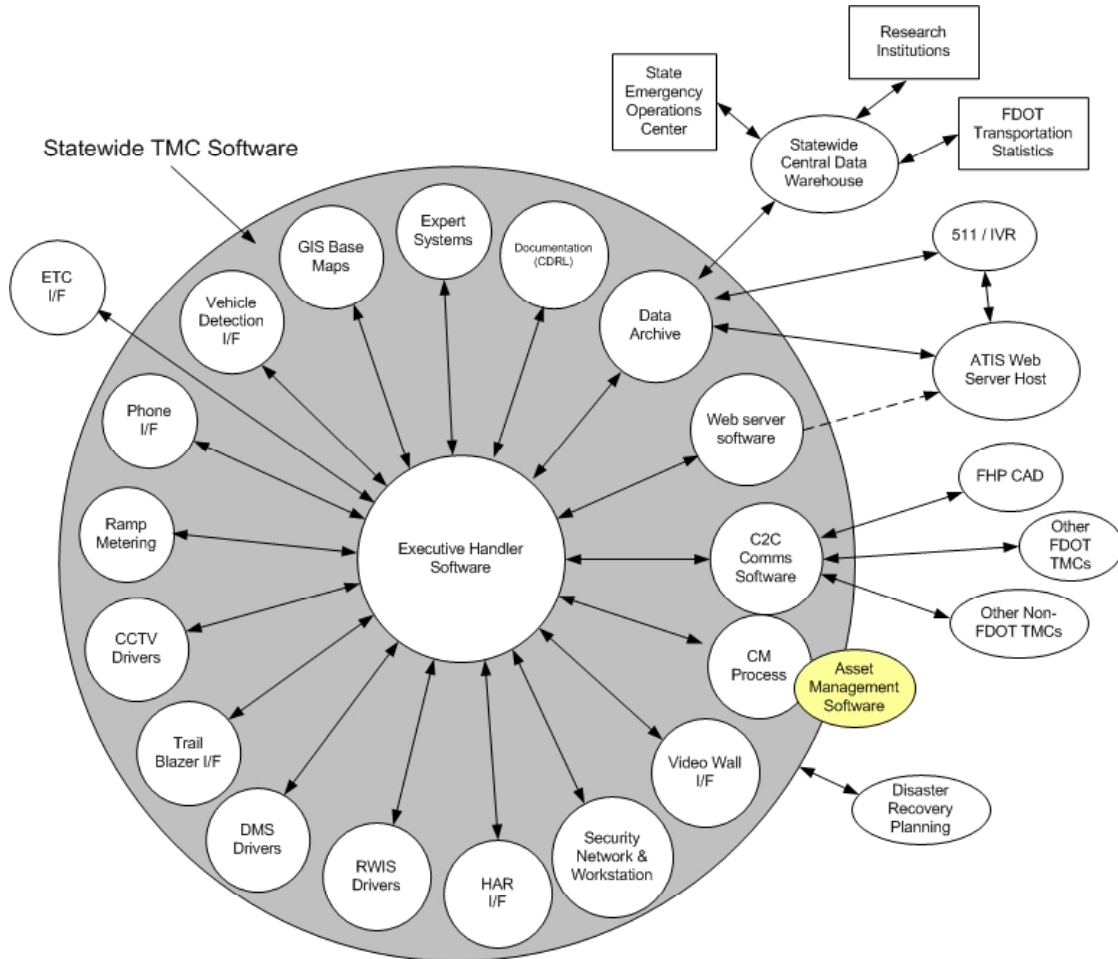


4.2.2 Long-Term Solution and Operational Approach

Linking the FIHS Conditions System to the STMCSLS is a very valuable long-term solution. The combination of these systems will take full advantage of the capabilities currently envisioned for the STMCSLS, but with the addition of a specialized data file and output format to propagate the statewide 511 ATIS with construction, incident, and travel-time data.

The components of the FDOT’s STMCSLS that are currently under contract to be developed and delivered are depicted in Figure 4.2. Components illustrated within the gray circle are part of the project. The STMCSLS will interface with the entities outside the circle. Part of the contract vendor’s responsibility is to define and document those interfaces. The software that accomplishes center-to-center communications will be developed in accordance with National Transportation Communications for ITS Protocol (NTCIP) standards. In addition, an interface to a life-cycle asset management software system is required.

Figure 4.2 – STMCSLS Concept of Operations



A brief description of some of the major components of the STMCSLS is provided in Table 4.1. The contract vendor will specify the TMC computer equipment required to meet the STMCSLS needs. Figure 4.2 indicates that the STMCSLS will archive data and provide an interface with the central data warehouse, state and regional 511 systems, and a FDOT traveler information Web site.

Table 4.1 – STMCSLS Computer Equipment Requirements

Component/Item	Description
Field Device Drivers	The types of drivers required include dynamic message signs (DMS), closed-circuit televisions (CCTV), and vehicle detection devices, such as loops, millimeter wave radar detectors (MWRD), and vehicle image detector systems (VIDS).
Road Weather Information System (RWIS)	The STMCSLS will interface with the RWIS to get real-time road condition data.
Highway Advisory Radio (HAR)	The STMCSLS will interface with the HAR to provide messages for broadcasts based on current TMC-detected conditions.
Video Wall Interface	The STMCSLS will interface with a video matrix switch and video wall system to select and route CCTV video-to-video displays.
Geographic Information System (GIS) Base Map(s)	The STMCSLS will use a FDOT-provided ArcView GIS map database and update that map database as required for TMC operations.
Expert Systems	The STMCSLS will incorporate expert systems software to recommend what response the TMC operators will provide when an event or alarm occurs.
Documentation	The STMCSLS will be provided with a complete set of software in accordance with the contract deliverable requirements list (CDRL) contained in this document.
Data Archive	The STMCSLS will archive data and provide an interface with the central data warehouse, state and regional 511 systems, and a FDOT traveler information Web site.
Web Server Software	The STMCSLS will include Web software to present TMC information to users seeking travel information through the Internet. Hosting of the Web software is outside the scope of the STMCSLS project.
Center-to-Center Communications Interface	<p>The design and specification of center-to-center communications will be accomplished through a separate contract with the FDOT Telecommunications General Consultant (TGC). The interface between the TMC software and the center-to-center communications software is subject to technical discussions between the STMCSLS contractor and the TGC; however, it is intended that the center-to-center communications be provided or acquired software drivers by the TGC and that it is to be used by the TMC software when needed. The STMCSLS contractor shall provide plug-ins for center-to-center communications. An interface control document will be developed to manage the center-to-center interface. The TGC and the STMCSLS contractor will jointly develop this interface and its documentation.</p> <p>The STMCSLS will use the center-to-center software to communicate with other FDOT TMCs, such as regional transportation management centers (RTMCs), satellite (or secondary) transportation management centers (STMCs), virtual transportation management centers (VTMCs), and portable transportation management centers (PTMCs), as well as with other city TMCs, emergency operations centers (EOCs), emergency management responder sites, transit, etc.</p>
Life-Cycle Asset Management	The STMCSLS will interface with external life-cycle asset management software to track TMC software and hardware assets.
Configuration Management	The STMCSLS will provide a process and software as required to manage the configuration of a TMC. This function is expected to also interface with the external life-cycle asset management software.

Once installed, each individual data entry point (i.e., an FDOT district office, the ITS Office, etc.) will have the ability to enter their own data, as well as view data entered by other offices and authorized users. The system will be capable of ingesting and fusing data received from automated sources such as the FHP incident data file and automated travel-time data sources. Additionally, the FIHS Conditions System will be able to interact and remain synchronous with the central data warehouse and, therefore, the STMCSLS.

The operational approach to data entry in this long-term solution is vital to system implementation. As in the near-term approach, daily entries and data maintenance are necessary to ensure that quality information is being delivered to end-users by verifying that the data existing in or being added to the system is current and correct.

It is envisioned that, for the STMCSLS, the FDOT district offices will enter information individually, with each office responsible for entries in their own area. These construction and road restriction information entries will replace current submissions to the FDOT ITS Office. Automated information received from the FHP database or other information, such as travel-time data, also needs to be validated in order to guarantee that all information correlates with other system information. An independent service provider will probably be required to perform some level of oversight and maintenance to assure a quality service.

Once fully implemented, the STMCSLS will become the primary data entry point, while the FIHS Conditions System will become a branch of the data structure with a specialized output for ATIS and other services.

5. Management of the FIHS Conditions System

The issue of oversight and data management is one that must be decided by the FDOT in order to maintain a consistent volume of data as well as a consistent level of data quality between all sources. There are essentially two options for managing these issues:

- Decentralized quality control; and
- Centralized quality control.

Additionally, there will be a need for oversight of certain data regardless of the option chosen for managing the overall system.

5.1 Option 1 – Decentralized Quality Control

In this option, the responsibility for maintaining a proper flow of data and for the quality of the data entered into the system resides with the district offices. Each district office will be charged with ensuring that required information, such as road closures, restrictions, and other pertinent, real-time data, is entered into the database with enough detail to create an understandable message when delivered to the public through the 511 system.

Each district office will also be responsible for entering data in a consistent manner in order to ensure 511 users that the level of detail and volume of information entered into the system is consistent on a day-to-day basis. This form of “self-management” means that each district office will be responsible for maintaining a level of consistency parallel to other district offices.

The responsibility for quality assurance for the entered information will belong to the ITS Office General Consultant (GC). However, since each district office is actively responsible for its own data entry and maintenance, the ITS Office’s responsibility is one of passive assurance. In other words, the ITS Office will check to make sure that information from each district is entered on a regular basis, but will not necessarily validate the information.

5.2 Option 2 – Centralized Quality Control

In this option, the responsibility for maintaining the proper flow of data and for the quality of the data entered into the system *still* resides with the district offices. As in Option 1, each district office will be charged with ensuring that required information is entered into the database with enough detail to create an understandable message when delivered to the public through the 511 system.

However, the responsibility for assuring a consistent LOS for each district office's entries, as well as ensuring that the district offices are maintaining the proper volume and quality of information, falls to the ITS Office or the ITS Office GC. The district offices will also respond to requests from the ITS Office to augment or update their data in order to create a LOS consistent with that of other district offices' entries.

While the district offices will be ultimately responsible for the individual messages and content entered into the system, the ITS Office will act as an active quality control manager to ensure consistency throughout the system. Should a district office be lax in following-up on entered information, or should information entered by one district office conflict with another district office's information, the ITS Office's responsibility will be to mitigate the situation and make efforts to align the information between the districts so that a consistent message is made available to the system's end-users.

5.3 Monitoring of FHP and Travel-Time Data

Regardless of the solution chosen for data entry, an additional oversight position is required in order to monitor and perform quality control on the automated data received from the FHP dispatch interface, as well as any automated travel-time data. This position will also serve as a high-level quality control on all data entry and data flow, with the level of involvement in managing district office entries determined by the decision made on the issue above.

If the decision is made to operate a decentralized quality control environment, then each district office will have the responsibility of ensuring that information within their district, even if it is generated from automated sources such as the FHP database, aligns with information manually entered into the system by their own offices.

If the decision is made to operate a centralized quality control environment, then the ITS Office or the ITS Office GC will have the responsibility of ensuring that all information generated from automated sources aligns with information entered manually from the district offices. If some of this information does not align properly, the ITS Office's responsibility will be to mediate between the information sources to present a consistent message to users of the system.

5.4 Management of the FIHS Conditions System by an Independent Service Provider

In the above management solutions, the FDOT ITS Office maintains the responsibility for oversight of data entries and data maintenance. The FDOT may choose to contract with an independent service provider to perform these functions, not only for the near-term FIHS Conditions System solution, but also for the long-term solution involving the STMCSLS.

Regardless of the near-term or long-term solution, these oversight functions must be maintained to assure that quality data is entered into the system, either through automated or manual entry, and to ensure that a quality service is being delivered to the end-user.