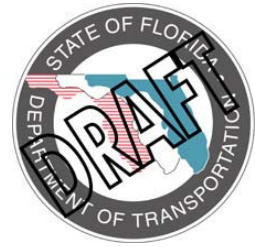


## Technical Memorandum No. 9



# Intelligent Transportation Systems Deployment Analysis System Customization

## Requirements Verification

September 29, 2004  
Version 1



Prepared for:

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*Technical Memorandum No. 9  
IDAS Customization – Requirements Verification*



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## List of Acronyms

APTS.....	Advanced Public Transit System
ATIS.....	Advanced Traveler Information System
ATMS .....	Arterial Traffic Management System
BPR.....	Bureau of Public Roads
CCTV.....	Closed-Circuit Television
CFP.....	Cost Feasible Plan
CVO .....	Commercial Vehicle Operations
DMS.....	Dynamic Message Sign
ETC.....	Electronic Toll Collection
FDOT .....	Florida Department of Transportation
FHWA.....	Federal Highway Administration
FIHS.....	Florida Intrastate Highway System
FFN.....	Florida Fiber Network
FMS.....	Freeway Management System
FSUTMS.....	Florida Standard Urban Transportation Modeling System
I-95.....	Interstate 95
IDAS.....	ITS Deployment Analysis System
IMS.....	Incident Management System
ITS.....	Intelligent Transportation System
JPO.....	Joint Program Office
MOE.....	Measure of Effectiveness
MTF.....	Model Task Force
O&M.....	Operations and Maintenance
OOCEA.....	Orlando-Orange County Expressway Authority
PDO.....	Property Damage Only
SPO.....	System Planning Office
TEOO.....	Traffic Engineering and Operations Office
TMC.....	Transportation Management Center
USDOT.....	United States Department of Transportation
USEPA.....	United States Environmental Protection Agency
V/C.....	Volume-to-Capacity



## **1. Introduction**

The Intelligent Transportation Systems (ITS) Deployment Analysis System (IDAS) is a sketch planning analysis tool that can be used to estimate the impacts and costs resulting from the deployment of ITS components. The set of impacts that IDAS evaluates includes changes in several performance measures, such as travel time/speed, travel-time reliability, fuel costs, operating costs, accidents, emissions, and noise. IDAS also provides benefit-to-cost comparisons of ITS improvements both individually and in combinations.

The IDAS software includes default values for the inputs required to calculate ITS deployment costs and benefits. These defaults are based on the analysis of data presented in the United States Department of Transportation's (USDOT) *ITS Benefits* and *ITS Costs Databases*.<sup>1,2</sup> The default benefits are also based on an extensive literature review that the IDAS developers performed during the initial software development. The IDAS program allows users to override the default values of the cost and benefit module parameters by inputting their own estimates of these parameters.

The Florida Department of Transportation (FDOT) Traffic Engineering and Operations Office (TEOO) ITS Section initiated this program to identify Florida-specific cost and benefit parameters and databases for use as IDAS inputs in the assessment of Florida ITS deployment alternatives. The project also identified a methodology for ranking ITS deployment alternatives based on IDAS outputs and other measures. In addition, the project includes a task to test the interface between the Florida Standard Urban Transportation Modeling System's (FSUTMS) demand model and IDAS developed by the FDOT Systems Planning Office (SPO).

*Technical Memorandum No. 1*<sup>3</sup> of this project discusses the technical requirements identified for the project tasks. These requirements have defined the needs that the project tasks should fulfill.

*Technical Memorandum No. 9* examines the technical requirements associated with project tasks and verifies that the performed project tasks have satisfied these requirements.

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<sup>1</sup> United States Department of Transportation, Intelligent Transportation Systems Joint Program Office, *ITS Benefits Database*. Available online at <http://www.benefitcost.its.dot.gov/its/benecost.nsf/ByLink/BenefitsHome>

<sup>2</sup> United States Department of Transportation, Intelligent Transportation Systems Joint Program Office, *ITS Costs Database*. Available online at <http://www.benefitcost.its.dot.gov/benecost.nsf/ByLink/CostHome>

<sup>3</sup> Hadi, Mohammed (PBS&J), *Technical Memorandum No. 1: ITS Deployment Analysis System (IDAS) Customization – Project Technical Requirements, Version 1* (July 2003). FDOT Contract No. C-7772, Task Work Order No. 17. Available online at <http://floridait.com/IDAS.htm>



## **2. Verification of Cost Parameter Requirements**

*Technical Memorandum No. 4*<sup>4</sup> of this project recommended Florida-specific defaults for ITS equipment unit costs and assumptions in IDAS. The default unit costs were recommended based on data obtained from three sources, including:

- Data collected from agencies responsible for deploying and maintaining ITS in Florida. This data was collected using a questionnaire that was developed and distributed to various public-sector agencies in Florida;
- Statewide pay item costs obtained from the FDOT State Estimates Office Web site; and<sup>5</sup>
- Previous ITS study cost estimates.

The recommended updates to the IDAS cost database identified in *Technical Memorandum No. 4* include updates to capital costs, operations and maintenance (O&M) costs, equipment quantity assumptions, and device life-cycle assumptions.

Table 2.1 evaluates the analysis presented in *Technical Memorandum No. 4* in relation to the technical requirements necessary for the update and adoption of the IDAS cost database to reflect Florida conditions as identified in *Technical Memorandum No. 1*.

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<sup>4</sup> Hadi, Mohammed, and Prasoon Sinha (PB S&J), *Technical Memorandum No. 4: Intelligent Transportation Systems Deployment Analysis System Customization – Florida-Specific Intelligent Transportation System Deployment Costs, Version 2* (August 2004). FDOT Contract No. C-7772, Task Work Order No. 17. Available online at <http://floridait.com/IDAS.htm>

<sup>5</sup> The statewide pay item costs are available online at <http://www.dot.state.fl.us/Estimates>



**Table 2.1 – Testing of the Technical Requirements for the Update and Adoption of IDAS Cost Parameters to Reflect Florida Conditions**

Requirement Number	Requirement	Requirement Verification
1.0	The study shall update the IDAS ITS cost default values to reflect Florida statewide conditions.	Table 6.7 of <i>Technical Memorandum No. 4</i> recommends Florida-specific ITS costs and compares these to the costs reported in the Joint Program Office's (JPO) <i>ITS Costs Database</i> , the IDAS Cost Database, and Florida's <i>ITS Plan's</i> <sup>6</sup> database. <i>Technical Memorandum No. 6</i> <sup>7</sup> gives details on implementing these recommendations in IDAS.
2.0	Recommended updates to the IDAS costs shall be limited to the eight ITS deployment categories addressed in the <i>ITS Plan</i> , including arterial traffic management systems (ATMS), freeway management systems (FMS), incident management systems (IMS), regional multimodal advanced traveler information systems (ATIS), electronic toll collection (ETC), commercial vehicle operations (CVO), emergency management services, and supporting deployments.	Updates were made to elements of the eight categories, except the regional multimodal ATIS category due to the lack of Florida cost information. Costs of advanced public transit system (APTS) deployment elements have also been identified.
3.0	The study shall recommend lifetimes for ITS projects.	IDAS assumes a 20-year ITS project lifetime. However, individual ITS device lifetimes vary and replacement costs are included in IDAS to account for this. This same approach is used in this study with some of the device lifetime assumptions updated according to the responses received from ITS agencies.

<sup>6</sup> Shaw, Terrel (PBS&J), *Intelligent Transportation Systems Plan: Saving Lives, Time, and Money, Version 2* (January 2003). FDOT Contract No. C-7772, Task Work Order No. 3. Available online at [http://www.dot.state.fl.us/trafficoperations/its/its\\_default.htm](http://www.dot.state.fl.us/trafficoperations/its/its_default.htm)

<sup>7</sup> Hadi, Mohammed, and Prasoon Sinha (PBS&J), *Technical Memorandum No. 6: Intelligent Transportation Systems Deployment Analysis System Customization – Integration and Testing of Customized Florida Costs and Benefits, Version 1* (August 2004). FDOT Contract No. C-7772, Task Work Order No. 17. Available online at <http://floridait.com/IDAS.htm>



**Table 2.1**  
 (CONTINUED)

Requirement Number	Requirement	Requirement Verification
4.0	The ITS deployments' default components shall be identified to the detail level required to allow the selection between ITS deployment alternatives.	<i>Section 7 of Technical Memorandum No. 4</i> identifies recommended changes to the list of equipment types.
5.0	The study shall provide guidelines for overriding Florida's statewide default costs and benefits based on information collected locally.	<i>Technical Memorandum No. 4</i> notes that Florida's existing ITS deployment cost data is very limited. This does not allow a detailed statistical analysis of the effect of various regional and local area attributes on the deployment costs. This type of data is expected to become available in the next few years, allowing more detailed investigation. To address this issue in this study, the low and high recommended capital and O&M costs are identified for ITS deployment components. In addition, <i>Technical Memorandum No. 4</i> presents the existing ITS deployment costs by region. The user should examine the costs reported for different regions to determine if the variations between these regions justify the selection of low, high, average, or different values for a given ITS deployment component.
6.0	The study's results shall be provided to the JPO for potential use in updating their ITS unit costs.	The study results will be provided to the JPO.
7.0	The study shall identify a process for annually updating and maintaining the customized Florida ITS unit costs database.	<i>Section 10 of Technical Memorandum No. 4</i> presents a process for the annual update of the Florida-specific IDAS cost parameters.



**Table 2.1**

(CONTINUED)

Requirement Number	Requirement	Requirement Verification
8.0	A distribution and installation process will be developed so IDAS users can obtain copies of Florida's customized defaults and prioritization strategy with the IDAS software. A user's manual will be prepared to instruct users on installation and utilization of Florida's default databases and prioritization methodology.	<i>Technical Memorandum No. 7</i> <sup>8</sup> presents the required processes for distributing, installing, and using the Florida-specific cost databases and parameters.
9.0	Testing of the project technical requirements will be conducted to ensure satisfactory completion and project acceptance.	This is provided in this document.
10.0	The study will recommend a standard input for an analysis time period in IDAS. A consistent time period for analysis will also be recommended for the development of the automated interface. The interface will allow users to automatically convert volumes to the appropriate analysis time period.	The <i>FSUTMS/IDAS Final Report</i> <sup>9</sup> that the FDOT SPO developed recommends analysis duration periods for specific types of ITS options.

<sup>8</sup> Hadi, Mohammed, and Prasoon Sinha (PBS&J), *Technical Memorandum No. 7: Intelligent Transportation Systems Deployment Analysis System Customization – The Customized Intelligent Transportation Systems Deployment Analysis System Application, Version 1* (September 2004). FDOT Contract No. C-7772, Task Work Order No. 17. Available online at <http://floridait.com/IDAS.htm>

<sup>9</sup> Cambridge Sytematics, Inc., *FSUTMS / IDAS Interface – Manual Approach: Final Report* (April 2003). Available online at <http://floridait.com/IDAS.htm>



**Table 2.1**  
 (CONTINUED)

Requirement Number	Requirement	Requirement Verification
11.0	The default capital cost data updates shall be based on cost data from ITS projects on Florida highways and toll authority highways from all Florida regions.	<p>Overall, a total of 87 questionnaires were distributed to agency representatives from all Florida regions. Only 12 agencies responded to the survey. Five of the agencies responded that they were unable to provide the requested information. The other seven agencies provided ITS cost information in various formats for various ITS elements. These agencies included the:</p> <ul style="list-style-type: none"> <li>• FDOT District 2 ITS Program;</li> <li>• FDOT District 4 ITS Program;</li> <li>• FDOT District 6 ITS Program;</li> <li>• FDOT District 7 ITS Program;</li> <li>• Lee County Traffic Engineering;</li> <li>• Broward County Traffic Engineering Division; and</li> <li>• Orlando-Orange County Expressway Authority (OOCEA).</li> </ul> <p>More agencies are expected to respond in future updates.</p>
12.0	The study shall recommend life cycle updates for the ITS equipment included in IDAS, based on the collected information, if supporting documentation is available.	The surveyed agencies provided lifetime values for currently deployed ATMS field devices, such as closed-circuit television (CCTV) cameras, dynamic message signs (DMS), and vehicle detectors. These values were used to identify default lifetimes for these devices in Florida.
13.0	The project cost data used in deriving the updates shall be examined to determine the validity of older data.	Due to the limited amount of data available, all of the data the agencies provided were used in the analysis. Most ITS deployments in Florida have occurred in the last five years and this factor is not anticipated to have a major influence on cost estimation at this time.
14.0	The collected project costs shall be examined to determine their applicability to the study's purpose, and to identify any special conditions and/or requirements that might have affected project costs.	This was done as part of the discussion with the agencies that provided the cost estimates.



**Table 2.1**  
 (CONTINUED)

Requirement Number	Requirement	Requirement Verification
15.0	The study shall identify any differences in capital, maintenance, and operational costs between urban and rural ITS deployments, and account for these differences when calculating the default values.	Few rural ITS deployments currently exist in Florida. This will change in future years, allowing this factor to be considered.
16.0	The study shall identify any differences in capital, maintenance, and operational costs between freeway and surface street ITS deployments, and account for these differences when calculating the default values.	When possible, differences were identified in ITS costs between arterial streets and freeways. Different costs for the two facility types were identified for CCTV, DMS, and detection systems.
17.0	The study shall identify any modification necessary to the type and quantity of ITS equipment required for each ITS deployment type included in IDAS.	<i>Section 7 of Technical Memorandum No. 4</i> addresses this issue.
18.0	The identified default costs shall take into account the type of communication system used (i.e., fiber optic, leased versus owned lines, and wireline versus wireless).	This issue was addressed in detail in <i>Section 7 of Technical Memorandum No. 4</i> .
19.0	The study shall recommend a discount rate and inflation factor for use in calculating ITS deployment life-cycle costs.	This was done in <i>Sections 8 and 9 of Technical Memorandum No. 4</i> .
20.0	The study shall identify the low, average, and high values for ITS equipment costs.	Table 6.7 of <i>Technical Memorandum No. 4</i> identifies low and high values for each deployment.
21.0	Wide ranges between low and high equipment costs shall be examined to determine the reasons for the large differences in reported costs.	This was done as part of the selection of low and high values for each deployment.
22.0	Large differences between the Florida ITS unit costs database and the JPO's <i>ITS Costs Database</i> shall be identified for further examination by the JPO.	The identified costs will be provided to the JPO.
23.0	The study shall identify statewide cost-sharing assumptions between the public and private sectors for use as IDAS inputs.	At this stage, no recommendations are given for cost-sharing assumptions. The user should make these assumptions on a case-by-case basis.



**Table 2.1**

(CONTINUED)

Requirement Number	Requirement	Requirement Verification
24.0	The study shall recommend a process for maintenance, review, and approval of the Florida ITS costs database prior to distribution for external office use.	This was done as part of <i>Technical Memorandum Nos. 4 and 7</i> .
25.0	The study shall provide the FDOT State Estimates Office with additional, up-to-date ITS cost data to supplement existing construction and transportation cost databases.	The study will be provided to the FDOT State Estimates Office.



### 3. Verification of Benefit Parameter Requirements

Technical Memorandum No. 5<sup>10</sup> of this project recommended Florida-specific defaults for the ITS equipment benefit parameters in IDAS. IDAS calculates ITS deployment impacts and their dollar values using three different calculation components, including the:

- **Benefit Modules** – These modules predict the network traffic volume and travel time using trip assignment, mode choice, temporal choice, and induced/forgone demand modules. Other measures of effectiveness (MOEs) are calculated using environmental, safety, and travel-time reliability modules;
- **ITS Default Impacts Database** – For each ITS component considered by IDAS, the program provides default ITS impact values. IDAS uses these values to adjust the MOEs calculated using the IDAS benefit modules to account for the ITS impacts; and
- **ITS Impacts Dollar Values** – To allow the comparison of the benefits and costs of deployment alternatives, IDAS converts the calculated ITS benefits to dollar values using default coefficients.

The following are the sources used to obtain Florida-specific IDAS benefit information:

- An attempt was made to collect data from the agencies responsible for deploying and maintaining ITS in Florida. A questionnaire was developed and distributed to various Florida public-sector agencies, as described in *Section 2* of this document. The aim was to obtain information that could be used to justify changes to the ITS impact parameters;
- The FDOT Safety Engineer was contacted to obtain data regarding any derived relationships to estimate crash, injury, and fatality rates, and to estimate crash dollar values in Florida;
- The FDOT SPO was contacted to obtain information regarding the benefit module parameters; and
- A review of technical reports, conference proceedings, and journals was conducted to identify information relevant to this study.

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<sup>10</sup> Hadi, Mohammed, and Prasoon Sinha (PBS&J), *Technical Memorandum No. 5: Intelligent Transportation Systems Deployment Analysis System Customization – Florida-Specific Intelligent Transportation System Deployment Benefits, Version 1* (February 2004). FDOT Contract No. C-7772, Task Work Order No. 17. Available online at <http://floridait.com/IDAS.htm>



Table 3.1 evaluates the analysis presented in *Technical Memorandum No. 5* in relationship to the technical requirements necessary for the update and adoption of the IDAS benefits database and parameters to reflect Florida conditions.

**Table 3.1 – Testing of the Technical Requirements for the Update and Adoption of IDAS Benefit Parameters to Reflect Florida Conditions**

Requirement Number	Requirement	Requirement Verification
1.0	The study shall update the default values for ITS benefits in IDAS to reflect Florida-specific conditions.	<i>Technical Memorandum No. 5</i> examines the IDAS benefit module parameters, the IDAS ITS default impacts database, and the ITS impact dollar values. Where appropriate, it recommends changes to these parameters to reflect Florida conditions. <i>Technical Memorandum No. 6</i> presents the details of implementing these recommendations in IDAS.
2.0	The recommended updates to the IDAS impact database shall be limited to the eight ITS deployment categories addressed in the <i>ITS Plan</i> , including ATMS, FMS, IMS, regional multimodal ATIS, ETC, CVO, emergency management services, and supporting deployments.	Few studies are available that assess the impacts of ITS deployments in Florida. These studies were reviewed and recommendations were given regarding a limited update to the ITS impact database based on these studies.
3.0	The study shall provide guidelines for overriding the Florida statewide default benefit parameters based on information collected locally.	Recommendations were given in <i>Technical Memorandum Nos. 5, 6, and 7</i> regarding the use of regionally calibrated benefit module parameters, such as mode choice parameters, volume-delay curves, and emission parameters, if they exist. The study recommends the use of the identified statewide defaults for the ITS impact database and ITS dollar values.
4.0	The results of the study shall be provided to the ITS JPO for potential use in updating the <i>ITS Benefits Database</i> .	The final report from this study will be provided to the JPO.
5.0	The study shall identify a process for annually updating and maintaining customized Florida ITS benefits.	The annual update and maintenance of the benefits database was addressed in <i>Technical Memorandum Nos. 5 and 7</i> .



**Table 3.1**

(CONTINUED)

Requirement Number	Requirement Number	Requirement Number
6.0	Testing, validation, and verification of project technical requirements will be conducted to ensure satisfactory completion and project acceptance.	This <i>Technical Memorandum</i> provides this information.
7.0	The study shall provide recommendations for possible updates to the IDAS environmental model parameters, including emissions, fuel consumption, and noise parameters, to allow the reflection of Florida conditions.	Florida-specific emission rates were obtained for the years 1999 to 2030 based on the United States Environmental Protection Agency's (USEPA) MOBILE6 vehicle emissions modeling program run for the Tampa Bay area. No Florida-specific fuel consumption parameters or noise parameters could be identified.
8.0	The study shall provide recommendations for possible updates to the IDAS safety model parameters to estimate property damage only (PDO) crashes, injuries, and fatalities to allow the reflection of Florida conditions.	The safety model parameters utilized in IDAS Version 2.3 were examined and recommendations were given regarding their updates to reflect Florida conditions.
9.0	The study shall provide recommendations for possible updates to the dollar values assigned by IDAS to various performance measures, such as values of time, dollars per trip, dollars per mile, emission costs, fuel consumption costs, noise costs, and safety costs (i.e., PDO crashes, injuries, and fatalities) to allow the reflection of FDOT crash values.	<i>Technical Memorandum No. 6</i> identifies Florida-specific ITS impact dollar values.
10.0	The study shall identify and implement potential modifications to the default ITS benefit adjustment factors that are used to calculate deployment benefits for ITS components.	Only a limited number of studies are available that assess the impacts of ITS deployments. These studies were reviewed and recommendations were provided regarding the impact database update. The only addition/modification recommended was an increase in crash rates due to ETC deployments.
11.0	Potential modifications to the default benefit adjustment factors shall be examined to determine if the difference between the existing and proposed defaults can be justified.	The increase in crash rates due to ETC deployments was based on statistical analysis, and was attributed to an increase in speed variance and driver uncertainty regarding lane configurations.



**Table 3.1**

(CONTINUED)

Requirement Number	Requirement Number	Requirement Number
12.0	Any modifications to the default benefit adjustment factors shall be supported by a reliable ITS evaluation study that uses sound methodology with no flaws in the analysis.	The added increase in crash rates due to ETC deployments was based on the results of a research study that used sound statistical analysis.



## 4. Verification of Customized Florida IDAS Parameters' Integration and Testing Requirements

*Technical Memorandum No. 6* of this project discusses the integration and testing of the costs and benefits recommended in *Technical Memorandum Nos. 4* and *5* as part of a customized version of the IDAS program for Florida ITS deployment assessments. *Technical Memorandum No. 6* also discusses the validations and verification of this customized version.

Table 4.1 evaluates the work effort discussed in *Technical Memorandum No. 6* to determine if it satisfies the technical requirements necessary for the integration and testing of the customized cost and benefit databases and parameters for Florida conditions.

**Table 4.1 – Testing of the Technical Requirements for the Integration and Testing of Customized Florida Costs and Benefits**

Requirement Number	Requirement	Requirement Verification
1.0	The study shall update the default values for IDAS ITS benefits and costs to reflect Florida statewide conditions.	<i>Technical Memorandum No. 6</i> describes the development of Florida-specific cost and benefit databases. For parameter values that cannot be saved for future use in IDAS, the values of these parameters were provided for coding by the user.
2.0	The customized IDAS software shall be tested to ensure that the modifications will not result in the introduction of bugs that prevent the software from running correctly under all combinations of input parameters.	IDAS was tested using a real-world ITS deployment in Florida and the results were compared with the existing IDAS results for reasonableness.
3.0	Ease of use of the customized IDAS software shall be compared with that of the existing IDAS software to ensure that the software modifications will not introduce difficulties in using the software.	<i>Technical Memorandum No. 6</i> includes a section that addresses this issue. The section concludes that the modifications will not introduce difficulties in using the software.
4.0	The customized IDAS software calculations shall be verified by comparing the software calculations with manual calculations of the benefits and costs	The customized IDAS software calculations were verified by comparing the software calculations with manual calculations of the benefits and costs of the Interstate 95 (I-95) project deployment.



**Table 4.1**

(CONTINUED)

Requirement Number	Requirement Number	Requirement Number
5.0	The customized IDAS shall be validated by using the software to calculate the costs and benefits of an existing or planned real-world ITS deployment in Florida, as approved by the ITS Section's project manager. The validation shall also include testing the software to select between the above-mentioned ITS deployment and the control alternative (i.e., no ITS deployment).	The customized IDAS was validated by using the software to calculate the costs and benefits of the I-95 Phase III ITS deployment in Jacksonville. The estimated costs were compared with the actual costs of the project. Only the cost calculations for the ITS deployment could be validated. Benefits validation would have required field evaluation of ITS project benefits, which is not within the scope of this study.



## 5. Verification of FSUTMS / IDAS Interface Requirements

This section presents the identified requirements related to the development and testing of an interface between the FSUTMS demand model and IDAS. This interface has been developed under a separate project conducted by the FDOT SPO. The ITS Section, in coordination with the SPO, has tested the FSUTMS/IDAS interface and the results were presented in *Technical Memorandum No. 2*<sup>11</sup> of this study. In that document, it was noted that the requirements related to the interface development are to be addressed as part of the SPO project, while those that are related to interface testing shall be addressed as part of this project. Table 5.1 indicates whether the identified requirements have been satisfied by either this project or the SPO project.

**Table 5.1 – Verification of the Technical Requirements for FSUTMS / IDAS Interface Testing**

Requirement Number	Requirement	Requirement Verification
1.0	The SPO, with assistance from the ITS Section, shall test the interface to ensure that it meets the technical requirements.	The ITS Section conducted the interface test. <i>Technical Memorandum No. 2</i> discusses in detail the testing procedure, results, and findings.
2.0	A methodology for creating a local area IDAS baseline will be developed and recommended. Local ITS practitioners can use this IDAS baseline option as a “no build” alternative to which all ITS improvement alternatives shall be compared.	Discussion of the issue is presented in the <i>FSUTMS/IDAS Interface Final Report</i> prepared for the FDOT SPO.
3.0	A standardized equivalency table will be developed to assist in converting the FSUTMS facility types to IDAS facility types. As part of the automation phase, a standard equivalency file and routine will be developed to automatically convert the FSUTMS facility types to IDAS facility types.	As discussed in <i>Technical Memorandum No. 7</i> , this study does not recommend values for the volume-delay curve parameters to be used as statewide defaults. Rather, the user should enter the curve parameters that are most suitable for the analysis and region under consideration. The IDAS facility import spreadsheet can assist in this effort.

<sup>11</sup> Quigley, Diane E. and Arun Krishnamurthy (PBS&J), *Technical Memorandum No. 2: Intelligent Transportation Systems Deployment Analysis System Customization – Florida Standard Urban Transportation Model System/ITS Deployment Analysis System Interface Testing, Version 8* (August 2004). FDOT Contract No. C-7772, Task Work Order No. 17. Available online at <http://floridait.com/IDAS.htm>



**Table 5.1**

(CONTINUED)

Requirement Number	Requirement Number	Requirement Number
4.0	A standardized equivalency table will be developed to assist in converting the FSUTMS area types to IDAS area types. As part of the automation phase, a standard equivalency file and routine will be developed to automatically convert the FSUTMS facility types to IDAS facility types.	The interface tool produced as part of the SPO project automatically converts the FSUTMS two-digit facility type to the IDAS single-digit facility type classifications.
5.0	A standardized equivalency table will be developed to assist in converting the FSUTMS volume-to-capacity (V/C) curves to the IDAS V/C curves. As part of the automation phase, a standard equivalency file and routine will be developed to automatically convert the FSUTMS V/C curves to the IDAS V/C curves.	The FSUTMS/IDAS interface developed as part of the SPO project contains the Bureau of Public Roads (BPR) curve import tool to assist in importing customized BPR curves.
6.0	An analysis duration period will be recommended for each type of ITS deployment. A manual methodology for converting the daily traffic to peak-hour or peak-period traffic will be developed and will be automated in the second phase of the interface development. As part of the interface, users can input the FSUTMS volumes and select the analysis duration, which will automatically be converted to the appropriate time period based on the selected deployment type.	The FSUTMS/IDAS interface project recommends analysis duration periods for specific types of ITS options. A manual method for converting daily traffic to peak-period traffic will be developed in Phase 2, which will address the fully automated approach.
7.0	Step-by-step guidelines will be developed to assist users in identifying and locating the correct model values to be input in IDAS. Additionally, guidance should be provided on the coordination of the available model forecast year data and deployment implementation schedule.	<i>Technical Memorandum No. 7</i> discusses the identification of cost and benefit module parameters. Information is also presented in the FSUTMS/IDAS interface project documentation, and a partnering memorandum was created to guide users in identifying and collecting data.



**Table 5.1**

(CONTINUED)

Requirement Number	Requirement Number	Requirement Number
8.0	<p>A manual methodology process for converting the FSUTMS data for IDAS will be documented. Step-by-step instructions for locating and reformatting the data will be provided. Additionally, commonly encountered problems or issues related to the conversion of data will be noted, along with potential solutions. Once a consensus on methodology is obtained from the Statewide Model Task Force (MTF) and the ITS Steering Committee, the process will be automated as part of a phased implementation process.</p>	<p><i>Section 8 of the FSUTMS/IDAS Interface Final Report</i> provides a note on commonly encountered problems or issues. <i>Technical Memorandum No. 2</i> presents a list of issues encountered during the conversion of the FSUTMS data to IDAS data for this study.</p>
9.0	<p>The FSUTMS/IDAS interface shall be flexible to accommodate variations among Florida FSUTMS models.</p>	<p>The FSUTMS/IDAS interface has been tested with some urban area travel demand models in Florida and is flexible enough to address the unique characteristics in a majority of these models.</p>



## 6. Verification of the Application Process Requirements

This section presents the testing and verification of the technical requirements for the application process presented in *Technical Memorandum No. 7* of this study. This process is used to apply the customized IDAS cost and benefit parameters identified in this study to the evaluation of Florida ITS projects and the distribution of customized parameters to Florida IDAS users. This process also includes instructions for IDAS users on how to access, incorporate, and utilize the new parameters databases. Table 6.1 presents the results of this analysis.

**Table 6.1 – Verification of the Technical Requirements for the Customized IDAS Application Process**

Requirement Number	Requirement	Requirement Verification
1.0	A distribution method shall be identified that will allow Florida users to obtain copies of the customized IDAS databases and parameters, and the annual updates to these databases and parameters.	<i>Technical Memorandum Nos. 4, 5, and 7</i> address this requirement.
2.0	Instructions shall be provided to guide the user in incorporating and utilizing the customized IDAS databases and parameters.	<i>Technical Memorandum No. 7</i> addresses this requirement.
3.0	The instructions to utilize the customized IDAS shall be tested for ease of use and user friendliness.	<i>Technical Memorandum No. 7</i> addresses this requirement.
4.0	Instructions shall be given to customized IDAS users on how to reload and use the national defaults if so desired.	<i>Technical Memorandum No. 7</i> addresses this requirement.



## 7. Verification of Project Ranking Process Requirements

One of the project tasks is to recommend ITS project ranking and evaluation process measures evaluated by the IDAS program and other measures. *Technical Memorandum No. 8*<sup>12</sup> of this study presents the results of this task. The task objective is to develop a standard evaluation technique for ITS projects on Florida Intrastate Highway System (FIHS) facilities, and to ensure that the resulting analyses reflect the ITS program goals, objectives, and policies. Table 7.1 presents a verification that the work effort discussed in *Technical Memorandum No. 8* satisfies the project ranking process requirements.

**Table 7.1 – Verification of Technical Requirements for the Project Ranking Process**

Requirement Number	Requirement	Requirement Verification
1.0	The study shall determine IDAS' ability to calculate the Florida performance measures recommended in <i>Florida's Intelligent Transportation System Strategic Plan</i> <sup>13</sup> and the <i>FIHS Ten-Year ITS Cost Feasible Plan (CFP)</i> . <sup>14</sup>	<i>Technical Memorandum No. 8</i> identifies the IDAS calculated measures and off-model measures (i.e., measures that are calculated outside IDAS) for use in the ranking process.
2.0	The study shall determine whether Florida ITS performance measures not included in the IDAS output can be calculated based on the IDAS outputs.	This was done as part of <i>Technical Memorandum No. 8</i> , with scores calculated for some ranking criteria based on IDAS output and others based on off-model evaluations.

<sup>12</sup> Hadi, Mohammed, and Arun Krishnamurthy (PBS&J), *Technical Memorandum No. 8: Intelligent Transportation Systems Deployment Analysis System Customization – Project Evaluation and Ranking Processes Based on the Intelligent Transportation Systems Deployment Analysis System, Version 1* (September 2004). FDOT Contract No. C-7772, Task Work Order No. 17. Available online at <http://floridait.com/IDAS.htm>

<sup>13</sup> 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](http://www.dot.state.fl.us/trafficoperations/its/its_default.htm)

<sup>14</sup> Florida Department of Transportation, *Ten-Year ITS Cost Feasible Plan* (December 2003). Available online at [http://www.dot.state.fl.us/trafficoperations/its/its\\_default.htm](http://www.dot.state.fl.us/trafficoperations/its/its_default.htm)



**Table 7.1**

(CONTINUED)

Requirement Number	Requirement Number	Requirement Number
3.0	The study shall recommend IDAS statewide default weighting factors MOEs based on inputs from the FDOT Districts and the ITS Section.	The weights were assigned in <i>Technical Memorandum No. 8</i> based on the weights agreed to in the FIHS <i>Ten-Year ITS CFP</i> by the FDOT Districts' ITS engineers and the ITS Section. <i>Technical Memorandum No. 8</i> is being distributed to the FDOT Districts and the ITS Section for further input.
4.0	The study shall develop an ITS project ranking methodology that is able to rank alternative ITS deployments on the same roadway segment, as well as prioritize different roadway segments for ITS deployments.	The recommended methodology accommodates both types of ranking. <i>Technical Memorandum No. 8</i> provides case studies for the two types of ranking.
5.0	The developed ITS project ranking methodology shall be based on the IDAS outputs as well as other quantitative and qualitative measures.	<i>Technical Memorandum No. 8</i> identified IDAS-calculated measures and off-model measures (measures that are calculated outside IDAS) for use in the ranking process.
6.0	The ranking methodology will be tested to evaluate its application to FIHS ITS deployments.	<i>Technical Memorandum No. 8</i> contains case studies that include the methodology's application to FIHS ITS deployments.



## **8. Conclusion and Recommendations**

This *Technical Memorandum* has examined the technical requirements associated with various project objectives. It was found that the project tasks have satisfied most of the requirements. A number of FSUTMS/IDAS interface requirements have been satisfied by the interface development project conducted by the FDOT SPO. A few of the Florida cost module parameter requirements could not be fully satisfied due to limited data availability. However, it is expected that more ITS cost data will become available in the next few years, allowing the full satisfaction of these requirements.