Florida's Intelligent Transportation System Strategic Plan

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RESOURCE DOCUMENTS

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RESOURCE DOCUMENTS

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INTRODUCTION

A survey of ITS activities and programs of other states and agencies is part of Task 1 in the scope of services. A survey questionnaire was produced, reviewed and finalized in July 1998. A copy of the survey questionnaire is in Appendix A.

The questionnaire was mailed to twenty-three (23) state DOTs and ITS operating agencies throughout the U.S. A list of contacts that was used in the mailing is in Appendix B. Also, three of the four ITS Priority Corridors were included from previous surveys and follow-up telephone calls. Fifteen (15) of the twenty-six agencies contacted responded either in a written response to the survey form or by sending relevant documents. These 15 respondents are listed below:

Gary-Chicago-Milwaukee
Priority Corridor
Colorado DOT #1
Colorado DOT #2
I-95 Priority Corridor
Washington State DOT
Virginia DOT
Wisconsin DOT
Houston Priority Corridor
Minnesota DOT
Missouri DOT
Caltrans
Maryland SHA CHART
New Jersey DOT
Texas DOT
Utah DOT

Each response did not necessarily include answers to all questions, therefore statistical analysis of the answers will not be conducted.

SUMMARY OF SURVEY RESULTS

The responses to the questions in the survey are summarized in the following pages. The answers given by each agency are compiled by question in Appendix C.

Section A. General Information

A. 1. How many local districts or geographic regions within your agency are there in your state or organization?

The ten responding DOTs are divided into districts. The number of districts varied from 2 in New Jersey to 12 in California and 25 in Texas. Florida DOT currently has seven geographic districts plus the Turnpike District.

A. 2. How many Metropolitan Planning Organizations (MPOs) exist in your state or organization?

The number of MPOs in the responding states varies from 25 in Texas, 15 in California, 13 in Washington to 2 in Maryland. Florida, with 26 MPOs, has the most of all states in the survey.

A. 3. Describe the ITS staffing plan and hierarchy for your agency headquarters. Also, include districts of your agency, if applicable.

Several states have a statewide ITS division or branch with headquarters staff and district or regional engineers staffing the districts for ITS operations. This model is representative of Colorado, Washington, Virginia, and California. Wisconsin has a small headquarters staff and no district staff. Missouri has district urban ITS coordinators and a statewide rural ITS coordinator. New Jersey has ITS engineers in each of their two districts. Florida DOT has a Central Office of Traffic Operations, with limited ITS-specific responsibilities. Most ITS deployment is handled by the FDOT districts.

A. 4. How do headquarters and district roles relate? (i.e., is your agency centralized or decentralized?)

Seven states described themselves as being decentralized (Colorado, Washington, Virginia, Missouri, California, Texas, and New Jersey). Wisconsin and Maryland were described as being centralized. Colorado and Virginia stated they are in the process of becoming more centralized. Florida DOT has traditionally been de-centralized.

A. 5. Which of the following does your agency have primary responsibility? (check all that apply)

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

All the responding states except Missouri and Texas stated that they are responsible for all five ITS activities listed. Missouri stated that DOT is responsible for ITS design, procurement, and operations only. Texas is responsible for planning and programming and design. As an agency, FDOT is involved is all of the listed activities. However, the level of involvement varies considerably by district.

A. 6. What types of ITS projects has your agency been involved with? (check all that apply)

- *ITS strategic planning and architecture development*
- *Advanced Traffic Management Systems (ATMS)*
- *Advanced Traveler Information Systems (ATIS)*
- *Commercial Vehicle Operations (CVO)*
- *Advanced Public Transit Systems (APTS)*
- *Advanced Vehicle Control and Safety Systems (AVCSS)*
- *Advanced Rural Transportation Systems (ARTS)*
- *Other*

All responding states and Priority Corridors stated that they are active in Planning/Architecture, ATIS, and CVO. All agencies except the I-95 Corridor have an ATMS component. Seven agencies (GCM Corridor, Colorado, I-95 Corridor, Wisconsin, Texas, Houston Corridor, Minnesota, and California) are involved in APTS. Nine agencies are active in ARTS (Colorado, Washington, Virginia, Wisconsin, Texas, Minnesota, Missouri, California, and Maryland). Houston and Minnesota added weather and incident management as other activities. Florida DOT has had some experience with all of the listed ITS project types.

General Observations and Implications for Florida

Of the 13 responding agencies, it appears that California and Texas are most similar to Florida in size, complexity (number of MPOs) and organizational structure (strong DOT districts). Both of these states have advanced ITS programs and may offer lessons for Florida.

Section B. ITS Planning and Programming

B.1. Does your state or jurisdiction have an ITS Strategic Plan?

All 14 responding agencies have an ITS Strategic Plan. This project is to develop an ITS Strategic Plan for Florida DOT.

***If yes**, please answer the following:*

A. When was the plan adopted? B. When will the plan be updated?

The earliest plan adopted was the I-95 Corridor Strategic Plan adopted in 1994. Several agencies have adopted their Strategic Plans in 1998 for the first time. The plans are to be updated annually in the I-95 Corridor, Virginia, and California. Others report that updates will be every few years.

B.2. Either in addition to, or instead of, a Strategic Plan, describe what kind of planning and/or programming has been done for ITS at either the statewide or regional level (i.e., comprehensive plan).

Five agencies report that there is no other ITS plan (Houston Corridor, Missouri, California, Maryland, and New Jersey). The other agencies state that they have an ITS Business Plan. All of Florida's major urban areas (Miami, Ft. Lauderdale, Orlando, Tampa/St. Petersburg and Jacksonville have developed ITS plans - either through Early Deployment Plans or on their own local initiative.

B.3. Is ITS planning and programming at the regional level primarily led by the DOT or by MPOs?

All agencies except Caltrans report that the DOTs lead regional planning and programming. In California, the MPOs in many regions take the lead in planning for ITS. Several of the large MPOs (including SANDAG in SanDiego and MTC in the San Francisco Bay Area) are national leaders in ITS activities. In Florida, especially recently, planning has been a cooperative effort between the MPOs and FDOT.

B. 4. How are you funding ITS projects?

- *Local ITS (line-item budget) funds*
- *State ITS funds*
- *Local Traffic Operations funds*
- *State Traffic Operations funds*
- *Local general transportation funds*
- *State general transportation funds*
- *Non-transportation source funds (i.e., communication & information systems, etc.)*
- *Federal ITS funds*
- *Federal general transportation funds (i.e., NHS, transit, CMAQ, etc.)*
- *Other*

All of the 11 responding agencies report using federal ITS funds for ITS activities. Eight agencies use state ITS funds making it the second most used funding source. Both state and federal general transportation funds are being used for ITS activities in five agencies. State traffic operations funds are used in four agencies. Only two agencies report using local ITS funds and one agency is using local traffic operations funds. None of the 11 agencies are using local general transportation funds or non-transportation funds. In summary, federal and state ITS funds are used by almost all agencies. Nearly half the agencies use federal and state general transportation and traffic operations funds for ITS activities. Only a few agencies are using local funds for ITS. This is likely due to the regional nature of ITS projects. Florida does not have a specific ITS funding category, but generally uses funds allocated to traffic operations. Some local agencies have used state and local general transportation funds for ITS related projects. A few Florida transit agencies have used state and local transit funding for APTS projects.

B.5. Do ITS projects in your jurisdiction have to comply with State Transportation Improvement Plan (STIP) and Implementation Plan (SIP) requirements?

***If yes,** please answer the following:*

A. How long has this policy been in effect?

B. What process do you use to ensure STIP and SIP compliance?

***If no,** please answer the following:*

C. Will future projects comply with these requirements?
If no, why not?

D. Is ITS included in any of the regional (MPO or rural) plans, TIPs or other special programs (e.g., transit development plans)?

Eight of the eleven responding agencies report that ITS projects must comply with STIP and SIP requirements. Missouri, California, and Maryland are the states that do not require compliance, although each state will be developing requirements in the future. Five agencies have required compliance for four or five years, while three agencies have instituted requirements this year. The most common response was that ITS projects are mainstreamed, that is they are treated like any

other capital project. California is the only state requiring ITS projects be included in the MPO's TIP. Florida is examining how to include ITS projects in these requirements through a separate project to develop Florida ITS Planning Guidelines.

B. 6. Does your agency monitor ITS performance (LOS, delay, travel time, transit on-time performance) on a routine basis?

Eight of the eleven agencies do not monitor the performance of ITS equipment. Three agencies (Washington, Houston Corridor, and California) are conducting performance monitoring. Washington uses loops to determine speed and travel time, Houston uses toll tag readers to monitor speed, while California conducts studies at specific locations using different equipment and methods. Florida DOT does not have a formal process for monitoring ITS performance, but some districts collect performance data on many individual ITS projects.

General Observations and Implications for Florida

DOTs are leading the ITS planning efforts in most areas. The exception is California, which has strong MPOs in the major regions. Florida should integrate the role of both the DOT and the MPOs in planning ITS activities.

Most every agency is using both federal and state funds of various sources to fund ITS activities. The regional nature of ITS activities suggests that local funds will not likely be a significant source for ITS funding. The fact no agency is using non-transportation funds suggests that resource sharing and other methods of public/private partnering have ben tried with limited success.

All reporting agencies require or will be requiring compliance with the state planning process (STIP and SIP). Florida should develop this compliance process for ITS projects.

The recently enacted TEA 21 legislation recommends performance monitoring of the transportation system. ITS equipment is an excellent tool for monitoring. As time passes, more agencies will be conducting performance monitoring using ITS data.

Section C. Systems Management and ITS Integration

C.1. Is your agency currently responsible for the day-to-day, real-time management of a portion of the transportation system (transit, highway, or intermodal)?

All eight responding DOTs are responsible for real-time transportation operations or ITS, except three of the priority corridors. For the three Priority Corridors, their member agencies conduct operations that are planned and coordinated through the Priority Corridor. Except for a few projects, Florida DOT has had limited experience with operation of ITS.

C. 2. Does your agency have a policy and/or mission statement regarding real-time transportation systems management?

Nine agencies reported yes, they have a policy or mission statement regarding ITS. Two agencies (Virginia and Missouri) do not. A mission statement will be developed as part of Florida's strategic plan.

C. 3. Do all ITS projects include a statement of justification for all system features (as opposed to just for the system in general)?

Three states (Colorado, Missouri, and New Jersey) require justification for individual ITS system features rather than the system as a whole. The other eight agencies do not have that requirement. FDOT does not have an explicit requirement.

C. 4. Do you have an ITS architecture for projects in your jurisdiction?

Eleven of the twelve reporting agencies have an architecture that was developed consistent with the National ITS Architecture. New Jersey does not have an ITS architecture currently. The South Florida Intelligent Corridor System (ICS) was developed before the National architecture was developed. Orlando and Jacksonville have completed EDPs that include the use of the National ITS architecture for the recommended regional framework. Tampa-St. Petersburg is currently developing a regional architecture compatible with the National architecture.

C. 5. Have you applied the National ITS architecture to any state or corridor ITS projects?

All agencies, except New Jersey, have applied the National ITS Architecture to ITS projects. Earlier ITS projects in Florida (e.g., TravTek, and ICS) were developed prior to the National ITS architecture. FDOT is developing one project in St. Petersburg that will be consistent with national requirements.

C. 6. Do you require that all new ITS projects in your jurisdiction comply with local or national ITS standards?

All twelve responding agencies require that new ITS projects comply with either local or national ITS standards.

C. 7. Please check which of the following ITS standards are used for new ITS projects in your jurisdiction:

- *State or local equipment standards (e.g., signal controllers, VMS, etc.)*
- *State or local communication protocols*
- *National Electrical Manufacturers Association (NEMA) standards*
- *National Transportation Communications for ITS Protocol (NTCIP)*
- *Other*

All eleven agencies use NTCIP standards, six use NEMA and state equipment standards and five use state communications protocols. Four states (Colorado, Washington, Wisconsin, and New Jersey) use all four types of standards. Florida has used all four standards on projects within the state.

C. 8. Do you have a policy or migration plan for incorporating or upgrading older (legacy) systems into the regional or statewide ITS architecture?

Three agencies (Minnesota, Maryland and New Jersey) have policies or plans to update legacy systems into the statewide/regional ITS architecture. The other eight reporting agencies do not. Florida DOT is currently developing a migration strategy.

General Observations and Implications for Florida

The responding eight DOTs are currently responsible for operating ITS, as is Florida. Nine of those agencies have developed policy and/or a mission statement regarding ITS operations and must believe that they derive benefit from that policy. Florida is developing an ITS operating policy or mission statement.

Three of the agencies require justification for individual system features, not just the system as whole. This policy may lead to a more tailored design and possibly a lower system cost.

Almost all agencies have an ITS architecture that is consistent with the National ITS Architecture and they have applied that architecture in specific projects. All agencies require ITS projects to be developed using federal or state standards, and all these agencies are using NTCIP standards. Most agencies use other standards also. Some of the agencies have developed plans for bringing legacy ITS systems into compliance with state ITS standards. These findings suggest that Florida consider developing a statewide architecture consistent with the National ITS Architecture and adopt ITS statewide standards, particularly the NTCIP standards.

Section D. Procurement Process

*D.1. Using the contract types and definitions in the table below check which type of procurement method you **usually use** to procure the ITS products and services shown in each column (check only one row for each column).*

Procurement Type	*Furnish and Install ITS Field Devices*	*Furnish and Install ITS-Software*	*ITS Operations*	*ITS Maint-enance*
***Engineer-Contractor** – Plans and (prescriptive) specs. are developed by an engineer. Selection of a contractor is by low bid only.*				
***System Manager** – Plans, specs, and system software are developed by an engineer. Selection of equipment and installation contractor is by low bid. Engineer provides system integration.*				

System Integrator *– Similar to System Manager, but the contractor has the ability to procure hardware and services (by low bid) on behalf of the agency and then acts as integrator*				

Procurement Type	*Furnish and Install ITS Field Devices*	*Furnish and Install ITS-Software*	*ITS Operations*	*ITS Maint-enance*
Best Value Contracting *– Used where the contractor must provide some technical designs or configurations. The selection of a contractor is based on a combined technical score and price.*				
Design-Build *– A set of (performance) specs. are let for bid by teams of engineers and contractors. Selection is usually based on combined technical and price factors.*				
Design-Build-Operate-Maintain *– The same as Design-Build, but with a requirement that the contractor operate and maintain the system for some time.*				
Franchise or Lease *– Also known as Design-Build-Own-Transfer. The contractor provides initial financing as well as engineering and construction in exchange for a lease payment over a period of time and eventual transfer to the agency.*				
Other *:*				

To furnish and install ITS field devices, all agencies reported using the Engineer/Contractor procurement method. California uses other contracting methods also. Florida DOT has also used a combination of System Manager with low-bid for a freeway management system with software.

The System Integrator method is used by seven agencies to furnish and install ITS software. Three agencies reported using the System Manager method for software. California also uses other contracting methods. New Jersey reported using other methods, but did not define them. Florida has had no recent experience with System Integrator for ITS procurement.

Three agencies conduct ITS Operations with in house staff (Colorado, Washington and Maryland). Wisconsin and Missouri report using a system integrator for ITS operations. California uses all types of contracts and New Jersey reported other but did not define. Florida DOT uses in-house staff exclusively for operations.

Colorado and Washington conduct ITS Maintenance with in house staff. Virginia and Maryland use the engineer/contractor method for maintenance. Wisconsin uses the best value contract method.

Again California uses all types of contracts and New Jersey reported other but did not define. Florida DOT uses both in-house and contract maintenance for ITS.

D. 2. Describe special procurement problems you have encountered with the above (e.g., legal).

Only a few comments were noted, including:

The GCM and I-95 Corridors reported that some agencies have procurements methods better suited for certain contract types. They will designate those agencies for those contracts.

Colorado and the Houston Corridor reported that a lack of staff knowledge was a procurement problem.

California stated that their state procurement process was time consuming and inflexible for ITS projects.

Maryland noted that system integrators work on a services contact, while ITS equipment is purchased as capital procurements. This makes scheduling difficult.

New Jersey stated that system integrators need input as the project is being designed since they often encounter difficulty installing the project as designed.

D. 3. Do you have a uniform statewide (corridor wide) procurement procedure?

Five agencies reported yes and six reported no on a uniform statewide procurement procedure. Other than the use of approved state practices, FDOT does not have a specific ITS procurement procedure.

D. 4. What are your major procurement issues? (please rank with 1 = most problem for ITS)

___ *Regional / National Architecture consistency*
___ *NTCIP*
___ *Technology Risk*
___ *Cost Concerns*
___ *Operations & Maintenance*
___ *Statutory limitations*
___ *Other (describe)*

Cost concerns were easily the highest ranked procurement issue. Technology risk and operations & maintenance were also highly ranked. Other issues mentioned were federal regulations (Virginia), state contract procedures (California), and bidding regulations that allow highway contractors to win ITS bids (New Jersey).

D. 5. Does your agency participate in public / private partnerships to procure ITS goods and/or services?

***If yes**, please answer the following questions.*

A. How many partnerships do you currently participate in?
B. Explain how these partnerships have been beneficial:

C. In your opinion, which types of ITS projects are the best suited for public/private partnerships?

All agencies, except New Jersey, reported participating in public/private partnerships. Several agencies report having more than one current partnership including Washington, which has four. Sharing or leveraging resources was mentioned most often as a benefit of the partnerships. Cost sharing and expertise were also mentioned as benefits. ATIS was mentioned most often as the best suited project type for partnership. Communications (shared resources) were also mentioned as being well suited for partnerships. Florida DOT has had several experiences with public/private partnerships for ITS procurement and operations. In most cases, the partnerships have proved mutually beneficial. Problems have arisen with state procurement regulations and the Florida public records law.

General Observations and Implications for Florida

All the responding agencies use low-bi, a variety of responding agencies have used other procurement methods. For ITS software installation, the system integrator and system manager methods are both commonly used. No consensus was observed from responding agencies regarding the use of in-house staff versus contracting for operations and maintenance services.

The procurement issues mentioned seem to vary by state and are not national issues. There is also no consensus on having a uniform statewide procurement procedure.

Cost concerns, technology risk and O&M were ranked as the most important procurement issues.

The reporting agencies use public/private partnerships and find them to be beneficial. ATIS and communications projects are reported to be the best-suited projects for partnering.

Section E. Operations and Maintenance Issues

E.1. How do you provide for the Operation and Maintenance (O&M) of ITS systems in your jurisdiction?: (check all that apply)

- *State transportation agency personnel*
- *State police personnel*
- *Local transportation agency personnel*
- *Local police personnel*
- *Joint state, local, police operations center(s)*
- *Private contract operations*
- *Other*

The use of state transportation agency personnel for ITS O&M was the most common response (6). Private contracts are being used by four agencies. Except for local police staff all other methods are being used at two or three agencies. Florida has used DOT and local agency staff, state police (jointly and separately) and private contracts for ITS operations.

E. 2.How do you document inter-agency agreements regarding ITS O&M? (check all that apply)

- *State or local statute*
- *Joint Project Agreements (JPA)*

- *Memoranda of Understanding (MOU)*
- *Formal resolutions by governing bodies*
- *Informal handshake agreements*
- *No agreements are currently in place*

Six agencies report using a Memoranda of Understanding, while three agencies do not have an agreement. California and Colorado also use joint project agreements. Florida typically uses joint project agreements with other agencies.

E. 3.How is funding for ITS O&M in your jurisdiction provided? (check all that apply)

- *State highway maintenance (and/or transit operations) funds*
- *Local highway (and/or transit operations) funds*
- *Public/Private Partnership agreements*
- *No O&M funds are identified for ITS*

Six report using state maintenance funds while two agencies use local funds (Colorado and California) and two use public/private partnership funds (Missouri and Maryland). Florida uses state maintenance funds for ITS maintenance on the interstate system and for (a limited number of) signals on state highways, but only under an approved JPA.

E. 4. Does your agency have a specific person or group responsible for ITS O&M?

Three agencies (Washington, Virginia and Maryland) report having a specific group responsible for O&M. All other agencies do not have a specific O&M staff. Florida does not have a specific ITS O&M group.

E. 5. Do you regularly upgrade ITS equipment as part of routine maintenance?

Three states (Washington, Wisconsin and Missouri) reported that they do upgrade equipment as part of maintenance. All other agencies do not. Florida upgrades equipment on an as needed basis.

*E. 6. What is the current fiscal year budget for ITS **operations** (only) in your jurisdiction?*

Only two states reported their operations budgets. Washington has an annual combined O&M budget of $1,900,000 for 800 signals and 120 miles of freeway surveillance. Maryland has an operations budget of $3,500,000 for 375 miles of freeway surveillance.

*E. 7. What is the current fiscal year budget for **maintenance** (only) of ITS installations in your jurisdiction?*

Maryland reported a maintenance budget of $1,000,000 for its 375 miles of freeway surveillance.

E. 8. Please indicate the number of people that typically staff each type of ITS operations center that you may have in your jurisdiction. Also indicate the number of hours the centers are staffed (for example, under the column for "weekdays" the numbers "2/24" would indicate 2 operators on duty for 24 hours per day).

Colorado reports 3 operating staff for 12 hours each weekday. Washington has 2 operating staff for 12 hours. Maryland has 2 staff for 24 hours and 4 staff for 16 hours.

General Observations and Implications for Florida

A majority of agencies are using state transportation staff for O&M. Several agencies are now using private contractors for ITS O&M. Most agencies fund O&M with state funds, although two agencies are using public/private partnerships.

Three states upgrade ITS equipment as part of routine maintenance. Due to the rapid changes in advanced technology, Florida should, on a regular basis, plan for upgrades to equipment based on their service life.

Section F. Economic Impact of ITS

F.1. How does ITS relate to economic development and vitality in your jurisdiction? (check one)

- ***9*** *In my opinion, ITS provides a benefit, but it has not been quantified*
- ***9*** *In my opinion, ITS cannot provide any direct benefit for economic development*
- ***9*** *We are currently studying the impact of ITS on economic development*
- ***9*** *We have found the following direct (or indirect) economic impacts of ITS.*

Five states indicate that they believe that ITS is beneficial but those are not quantifiable. Four states indicate that they are currently studying the impacts of ITS (Virginia, Wisconsin, Missouri and California). Florida will be documenting economic benefits through this project.

F. 2. Has your agency prepared a Business Plan (i.e., a plan outlining roles, investments and expected benefits/returns) to guide implementation of ITS?

Nine agencies do have a Business Plan and are currently using it. Three agencies (GCM Corridor, Houston Corridor and Missouri) do not have business plans. Florida will be developing a business plan through this project.

F. 3. Have any market research surveys been conducted regarding ITS deployment or services in your jurisdiction?

Four agencies (I-95 Corridor, Wisconsin, Missouri, and New Jersey) report having conducted market research for ITS. The other agencies have not conducted any market research. Florida DOT participated in extensive market research conducted for the TravTek project. Additional research was done in Orlando for a VMS project and for the Orlando EDP project.

F. 4. Have any steps been taken to involve local businesses or other stakeholders in ITS deployment or operation?

Six agencies have stakeholder involvement programs (Colorado, Washington, Virginia, Wisconsin, Missouri, and California). Several states use the ITS America state chapter for this involvement. All major urban areas in Florida that have developed ITS plans, Miami, Ft. Lauderdale, Orlando, Jacksonville, and Tampa-St. Petersburg have used (or are using) public involvement programs.

General Observations and Implications for Florida

The lack of quantifiable benefits of ITS is a national issue and Florida should monitor benefits research. Most agencies report having an ITS Business Plan and are currently using it. Florida should consider developing a statewide ITS Business Plan. There has not been much market research for ITS. It may be considered for specific products or services. Stakeholder involvement through ITS Florida may be a good method to include more participants in ITS development.

Section G. Inter-Urban and Rural ITS Applications

G.1. Has your agency deployed any ITS projects in inter-urban or rural areas?

Nine agencies have deployed rural ITS projects, three (GCM Corridor, Houston Corridor and New Jersey) have not. Florida is currently developing a rural ITS project to address transit for the disadvantaged.

G. 2. Does your agency have a formal (i.e., separate) planning process for inter-urban and rural ITS projects?

Four states have a separate process for rural or inter-urban ITS projects (Wisconsin, Minnesota, California and New Jersey-inter-urban only). Florida does not have a separate rural process.

G.3. What are your priority ITS needs for inter-urban and rural applications? (please rank, with 1 = highest priority)

___ *Communications*
___ *Traveler information*
___ *Transit related services*
___ *Incident response*
___ *Mayday response*
___ *Emergency related services*
___ *Other*

Traveler information and communications were highest ranked. Incident response and weather were also mentioned.

G. 4. Is there any plan in your agency for the integration of ITS services across (or between) inter-urban / rural areas and urban areas?

All respondents except Houston and New Jersey indicate that they are planning to integrate ITS services regionally or statewide. Florida plans to integrate ITS statewide for such services as hurricane evacuation and inter-urban travel.

General Observations and Implications for Florida

Rural and inter-urban projects are being implemented in most areas. With the number of urban areas and the importance of standards it would seem that Florida should consider a rural and inter-urban development process.

Section H. Implementation Authority

*H.1. Which agency has the **primary** responsibility and authority for the following stages of ITS deployment in your jurisdiction? (Please differentiate between district/region level and headquarters offices.)*

Strategic ITS Policies and Planning
ITS Project Planning
ITS Project Design
ITS Operation
ITS Maintenance

All agencies except the Houston Priority Corridor report that DOTs have authority for implementing the various stages of ITS. DOT headquarters in all cases conducts strategic planning. Headquarters conduct ITS project planning in most cases, districts or regions participate in ITS project planning in Colorado, Virginia and Missouri. ITS project design is also conducted at headquarters in most cases, districts participate in Colorado and Missouri. ITS operations and maintenance is usually conducted at the district level in most states. Florida DOT districts have the primary responsibility for these stages, except for operations and maintenance, which has historically been the responsibility of the local agency. This area of responsibility is being examined in this project.

H. 2. Does your agency have an formal (i.e., separate) organizational entity to plan for and implement ITS projects?

Eight of the responding agencies have a separate entity to implement ITS. The three that do not are GCM Corridor, Houston Corridor and California. Florida does not have any separate entity for ITS implementation. This aspect is being examined as part of this project.

H. 3. Does your agency have any special policy or directive specific to the planning and implementation of ITS?

Four agencies including the GCM Corridor, Washington, Wisconsin and California have ITS implementation policies. The other agencies do not have an implementation policy. Florida is developing the procedures for this phase through this and other projects.

H. 4. Is ITS specifically included in your agency's long range plans (i.e., 2020 transportation plan)?

Nine of the ten responding agencies have ITS as part of their long-range plan. Virginia is the exception. ITS is not specifically mentioned in the Florida 2020 Transportation Plan. An update to this plan will address ITS.

H.5. Rank the following challenges facing ITS implementation in your jurisdiction? (with 1 = most challenging)

1. Lack of knowledge on ITS/training
2. Lack of supporting policies for ITS

3. Inadequate funding
4. Lack of an ITS plan
5. Lack of coalition/consensus on ITS activities
6. Higher priorities for other transportation improvements
7. Other

GCM Priority Corridor	3	
Colorado DOT #1	6,1,4,2,5,3	
Colorado DOT #2	5,6,4	
I-95 Priority Corridor	3	
Washington State DOT	6,3,5,1,2	
Virginia DOT	7, 2	7=not traditional DOT function, organizational structure, staff shortage
Wisconsin DOT	7,2,6,1,3	7=lack of staff
Houston Priority Corridor	3	
Minnesota DOT		
Missouri DOT	6,3,5,2,4,1	
Caltrans	7,5,6,2,3,1	7=too many agencies
Maryland SHA CHART	3,2,6,5,1,4	
New Jersey DOT	6,3,1,5,2,4	
Texas DOT	6,3,1,5,2,4	
Utah DOT	2,5,1,3,4,6	

Inadequate funding and higher priorities for other transportation improvements are the highest ranked challenges by most agencies.

General Observations and Implications for Florida

Most responding agencies conduct ITS planning and design at headquarters, while O&M is conducted at the district level. Florida may consider this approach although several districts in Florida already have ITS expertise in ITS planning and design. Most responding agencies are including ITS in their long-range plan as should Florida.

Section I. ITS Technology Cost

I.1. In your experience, what factors have the most impact on the costs of an ITS project? (rank the following with 1= highest impact)
___ Urban vs. rural conditions
___ System functionality
___ System design standards
___ Labor costs (union vs.non-union)
___ Technology risk (new vs. proven)
___ Other

There is no consensus among the reporting agencies. System functionality and system design standards were the highest ranked. Technology risk was also ranked.

I.2. What controls do you use in the basis of payment for ITS equipment purchase (e.g., retainage, extended warrantees, etc.) to control costs?

Three states (Colorado, California and New Jersey) use retainage. Wisconsin, Maryland and New Jersey use extended warranties. Virginia uses the low bid process to control costs. Maryland uses bonding and liquidated damages for cost controls also. Florida uses minimum requirements to pre-qualify ITS contractors. State contract prices are used in some cases for ITS equipment.

I.3. Do you require extended warranties (longer than one year) for equipment and systems?

Five states require extended warranties including Colorado, Washington, Wisconsin, Maryland and New Jersey. The other states do not require warranties longer than one year. Florida DOT has required extended warrantees for ITS equipment and complete systems.

I.4. Have you procured ITS system software?

***If yes**, which do you find is more cost effective?*

- ***9*** *Commercial, off the shelf (COTS) software (also known as single entity, "third party" software)*
- ***9*** *Multiple vendor supplied software, with systems integration provided by others*
- ***9*** *Custom designed software*

All reporting agencies have procured ITS software. Colorado, Washington, Virginia and Maryland have custom designed software. I-95 and Wisconsin have COTS software. Wisconsin and New Jersey have multiple vendor-supplied software. The other states did not specify the software type. Florida has used all three methods for software procurement.

I. 5. How do you pay for software support and maintenance for COTS and vendor supplied software?

I-95, Virginia and Maryland use maintenance contracts. Wisconsin and Houston use O&M funds. New Jersey has maintenance as a bid item in the software contract. Washington uses state staff to maintain software. Florida uses contract maintenance (vendor supplied and third party) and in-house maintenance for software.

I. 6. In the table below, please provide typical ITS deployment (unit) costs, used for planning purposes by your agency, for as many of the following components as possible:

ITS Component	Unit Cost Range
Vehicle Detection Station (VDS) (loop or in-pavement)	$500-$45,000
Vehicle Detection Station (VDS) (radar or ultrasonic)	$2,500-$30,000
Vehicle Detection Station (VDS) (video-based)	$25,000-$40000
CCTV Installation	$7,000-$100,000
Dynamic / Variable / Changeable Message Sign (DMS/VMS/CMS)	$100,000-$250,000

Kiosk Installation	$15,000
Ramp Metering Installation	$20,000-$250,000
AVL (Cost per Bus)	$10,000
AVI (Cost per Toll Lane)	
Motorist Aid Call Box	$5,000-$10,000
Highway Advisory Radio (HAR) Station	$2,500-$250,000
Highway Advisory Telephone (HAT) System	$40,000
Fiber Optic Cable Installation (per unit of length)	$3/lf-$23/lf
Microwave/Cellular Communications Link	$15,000-$80,000
SONET Hub Site Installation	$50,000
Internet Web Site (development cost)	$15,000-$140,000
Internet Web Site (monthly maintenance cost)	$5,000
Roadway Weather Information Station	$100,000

General Observations and Implications for Florida

As evidenced above, there is a wide range of unit costs for typical ITS components. A more detailed analysis is provided in the Cost Analysis Issue Paper. Several states use retainage and extended warranties to control ITS costs. The type of software purchased seems to be dependent on the application, which is appropriate. There is also no consensus on the type of software maintenance contract, options are a maintenance contract, O&M funds, or developing a state software staff.

Section A. General Information

A.1. How many local districts or geographic regions within your agency are there in your state or organization?

GCM Priority Corridor	3 states
Colorado DOT #1	6 districts
Colorado DOT #2	6 districts
I-95 Priority Corridor	12 states
Washington State DOT	6 districts
Virginia DOT	9 districts
Wisconsin DOT	8 districts
Houston Priority Corridor	4 agencies
Minnesota DOT	
Missouri DOT	10 districts
Caltrans	12 districts
Maryland SHA CHART	7 districts
New Jersey DOT	2 districts for ITS
Texas DOT	25 districts
Utah DOT	4 districts

A.2. How many Metropolitan Planning Organizations (MPOs) exist in your state or organization?

GCM Priority Corridor	3
Colorado DOT #1	4
Colorado DOT #2	5
I-95 Priority Corridor	many
Washington State DOT	13
Virginia DOT	3
Wisconsin DOT	8
Houston Priority Corridor	1
Minnesota DOT	
Missouri DOT	3
Caltrans	15
Maryland SHA CHART	2
New Jersey DOT	3
Texas DOT	25
Utah DOT	4

A.3. Describe the ITS staffing plan and hierarchy for your agency headquarters. Also, include districts of your agency, if applicable.

GCM Priority Corridor	Consultant
Colorado DOT #1	District traffic engineers comprise an ITS Steering Comm.
Colorado DOT #2	ITS Office reports to Chief Engineer
I-95 Priority Corridor	5 Corridor staff
Washington State DOT	Statewide Advanced Technical Branch with Regional Engineers
Virginia DOT	Statewide ITS Office with Regional Engineers on a Steering Comm.
Wisconsin DOT	Statewide ITS is part of Division of Investment Management/Planning, no regional/district staff
Houston Priority Corridor	TRANSTAR has 5 staff, agencies supply additional
Minnesota DOT	
Missouri DOT	ITS in Traffic Division, urban district coordinators and rural coordinator
Caltrans	Statewide R&D staff, district ITS staff
Maryland SHA CHART	
New Jersey DOT	Traffic Ops North and South have ITS engineers
Texas DOT	Traffic Ops Division has ITS Branch
Utah DOT	ITS staff within Traffic & Safety Division

A. 4. How do headquarters and district roles relate? (i.e., is your agency centralized or decentralized?)

GCM Priority Corridor	n/a
Colorado DOT #1	Decentralized moving toward centralized
Colorado DOT #2	Decentralized
I-95 Priority Corridor	n/a
Washington State DOT	Decentralized
Virginia DOT	Decentralized moving toward centralized
Wisconsin DOT	Centralized
Houston Priority Corridor	n/a
Minnesota DOT	
Missouri DOT	Decentralized

Caltrans	Decentralized
Maryland SHA CHART	Centralized
New Jersey DOT	Decentralized
Texas DOT	Decentralized
Utah DOT	Decentralized

A. 5. Which of the following does your agency have primary responsibility? (check all that apply)
1 ITS planning and programming
2 ITS design and specification
3 ITS procurement (contracting agency or authority)
4 ITS operations (with agency staff or contract operators)
5 ITS maintenance (with agency staff or contract operators)

GCM Priority Corridor	none
Colorado DOT #1	all
Colorado DOT #2	1,4
I-95 Priority Corridor	none
Washington State DOT	all
Virginia DOT	all
Wisconsin DOT	all
Houston Priority Corridor	none
Minnesota DOT	all
Missouri DOT	2,3,4
Caltrans	all
Maryland SHA CHART	all
New Jersey DOT	all
Texas DOT	1,2
Utah DOT	2,3,4,5

A. 6. What types of ITS projects has your agency been involved with? (check all that apply)
1 ITS strategic planning and architecture development
2 Advanced Traffic Management Systems (ATMS)
3 Advanced Traveler Information Systems (ATIS)
4 Commercial Vehicle Operations (CVO)
5 Advanced Public Transit Systems (APTS)
6 Advanced Vehicle Control and Safety Systems (AVCSS)
7 Advanced Rural Transportation Systems (ARTS)

GCM Priority Corridor	Planning/Arch, ATMS, ATIS, CVO, APTS

Colorado DOT #1	Planning/Arch, ATMS, ATIS, CVO, APTS, ARTS
Colorado DOT #2	Planning/Arch, ATMS, ATIS, CVO, APTS, ARTS
I-95 Priority Corridor	Planning/Arch, ATIS, CVO, APTS, incident mgt., ETTM
Washington State DOT	Planning/Arch, ATMS, ATIS, CVO, ARTS
Virginia DOT	Planning/Arch, ATMS, ATIS, CVO, ARTS
Wisconsin DOT	Planning/Arch, ATMS, ATIS, CVO, APTS, ARTS
Houston Priority Corridor	Planning/Arch, ATMS, ATIS, APTS, incident mgt., EMS coordination, weather
Minnesota DOT	Planning/Arch, ATMS, ATIS, CVO, APTS, incident mgt., weather, ARTS
Missouri DOT	Planning/Arch, ATMS, ATIS, CVO, ARTS
Caltrans	all
Maryland SHA CHART	Planning/Arch, ATMS, ATIS, CVO, ARTS
New Jersey DOT	Planning/Arch, ATMS, ATIS, CVO
Texas DOT	Planning/Arch, ATMS, ATIS, APTS, ARTS
Utah DOT	Planning/Arch, ATMS

Section B. ITS Planning and Programming

B. 1. Does your state or jurisdiction have an ITS Strategic Plan?

		Yes, when adopted?	Yes, when updated?	No, when developed?
GCM Priority Corridor	yes	95	97	
Colorado DOT #1	yes	98	2002	
Colorado DOT #2	yes	98		
I-95 Priority Corridor	yes	94	97(annually)	
Washington State DOT	yes	guidance only	2000	
Virginia DOT	yes	98	99(annually)	
Wisconsin DOT	yes	94	98	
Houston Priority Corridor	yes	97	unknown	
Minnesota DOT	yes	96		
Missouri DOT	yes	98	unknown	
Caltrans	yes	93	99(annually)	
Maryland SHA CHART	yes	96	98	
New Jersey DOT	yes	98	99	
Texas DOT	yes	May-96	unknown	
Utah DOT	yes	96	unknown	

B. 2. Either in addition to, or instead of, a Strategic Plan, describe what kind of planning and/or programming has been done for ITS at either the statewide or regional level (i.e., comprehensive plan).

GCM Priority Corridor	project planning, business plan
Colorado DOT #1	business plan
Colorado DOT #2	Smart Path projects
I-95 Priority Corridor	business plan
Washington State DOT	business plan
Virginia DOT	business plan
Wisconsin DOT	business plan
Houston Priority Corridor	no
Minnesota DOT	business plan
Missouri DOT	no
Caltrans	no
Maryland SHA CHART	no
New Jersey DOT	no
Texas DOT	regional plans
Utah DOT	no

B. 3. Is ITS planning and programming at the regional level primarily led by the DOT or by MPOs?

GCM Priority Corridor	DOT
Colorado DOT #1	DOT
Colorado DOT #2	DOT
I-95 Priority Corridor	DOT
Washington State DOT	DOT
Virginia DOT	DOT
Wisconsin DOT	DOT
Houston Priority Corridor	DOT
Minnesota DOT	DOT
Missouri DOT	DOT
Caltrans	MPO
Maryland SHA CHART	DOT
New Jersey DOT	DOT
Texas DOT	MPO
Utah DOT	DOT

B. 4. How are you funding ITS projects?
1 Local ITS (line-item budget) funds
2 State ITS funds
3 Local Traffic Operations funds
4 State Traffic Operations funds
5 Local general transportation funds
6 State general transportation funds
7 Non-transportation source funds (i.e., communication & information systems, etc.)
8 Federal ITS funds
9 Federal general transportation funds (i.e., NHS, transit, CMAQ, etc.)

GCM Priority Corridor	2,8
Colorado DOT #1	2,4,6,8,9
Colorado DOT #2	2,4,6,9
I-95 Priority Corridor	2,8
Washington State DOT	2,3,4,8
Virginia DOT	6,8,9
Wisconsin DOT	2,4,6,8,9
Houston Priority Corridor	1,2,8
Minnesota DOT	
Missouri DOT	4,8
Caltrans	6,8,9,other

Maryland SHA CHART	2,6,8
New Jersey DOT	1,2,8,9
Texas DOT	4,8,9
Utah DOT	6,8,9

B. 5. Do ITS projects in your jurisdiction have to comply with State Transportation Improvement Plan (STIP) and Implementation Plan (SIP) requirements?

		Yes, how long?	Yes, process for compliance	No, future?	No, in MPO TIP?
GCM Priority Corridor	yes	95	ITS is mainstreamed		
Colorado DOT #1	yes		ITS is mainstreamed		
Colorado DOT #2	yes	98	not yet developed		
I-95 Priority Corridor	yes	95	Up to each state		
Washington State DOT	yes	94	ITS is mainstreamed		
Virginia DOT	yes	98	not yet developed		
Wisconsin DOT	yes	98	ITS is mainstreamed		
Houston Priority Corridor	yes	95	Up to each agency		
Minnesota DOT					
Missouri DOT	No			to be developed	
Caltrans	No			to be developed	yes
Maryland SHA CHART	No			to be developed	no
New Jersey DOT	yes	always	ITS is mainstreamed		
Texas DOT	yes	93	ITS is mainstreamed		
Utah DOT	yes	93	ITS is mainstreamed		

B. 6. Does your agency monitor ITS performance (LOS, delay, travel time, transit on-time performance) on a routine basis?

GCM Priority Corridor	no
Colorado DOT #1	no
Colorado DOT #2	no
I-95 Priority Corridor	no
Washington State DOT	yes, loop data, travel time, speed
Virginia DOT	no
Wisconsin DOT	no
Houston Priority Corridor	yes, speed from toll tag readers
Minnesota DOT	
Missouri DOT	no

Caltrans	yes, specific studies
Maryland SHA CHART	no
New Jersey DOT	no
Texas DOT	yes
Utah DOT	no

C. Systems Management and ITS Integration

C.1. Is your agency currently responsible for the day-to-day, real-time management of a portion of the transportation system (transit, highway, or intermodal)?

GCM Priority Corridor	no
Colorado DOT #1	yes
Colorado DOT #2	yes
I-95 Priority Corridor	no
Washington State DOT	yes
Virginia DOT	yes
Wisconsin DOT	yes
Houston Priority Corridor	no
Minnesota DOT	yes
Missouri DOT	yes
Caltrans	no, districts are
Maryland SHA CHART	yes
New Jersey DOT	yes
Texas DOT	yes
Utah DOT	yes

C. 2. Does your agency have a policy and/or mission statement regarding real-time transportation systems management?

GCM Priority Corridor	yes
Colorado DOT #1	yes
Colorado DOT #2	no
I-95 Priority Corridor	yes
Washington State DOT	yes
Virginia DOT	no
Wisconsin DOT	yes
Houston Priority Corridor	yes
Minnesota DOT	
Missouri DOT	no
Caltrans	yes
Maryland SHA CHART	yes
New Jersey DOT	yes
Texas DOT	no
Utah DOT	no

C. 3. Do all ITS projects include a statement of justification for all system features (as opposed to just for the system in general)?

GCM Priority Corridor	no
Colorado DOT #1	yes
Colorado DOT #2	no
I-95 Priority Corridor	no
Washington State DOT	no
Virginia DOT	no
Wisconsin DOT	no
Houston Priority Corridor	no
Minnesota DOT	
Missouri DOT	yes
Caltrans	no
Maryland SHA CHART	no
New Jersey DOT	yes
Texas DOT	no
Utah DOT	no

C. 4. Do you have an ITS architecture for projects in your jurisdiction?
1. Yes, but it was developed before the National ITS Architecture
2. Yes, it was developed "consistent with" the National ITS Architecture
3. No
4. Don't know

GCM Priority Corridor	2
Colorado DOT #1	4
Colorado DOT #2	2
I-95 Priority Corridor	2
Washington State DOT	2
Virginia DOT	2
Wisconsin DOT	1,2
Houston Priority Corridor	2
Minnesota DOT	1,2
Missouri DOT	2
Caltrans	2
Maryland SHA CHART	1,2
New Jersey DOT	3
Texas DOT	1

Utah DOT	1

C. 5. Have you applied the National ITS architecture to any state or corridor ITS projects?

GCM Priority Corridor	yes
Colorado DOT #1	yes
Colorado DOT #2	yes
I-95 Priority Corridor	yes
Washington State DOT	yes
Virginia DOT	yes
Wisconsin DOT	yes
Houston Priority Corridor	yes
Minnesota DOT	yes
Missouri DOT	yes
Caltrans	yes
Maryland SHA CHART	yes
New Jersey DOT	no
Texas DOT	no
Utah DOT	no

C. 6. Do you require that all new ITS projects in your jurisdiction comply with local or national ITS standards?

GCM Priority Corridor	yes
Colorado DOT #1	yes
Colorado DOT #2	yes
I-95 Priority Corridor	yes
Washington State DOT	yes
Virginia DOT	yes
Wisconsin DOT	yes
Houston Priority Corridor	yes
Minnesota DOT	yes
Missouri DOT	yes
Caltrans	yes
Maryland SHA CHART	yes
New Jersey DOT	yes
Texas DOT	yes
Utah DOT	yes

C. 7. Please check which of the following ITS standards are used for new ITS projects in your jurisdiction:
1. State or local equipment standards (e.g., signal controllers, VMS, etc.)
2. State or local communication protocols

3. National Electrical Manufacturers Association (NEMA) standards
4. National Transportation Communications for ITS Protocol (NTCIP)
5. Other (describe)

GCM Priority Corridor	4
Colorado DOT #1	all
Colorado DOT #2	1,2,3,4
I-95 Priority Corridor	4
Washington State DOT	1,2,3,4
Virginia DOT	4
Wisconsin DOT	all
Houston Priority Corridor	4
Minnesota DOT	
Missouri DOT	4
Caltrans	5
Maryland SHA CHART	1,3,4
New Jersey DOT	1,2,3,4
Texas DOT	1,2,3,4
Utah DOT	1,3,4

C8. Do you have a policy or migration plan for incorporating or upgrading older (legacy) systems into the regional or statewide ITS architecture?

GCM Priority Corridor	
Colorado DOT #1	no
Colorado DOT #2	no
I-95 Priority Corridor	no
Washington State DOT	no
Virginia DOT	no
Wisconsin DOT	no
Houston Priority Corridor	
Minnesota DOT	yes
Missouri DOT	no
Caltrans	no
Maryland SHA CHART	yes
New Jersey DOT	yes
Texas DOT	no
Utah DOT	yes

D. Procurement Process

D. 1. Using the contract types and definitions in the table below check which type of procurement method you usually use to procure the ITS products and services shown in each column

	Furnish and Install ITS Field Devices	Furnish and Install ITS-Software	ITS Operations	ITS Maintenance
GCM Priority Corridor	Engr/Contr.	Sys. Integrator	n/a	n/a
Colorado DOT #1	Engr/Contr.	Sys. Integrator	in house	in house
Colorado DOT #2	Engr/Contr.	Engr/Contr.		
I-95 Priority Corridor	Engr/Contr.	Sys. Mgr.	n/a	n/a
Washington State DOT	Engr/Contr.	Sys. Integrator	in house	in house
Virginia DOT	Engr/Contr.	Sys. Mgr.	Engr/Contr.	Engr/Contr.
Wisconsin DOT	Engr/Contr.	Sys. Integrator	Sys. Integrator	best value
Houston Priority Corridor	Engr/Contr.	Sys. Mgr.	n/a	n/a
Minnesota DOT				
Missouri DOT	Engr/Contr.	Sys. Integrator	Sys. Integrator	
Caltrans	all types	all types	all types	all types
Maryland SHA CHART	Engr/Contr.	Sys. Integrator	in house	Engr/Contr.
New Jersey DOT	Engr/Contr.	other	other	other
Texas DOT	Sys. Integrator	Sys. Integrator	Design/build	Engr/Contr.
Utah DOT	Engr/Contr.	Sys. Integrator	in house	in house

D. 2. Describe special procurement problems you have encountered with the above (e.g., legal):

GCM Priority Corridor	Some agencies have better procurements process and they are selected for Corridor projects.
Colorado DOT #1	
Colorado DOT #2	Lack of knowledge in approving agencies
I-95 Priority Corridor	Some agencies have better procurements process and they are selected for Corridor projects.
Washington State DOT	
Virginia DOT	
Wisconsin DOT	
Houston Priority Corridor	Staff knowledge, lack of funding
Minnesota DOT	
Missouri DOT	

Caltrans	Federal labs difficult to contract with, State process is time consuming and inflexible.
Maryland SHA CHART	System integrators work in A/E services contract, equipment is a capital procurement. This makes scheduling difficult.
New Jersey DOT	System integrators need input in design phase.
Texas DOT	
Utah DOT	Not same as hwy cst., process is confusing

D. 3. Do you have a uniform statewide (corridor wide) procurement procedure?

GCM Priority Corridor	no
Colorado DOT #1	yes
Colorado DOT #2	no
I-95 Priority Corridor	yes
Washington State DOT	yes
Virginia DOT	no
Wisconsin DOT	yes
Houston Priority Corridor	no
Minnesota DOT	
Missouri DOT	no
Caltrans	no
Maryland SHA CHART	yes
New Jersey DOT	no
Texas DOT	yes
Utah DOT	no

D. 4. What are your major procurement issues? (please rank with 1 = most problem for ITS)
1. Regional / National Architecture consistency
2. NTCIP
3. Technology Risk
4. Cost Concerns
5. Operations & Maintenance
6. Statutory limitations
7. Other (describe

GCM Priority Corridor	4,3,5
Colorado DOT #1	4,5,3,2,1
Colorado DOT #2	5,1,4
I-95 Priority Corridor	4,3,2
Washington State DOT	4,5,3,1,2

Virginia DOT	7	7=federal regs., VDOT can't do design/build
Wisconsin DOT	6,7,5,2,4,1,3	7=process development
Houston Priority Corridor	4,3,5	
Minnesota DOT		
Missouri DOT	4,5,3,6,1,2	
Caltrans	7	7=contract procedures
Maryland SHA CHART	4,5,2,6,3,1	
New Jersey DOT	7,3,5,4,6,2,1	7=bidding regs that allow hwy contractors to win bids
Texas DOT	6,4,3,5,1,2	
Utah DOT	1,3,4,2,5	

D. 5. Does your agency participate in public / private partnerships to procure ITS goods and/or services?

		How many?	**How Beneficial?**	**Best Suited Projects**
GCM Priority Corridor	yes	2		ATIS, comm
Colorado DOT #1	yes		resources, expertise	
Colorado DOT #2	yes	1	expertise	all
I-95 Priority Corridor	yes	2		
Washington State DOT	yes	4	cost sharing	projects with salable products
Virginia DOT	yes	3	resources, cost sharing	ATIS, shared resources
Wisconsin DOT	yes	3	resources, expertise	systems, comm, software
Houston Priority Corridor	yes	1		all
Minnesota DOT	yes			
Missouri DOT	yes	3	leverage resources	regional
Caltrans	yes	1	resources	ATIS
Maryland SHA CHART	yes	2	resources	ATIS, comm, CVO
New Jersey DOT	no			
Texas DOT	yes	2	leverage resources	regional ATMS
Utah DOT	no			traveler information

E. Operation and Maintenance Issues

E. 1. How do you provide for the Operation and Maintenance (O&M) of ITS systems in your jurisdiction?:
1. State transportation agency personnel
2. State police personnel
3. Local transportation agency personnel
4. Local police personnel
5. Joint state, local, police operations center(s)
6. Private contract operations
7. Public / Private Partnership operations
8. Other (describe)

GCM Priority Corridor	
Colorado DOT #1	1,2,6
Colorado DOT #2	1,2
I-95 Priority Corridor	
Washington State DOT	1,3
Virginia DOT	1,6
Wisconsin DOT	1,2,3,5,6,8
Houston Priority Corridor	
Minnesota DOT	
Missouri DOT	5,7,8
Caltrans	8
Maryland SHA CHART	1,2,5,6,7
New Jersey DOT	1
Texas DOT	1
Utah DOT	1

E. 2. How do you document inter-agency agreements regarding ITS O&M?
1. State or local statute
2. Joint Project Agreements (JPA)
3. Memoranda of Understanding (MOU)
4. Formal resolutions by governing bodies
5. Informal handshake agreements
6. No agreements are currently in place

GCM Priority Corridor	
Colorado DOT #1	3
Colorado DOT #2	2,3
I-95 Priority Corridor	
Washington State DOT	3
Virginia DOT	6
Wisconsin DOT	6
Houston Priority Corridor	
Minnesota DOT	
Missouri DOT	6
Caltrans	2,3

Maryland SHA CHART	3
New Jersey DOT	3
Texas DOT	2,4
Utah DOT	3,4,5

E. 3. How is funding for ITS O&M in your jurisdiction provided?
1. State highway maintenance (and/or transit operations) funds
2. Local highway (and/or transit operations) funds
3. Public/Private Partnership agreements
4. No O&M funds are identified for ITS

GCM Priority Corridor	
Colorado DOT #1	4
Colorado DOT #2	1,2
I-95 Priority Corridor	
Washington State DOT	1
Virginia DOT	1
Wisconsin DOT	1
Houston Priority Corridor	
Minnesota DOT	
Missouri DOT	3
Caltrans	2
Maryland SHA CHART	1,3
New Jersey DOT	1
Texas DOT	1,3
Utah DOT	1

E. 4. Does your agency have a specific person or group responsible for ITS O&M?

GCM Priority Corridor	
Colorado DOT #1	no
Colorado DOT #2	no
I-95 Priority Corridor	
Washington State DOT	yes
Virginia DOT	yes
Wisconsin DOT	no
Houston Priority Corridor	
Minnesota DOT	
Missouri DOT	no
Caltrans	no
Maryland SHA CHART	yes
New Jersey DOT	no
Texas DOT	yes
Utah DOT	no

E. 5. Do you regularly upgrade ITS equipment as part of routine maintenance?

GCM Priority Corridor	

Colorado DOT #1	no
Colorado DOT #2	no
I-95 Priority Corridor	
Washington State DOT	yes
Virginia DOT	no
Wisconsin DOT	yes
Houston Priority Corridor	
Minnesota DOT	
Missouri DOT	yes
Caltrans	no
Maryland SHA CHART	no
New Jersey DOT	no
Texas DOT	no
Utah DOT	no

E. 6. What is the current fiscal year budget for ITS operations (only) in your jurisdiction?

	$/yr in house	$/yr contract	# signals	miles freeway	transit pass.	
GCM Priority Corridor						
Colorado DOT #1				5		
Colorado DOT #2						
I-95 Priority Corridor						
Washington State DOT	1.9m		800	120		O&M combined
Virginia DOT						
Wisconsin DOT						
Houston Priority Corridor						
Minnesota DOT						
Missouri DOT						
Caltrans						
Maryland SHA CHART	3.5m			375		
New Jersey DOT						
Texas DOT	10-15m			210		O&M combined
Utah DOT	200k	200k	600	70		

E. 7. What is the current fiscal year budget for maintenance (only) of ITS installations in your jurisdiction?

	$/yr in house	$/yr contract	# signals	miles freeway	transit pass.
GCM Priority Corridor					
Colorado DOT #1				5	
Colorado DOT #2					
I-95 Priority Corridor					
Washington State DOT					
Virginia DOT					
Wisconsin DOT					
Houston Priority Corridor					
Minnesota DOT					
Missouri DOT					

Caltrans					
Maryland SHA CHART	1.0m			375	
New Jersey DOT					
Texas DOT					
Utah DOT	500k		600		

E. 8. In the table below, please indicate the number of people that typically staff each type of ITS operations center that you may have in your jurisdiction. Also indicate the number of hours the centers are staffed.

	Signal Control	Fwy. Ops.
GCM Priority Corridor		
Colorado DOT #1		3-12
Colorado DOT #2		
I-95 Priority Corridor		
Washington State DOT		2-12
Virginia DOT		
Wisconsin DOT		
Houston Priority Corridor		
Minnesota DOT		
Missouri DOT		
Caltrans		
Maryland SHA CHART		2-24, 4-16
New Jersey DOT		
Texas DOT		12-24
Utah DOT		2-14

F. Economic Impact of ITS

F. 1. How does ITS relate to economic development and vitality in your jurisdiction?

1. In my opinion, ITS provides a benefit, but it has not been quantified
2. In my opinion, ITS cannot provide any direct benefit for economic development
3. We are currently studying the impact of ITS on economic development
4. We have found the following direct (or indirect) economic impacts of ITS:

GCM Priority Corridor	
Colorado DOT #1	1
Colorado DOT #2	1
I-95 Priority Corridor	
Washington State DOT	1
Virginia DOT	1,3
Wisconsin DOT	3
Houston Priority Corridor	
Minnesota DOT	
Missouri DOT	3
Caltrans	3
Maryland SHA CHART	1
New Jersey DOT	1
Texas DOT	1
Utah DOT	

F. 2. Has your agency prepared a Business Plan (i.e., a plan outlining roles, investments and expected benefits/returns) to guide implementation of ITS?

GCM Priority Corridor	no
Colorado DOT #1	yes
Colorado DOT #2	yes
I-95 Priority Corridor	yes
Washington State DOT	yes
Virginia DOT	yes
Wisconsin DOT	yes
Houston Priority Corridor	no
Minnesota DOT	yes
Missouri DOT	no
Caltrans	yes
Maryland SHA CHART	yes
New Jersey DOT	yes

Texas DOT	no
Utah DOT	no

F. 3. Have any market research surveys been conducted regarding ITS deployment or services in your jurisdiction?

GCM Priority Corridor	no
Colorado DOT #1	no
Colorado DOT #2	no
I-95 Priority Corridor	yes
Washington State DOT	no
Virginia DOT	no
Wisconsin DOT	yes
Houston Priority Corridor	no
Minnesota DOT	
Missouri DOT	yes
Caltrans	no
Maryland SHA CHART	no
New Jersey DOT	yes
Texas DOT	no
Utah DOT	no

F. 4. Have any steps been taken to involve local businesses or other stakeholders in ITS deployment or operation?

GCM Priority Corridor	
Colorado DOT #1	yes
Colorado DOT #2	yes
I-95 Priority Corridor	
Washington State DOT	yes
Virginia DOT	yes
Wisconsin DOT	yes
Houston Priority Corridor	
Minnesota DOT	
Missouri DOT	yes
Caltrans	yes
Maryland SHA CHART	no
New Jersey DOT	no
Texas DOT	yes
Utah DOT	yes

G. Inter-Urban and Rural ITS Applications

G. 1. Has your agency deployed any ITS projects in inter-urban or rural areas?

GCM Priority Corridor	no
Colorado DOT #1	yes
Colorado DOT #2	yes
I-95 Priority Corridor	yes
Washington State DOT	yes
Virginia DOT	yes
Wisconsin DOT	yes
Houston Priority Corridor	no
Minnesota DOT	yes
Missouri DOT	yes
Caltrans	yes
Maryland SHA CHART	yes
New Jersey DOT	no
Texas DOT	no
Utah DOT	no

G. 2. Does your agency have a formal (i.e., separate) planning process for inter-urban and rural ITS projects?

GCM Priority Corridor	no
Colorado DOT #1	no
Colorado DOT #2	no
I-95 Priority Corridor	no
Washington State DOT	no
Virginia DOT	no
Wisconsin DOT	yes
Houston Priority Corridor	no
Minnesota DOT	yes
Missouri DOT	no
Caltrans	yes
Maryland SHA CHART	no
New Jersey DOT	yes
Texas DOT	no
Utah DOT	no

G. 3. What are your priority ITS needs for inter-urban and rural applications?

1. Communications

2. Traveler information

3. Transit related services
4. Incident response
5. Mayday response
6. Emergency related services
7. Other _

GCM Priority Corridor		
Colorado DOT #1	2,1	
Colorado DOT #2	2,1,4,5	
I-95 Priority Corridor		
Washington State DOT	1,2	
Virginia DOT	2,4,6,1	
Wisconsin DOT	4,2,1,7,5,6	7=CVO
Houston Priority Corridor		
Minnesota DOT		
Missouri DOT	1,2,4,6,5,3	
Caltrans	7	7=COATS
Maryland SHA CHART	7,5,1,2,6,4,3	7=weather
New Jersey DOT	7,2,1,3,4,5,6	7=traffic mgt.
Texas DOT	1,2,5,4,6,3	
Utah DOT	1,2,6,4	

G. 4. Is there any plan in your agency for the integration of ITS services across (or between) inter-urban / rural areas and urban areas?

GCM Priority Corridor	
Colorado DOT #1	yes
Colorado DOT #2	yes
I-95 Priority Corridor	yes
Washington State DOT	yes
Virginia DOT	yes
Wisconsin DOT	yes
Houston Priority Corridor	no
Minnesota DOT	yes
Missouri DOT	yes
Caltrans	yes
Maryland SHA CHART	yes
New Jersey DOT	no
Texas DOT	no
Utah DOT	no

H. ITS Implementation Authority

H. 1. Which agency has the primary responsibility and authority for the following stages of ITS deployment in your jurisdiction? (Please differentiate between district/region level and headquarters offices.)

	1. Strategic ITS Policies and Planning	2. ITS Project Planning	3. ITS Project Design	4. ITS Operation	5. ITS Maintenance
GCM Priority Corridor	DOTs	DOTs	DOTs	DOTs	DOTs
Colorado DOT #1	HQ	region	region	varies	varies
Colorado DOT #2	HQ	HQ	region	HQ,region	region
I-95 Priority Corridor	DOTs	DOTs	DOTs	DOTs	DOTs
Washington State DOT	DOT	DOT	DOT	DOT	DOT
Virginia DOT	HQ	HQ,districts	HQ	district	district
Wisconsin DOT	DOT	DOT	DOT	DOT	DOT
Houston Priority Corridor	varies	varies	varies	varies	varies
Minnesota DOT					
Missouri DOT	HQ, district	HQ, district	HQ, district	district	district
Caltrans	HQ	HQ	HQ	district	district
Maryland SHA CHART	SHA	SHA	SHA	SHA	SHA
New Jersey DOT	HQ	HQ	HQ	region	region
Texas DOT	district	district	district	district	district
Utah DOT	HQ	HQ	HQ	HQ	HQ

H. 2. Does your agency have an formal (i.e., separate) organizational entity to plan for and implement ITS projects?

GCM Priority Corridor	no
Colorado DOT #1	yes
Colorado DOT #2	yes
I-95 Priority Corridor	yes
Washington State DOT	yes
Virginia DOT	yes
Wisconsin DOT	yes
Houston Priority Corridor	no
Minnesota DOT	
Missouri DOT	yes
Caltrans	no
Maryland SHA CHART	yes
New Jersey DOT	yes
Texas DOT	yes

Utah DOT	no

H. 3. Does your agency have any special policy or directive specific to the planning and implementation of ITS?

GCM Priority Corridor	yes
Colorado DOT #1	no
Colorado DOT #2	no
I-95 Priority Corridor	no
Washington State DOT	yes
Virginia DOT	no
Wisconsin DOT	yes
Houston Priority Corridor	no
Minnesota DOT	
Missouri DOT	no
Caltrans	yes
Maryland SHA CHART	no
New Jersey DOT	no
Texas DOT	yes
Utah DOT	no

H. 4. Is ITS specifically included in your agency's long range plans (i.e., 2020 transportation plan)?

GCM Priority Corridor	yes
Colorado DOT #1	yes
Colorado DOT #2	no
I-95 Priority Corridor	
Washington State DOT	yes
Virginia DOT	no
Wisconsin DOT	yes
Houston Priority Corridor	yes
Minnesota DOT	
Missouri DOT	yes
Caltrans	yes
Maryland SHA CHART	yes
New Jersey DOT	yes
Texas DOT	yes
Utah DOT	no

H. 5. Rank the following challenges facing ITS implementation in your jurisdiction? (with 1 = most challenging)

1. Lack of knowledge on ITS/training

2. Lack of supporting policies for ITS

3. Inadequate funding
4. Lack of an ITS plan
5. Lack of coalition/consensus on ITS activities
6. Higher priorities for other transportation improvements
7. Other

GCM Priority Corridor	3	
Colorado DOT #1	6,1,4,2,5,3	
Colorado DOT #2	5,6,4	
I-95 Priority Corridor	3	
Washington State DOT	6,3,5,1,2	
Virginia DOT	7, 2	7=not traditional DOT function, organizational structure, staff shortage
Wisconsin DOT	7,2,6,1,3	7=lack of staff
Houston Priority Corridor	3	
Minnesota DOT		
Missouri DOT	6,3,5,2,4,1	
Caltrans	7,5,6,2,3,1	7=too many agencies
Maryland SHA CHART	3,2,6,5,1,4	
New Jersey DOT	6,3,1,5,2,4	
Texas DOT	6,3,1,5,2,4	
Utah DOT	2,5,1,3,4,6	

I. ITS Technology Cost

I. 1. In your experience, what factors have the most impact on the costs of an ITS project? (rank the following with 1= highest impact)
1. Urban vs. rural conditions
2. System functionality
3. System design standards
4. Labor costs (union vs.non-union)
5. Technology risk (new vs. proven)
6. Other

GCM Priority Corridor		
Colorado DOT #1	3,6,1,2,5,4	6=O&M
Colorado DOT #2	2,3	
I-95 Priority Corridor		
Washington State DOT	2,3,5	
Virginia DOT	2	
Wisconsin DOT	5,2,4,1,3	
Houston Priority Corridor	3	
Minnesota DOT		
Missouri DOT		
Caltrans	6	6=not a problem
Maryland SHA CHART	1,2,3,4,5	
New Jersey DOT	2,5,4,3,1	
Texas DOT	5,4,2,3,1	
Utah DOT	5,4,2,3,1	

I. 2. What controls do you use in the basis of payment for ITS equipment purchase (e.g., retainage, extended warrantees, etc.) to control costs?

GCM Priority Corridor	
Colorado DOT #1	retainage
Colorado DOT #2	retainage
I-95 Priority Corridor	
Washington State DOT	
Virginia DOT	low bid
Wisconsin DOT	2 yr. maintenance warranty
Houston Priority Corridor	
Minnesota DOT	

Missouri DOT	
Caltrans	retainage, require deliverable for payment
Maryland SHA CHART	extended warranty, bonding, liquidated damages
New Jersey DOT	retainage, extended warranty, pay when operational
Texas DOT	purchase from pre-qualified vendors
Utah DOT	warranty, inspection, testing

I. 3. Do you require extended warranties (longer than one year) for equipment and systems?

GCM Priority Corridor	
Colorado DOT #1	yes
Colorado DOT #2	no
I-95 Priority Corridor	no
Washington State DOT	yes
Virginia DOT	no
Wisconsin DOT	yes
Houston Priority Corridor	no
Minnesota DOT	
Missouri DOT	no
Caltrans	no
Maryland SHA CHART	yes
New Jersey DOT	yes
Texas DOT	yes
Utah DOT	yes

I. 4. Have you procured ITS system software?
If yes, which do you find is more cost effective?
1.Commercial, off the shelf (COTS) software (also known as single entity, "third party" software)
2. Multiple vendor supplied software, with systems integration provided by others
3. Custom designed software

GCM Priority Corridor	
Colorado DOT #1	yes
Colorado DOT #2	yes - 3
I-95 Priority Corridor	yes - 1
Washington State DOT	yes - all
Virginia DOT	yes - 3

Wisconsin DOT	yes - 1,2
Houston Priority Corridor	yes
Minnesota DOT	
Missouri DOT	yes
Caltrans	yes
Maryland SHA CHART	yes - 3
New Jersey DOT	yes - 2
Texas DOT	yes - 1
Utah DOT	yes - 1

I. 5. How do you pay for software support and maintenance for COTS and vendor supplied software?

GCM Priority Corridor	
Colorado DOT #1	
Colorado DOT #2	
I-95 Priority Corridor	maintenance contract
Washington State DOT	state forces
Virginia DOT	contract
Wisconsin DOT	CMAQ, O&M funds
Houston Priority Corridor	O&M funds
Minnesota DOT	
Missouri DOT	
Caltrans	
Maryland SHA CHART	maintenance contract
New Jersey DOT	bid item
Texas DOT	O&M funds
Utah DOT	federal ITS funds

I. 6. In the table below, please provide typical ITS deployment (unit) costs, used for planning purposes by your agency, for as many of the following components as possible

ITS Component	Unit Cost
Vehicle Detection Station (VDS) (loop or in-pavement)	$1000, $500, $20000, $45000,$2000, $500
Vehicle Detection Station (VDS) (radar or ultrasonic)	$2500,$10000, $30000, $25000, $5000, $7000, $3000
Vehicle Detection Station (VDS) (video-based)	$25000, $40000, $35000, $40000, $25000, $20000

CCTV Installation	$70000, $20000, $40000, $7000, $100000, $45000, $9000, $25000
Dynamic / Variable / Changeable Message Sign (DMS/VMS/CMS)	$100000, $75-250000, $225000, $225000, $225000, $100000, $250000
Kiosk Installation	$15,000
Ramp Metering Installation	$250000, $20-500000, $50000, $25000, $200000
AVL (Cost per Bus)	$10,000
AVI (Cost per Toll Lane)	
Motorist Aid Call Box	$10000, $5000, $5000
Highway Advisory Radio (HAR) Station	$15000, $80000, $2500, $30000, $250000, $40000
Highway Advisory Telephone (HAT) System	$40,000
Fiber Optic Cable Installation (per unit of length)	$3/lf, $23/lf, $11/lf
Microwave/Cellular Communications Link	$15000, $80000
SONET Hub Site Installation	$50,000
Internet Web Site (development cost)	$15000, $140000, $40000
Internet Web Site (monthly maintenance cost)	$5,000
Roadway Weather Information Station	$100,000

Vision, Guiding Principles, Goals and Objectives

This material provides a framework to guide Florida's ITS program and is designed to be flexible enough to accommodate regional differences, but still relate to the 2020 Florida Transportation Plan (FTP) and the plans of the Metropolitan Planning Organizations (MPO) and local government. Because ITS projects must compete for limited resources and contribute to Florida's overall goals, the ITS Vision, Guiding Principles, Goals and Objectives should reflect the unique features of Florida, the existing program legacy and the best efforts of other larger complex states.

Vision Development Background

The scope of this plan is clearly strategic in nature. Therefore, the time frame for the ITS vision, goals and objectives is long term (20 years plus) so that would fit within that of the 2020 Florida Transportation Plan (FTP). Many of the ITS strategies will be long term in nature and, therefore, compatible with the long range component of the FTP. There is no "short term" component, per se, of the ITS Strategic Plan. However, ITS offers several "early winners" that can benefit travelers now (zero to 5 years) and demonstrate the cost effectiveness of ITS strategies. The concept of ITS early winners is embodied in the Guiding Principles of this plan.

The vision, guiding principals, goals and objectives should be developed to support the 2020 FTP, since ITS is demonstrably a cost-effective means of pursuing the FTP goals. Consideration should be given to selection of measures of effectiveness (MOEs) that will confirm this.

After reviewing the visions of several states' ITS programs, it was clear that a short general statement, clearly linked into state policy would be the most useful for a Florida Vision. Program characteristics and specific services are then handled within program principals and goal-related objectives. Note that the vision below is explicitly linked to the four 2020 FTP goals.

Florida's ITS Vision

Nearly two decades into the 21st Century, travelers in Florida are seeing more and more benefits from an integrated and coordinated Intelligent Transportation System within each of its urbanized areas and along all major transportation corridors. ITS provides valuable services to travelers, business, industry and government that were unavailable just a few decades ago. Pedestrian, automobile and transit mobility have benefited from real-time information sharing, route navigation, electronic payment systems and system management activities made possible through ITS. Business and commerce are both partners and benefactors in ITS using the improved information and intermodal linkages provided by the system to improve business operations. The economic vitality of Florida has never been better aided by a statewide transportation system made safer and more efficient by ITS. All stakeholders in Florida's transportation system benefit from improved safety provided by ITS technologies in our vehicles and the network of systems assisting emergency service providers. Florida's ITS Strategic Plan, first adopted in 1999 and updated regularly ever since, assures that Intelligent Transportation Systems are considered at all levels of planning, production, operations and management, providing improvements in safety, mobility and economic vitality to maximize the investment in Florida's multi-modal transportation system.

Guiding Principles

Guiding principles are designed to describe how the vision will be realized, i.e., they characterize the ITS program itself. The following set of principles have been adapted to Florida's ITS needs.

Planning and Development

- Undertake strategic deployment - clarify ITS project priorities; develop a cost-effective incremental approach to deployment, consider both short and long-term elements.

- Provide a common framework for the planning, deployment and integration of systems through ITS architecture and standards consistency - develop regional applications of the National ITS Architecture, maximize the use of common architecture and standards; provide for a migration plan for older (legacy) systems to meet ITS standards and architecture consistency; establish a statewide ITS infrastructure through the use of statewide and national standards and architecture.

- Promote institutional and inter-jurisdictional cooperation and coordination in the planning, deployment, operations, management, and maintenance of ITS infrastructure - include ITS in all regional and statewide processes for transportation infrastructure planning, development and maintenance, emergency operations planning and management, and system operations and management; optimize cooperation and coordination among key stakeholders, both "vertical" (FDOT, local government, MPOs) and "horizontal" (transit and toll authorities, police, fire, emergency management services (EMS), etc.)

- Provide service on a regional, integrated and interoperable basis - provide seamless service through the integration of traffic operations and transit services across jurisdictional lines.

- Integrate ITS planning and ITS-related operations planning with statewide, metropolitan, authority and local government planning processes; incorporate ITS plans with Long Range Transportation (LRTP) and with State Implementation Plans (SIP), Transportation Improvement Program (TIP), Congestion Management System (CMS) Transportation System Management (TSM), activities, etc.

- Support concurrency / growth management program - use ITS as means of both monitoring and supporting program objectives; maximize the use of ITS developed data as a resource for other planning needs.

- Emphasize Intermodal/multimodal orientation to enhance both passenger and freight connections and transfers at ports, airports, and via all applicable modes.

- Utilize proven cost-effective technologies to deliver new and enhanced services to travelers and system users; use total life-cycle cost analysis to select appropriate ITS components and designs.

Operations & Management

- Provide performance-driven service – provide real-time operations and management of all transportation systems to maximize system performance, safety and time reliability; use ITS data to make real-time traffic control decisions and to evaluate transportation system performance.

- Adapt system operations and management strategies to changing conditions - incorporate new and modify existing service attributes based on performance evaluations.

- Provide emergency operations support - ensure traveler information systems and traffic management systems be capable of suporting hurricane and other emergency evacuation procedures.

- Actively pursue inter-agency operations and management agreements - agreements for the operation, maintenance, staffing, data-sharing and management of ITS deployments.

Finance

- Provide ITS Funding for Architecturally consistent projects - funding priorities should favor those ITS projects which are consistent with state and national ITS architecture and standards.

- Leverage value of "conventional" capital investment in roadway and transit improvements through ITS features that improve operational efficiency.

- Develop ITS funding strategies - pursue development of specific funding strategies for ITS deployment in the MPOs, TIPs and Department's Work Program. Such strategies should include funding for long-term operations and management.

- Capitalize on private sector resources - access technology, capital and entreprenuership through public-private partnerships and private sector information service providers (ISPs); coordinate electronic payment services, such as "smart card technology", with private sector financial institutions, maximize customer-responsive commercial opportunities (with revenue potential); capitalize on innovative finance for both capital and operations funding through the use of privatization, commercialization, and cost-sharing; support private sector initiatives for personal safety and mobility (e.g., May Day systems, on-board navigation, etc.).

Public Awareness / Involvement

- Include education, training and outreach for policy makers, general public and technical staff.

- Respond to special user needs – provide for the mobility and safety needs of commuters, tourists, goods movement, pedestrians, bicyclists, older road users and mature drivers.

- Identify and support ITS advocates / champions - seek out and promote ITS champions in local government, public agencies, academia, and the private sector including the general public.

Research & Development

- Support continued research and operational testing – provide a systematic research program to evaluate emerging technologies, new systems, markets, and planning methods.

Goals & Objectives

These ITS Strategic Plan goals parallel the four 2020 FTP Goals. The corresponding objectives are designed to show how the ITS program contributes to FTP goals and can be tracked through a common set of performance measures. Potential relevant ITS applications are shown in parentheses after each objective. This is important to help insure a goal-oriented ITS program.

Goal 1:
Safe transportation for residents, visitors and commerce.

ITS Objectives

- Minimize response time for incidents and accidents (incident management programs)
- Reduce commercial vehicle safety violations (commercial vehicle operations safety programs)
- Reduce weather related traffic incidents (road-weather information systems)
- Minimize grade crossing accidents (highway-rail interface safety systems)
- Improve emergency management communications (coordination of communication frequencies; real-time traveler information systems for evacuation and major route closings, re-routings or restrictions)
- Improve security for highway and transit users (surveillance cameras, call boxes, and emergency services support)
- Improve the security, safety and convenience of pedestrians and bicyclists (improved interfaces at pedestrian crossings, signalized intersections, kiosks, surveillance systems)

Goal 2:
Protection of the public's investment in transportation

ITS Objectives

- Reduced vehicular delay from incidents (incident response programs)
- Improved peak period flow and throughput (traffic control systems and operations)
- Reduce cost of commercial vehicle fleet operations (CVO and intermodal systems)
- Assist in providing safe and efficient maintenance of traffic during project construction (work zone monitoring systems, real-time traveler information systems)

Goal 3:
A statewide interconnected transportation system that enhances Florida's economic competitiveness.

ITS Objectives

- Reduce cost and delay of intermodal connections (commercial vehicle operations and information systems)
- Minimize shipping and delivery delays to improve freight operations (real-time system management programs)
- Improved predictability of travel and delivery times (incident management systems)

- Improve efficiency of fleet operations (CVO information systems)
- Improve tourist access and convenience (special traveler information systems)
- Increased employment (new ITS industry in Florida)

Goal 4:
Travel choices to ensure mobility, sustain the quality of the environment, preserve community values and reduce energy consumption.

ITS Objectives

- Improve mobility and choices for highway and transit users (traveler information systems for conditions and modal / route options)
- Improve tourist access (specialized traveler information systems)
- Reduce need to travel (communications infrastructure to support telecommuting, teleconferencing, teleshopping, etc)
- Reduce energy use and environmental degradation (ITS systems management to reduce vehicle trips, and vehicle miles of travel)
- Improve service for special traveler needs (smart cards, computer aided dispatch and automated vehicle location system to enable true demand-responsive transit systems)
- Improved multimodal travel (smart cards, traveler information and transit management systems to reduce transit travel times)
- Reduced energy use and delay associated with major incidents (ITS systems management and route diversion)
- Improve efficiency of toll operations (electronic toll collection systems)
- Enhance and support ride sharing opportunities (high occupancy vehicle / high occupancy toll systems)

Florida Statewide ITS Strategic Plan

ITS Project Cost Comparison

1. PURPOSE

The purpose of this ITS Cost Issue Paper is to compare similar freeway management system project's costs in the State of Florida. A related effort under this contract is considering project cost factors for the purpose of planning and managing future ITS deployment costs by the Department.

2. BACKGROUND

The Florida Department of Transportation has become aware of substantial variance between costs of freeway management system projects in different regions of the state. This concern has led to a review by the District Traffic Operations offices involved, with an examination of the factors contributing to the individual projects' costs. These contributing factors and the plans and specifications themselves were reviewed by other State's DOTs through the Peer-to-Peer program, sponsored by FHWA. While there were numerous factors cited, the Department has requested further analysis of the cost related issues.

3. SUMMARY OF RECENT ITS DEPLOYMENT COST EXPERIENCE

3.1. FREEWAY MANAGEMENT SYSTEMS IN FLORIDA

Introduction

Freeway management system costs are a major part of the overall costs of the urban intelligent transportation infrastructure. The typical freeway management system provides a communications backbone and a transportation management center, which can serve multiple purposes for ITS beyond simple freeway surveillance and control.

The costs of freeway management systems can generally be broken down into components. For the purpose of comparison, the number of components is kept at a basic level. The freeway management system includes the following major components:

- Transportation Operations Center (TOC)
- Communications Subsystem
- Detection Stations
- Changeable Message Signs (CMS)
- Highway Advisory Radio (HAR)
- Closed Circuit Television (CCTV)
- Ramp Metering

This component level analysis is used to normalize the comparison between projects with different spacing of the components along the freeway centerline and is consistent with other national ITS cost analyses.

The freeway management system projects sampled in this section represent Florida projects from medium and large cities, and a variety of technologies. The projects all reflect those most current with actual bid experience.

- Table 1 provides a summary of the sampled projects' costs for all phases of work.

- Table 2 provides a summary of sampled component costs of these projects. These component costs are derived from the same recent Florida projects.

- Table 3 reflects the derivation of the component costs based on the plans and contract unit prices from the projects. The component costs reflect all of the items associated with the device. For example, the changeable message sign cost includes the support structure, controller, ancillary hardware, and wiring.

Insert Table 1

Insert Table 2

Insert Table 3

3.1.1. Broward County Freeway Management System

The Broward County Freeway Management System deploys a functionally incremental freeway management capability on I-95 and I-595 in Broward County. Construction is presently underway. The system lengths are 27 and 13 miles respectively.

This project began with a feasibility study, addressing:

- The project overview
- System concept development
- System justification
- Implementation plan
- System operation

A subsequent technical report was prepared which addressed:

- Description and purpose
- Variable message sign technology
- Detection technology

The project deployment is broken up into phases. The project descriptions are provided in Table 4 below:

Phase	Length	# of CMSs	# of Detection Stations	# of CCTVs
I-595 from I-75 to US 1 Ph I	13 mi	22	3	0
I-95 from Dade Co. Line to Palm Beach Co Line Ph II	27 mi	12	0	0
I-595 Ph III		25	10	0
I-95 Ph III		22	16	0
I-595 Video Ph III				22
I-95 Video Ph III				26
Totals	40	81	29	48

Table 4 Broward County Freeway Management System Projects

The additional infrastructure components defined in phase III are tentatively planned at this time. The system O&M is anticipated to be addressed through a contracted operation. The contracted party will operate, manage the maintenance, and integrate/enhance the individual project components.

The deployment of these phases employs vendor supplied hardware/software for each of the subsystems, (i.e. separate control systems for the CMS, and Detection subsystems at this time).

3.1.2. Miami-Dade ICS Freeway Management System

The Miami-Dade County Freeway Management System deploys a freeway management system for I-95 throughout Miami-Dade County. The system is also intended to provide a communications backbone for all other ITS functions in the region.

The master plan for ITS functions in the Miami-Dade, Broward, and Palm Beach County Region is called the Intelligent Corridor System (ICS). The Master Plan Study addressed:

- Introduction
- Management Plan
- Implementation Plan
- Operations Plan
- Maintenance Plan
- Evaluation Plan
- Agreements and Legislation
- Incident Management Program

The project is broken up into phases as shown below in Table 4.

Phase	Length	# of CMSs	# of Detection Stations	# of CCTVs	# of Ramp Meters
Phase A I 95 form US 1 to Broward Co Line	18	4	15	27	
Ph B		18	21		22
Ph C (TMC Only)					
Totals	18	22	36	27	22

Table 4 Miami Dade County Freeway Management System Projects

3.1.3. Orlando / Daytona Beach Freeway Management Systems

The I-4 Surveillance and Motorist Information System (SMIS) is a full featured freeway management system with automated vehicle and incident detection, camera control and VMS control. Monitoring and control of field devices is from an integrated central computer system. The I-4 system is operated by FDOT District 5 personnel, in concert

with FHP and the City of Orlando.

The current freeway management system on I-4 in Orlando is actually the second of two phases. The original Phase 1 was an 11 mile system from John Young Parkway to Maitland Boulevard. This 11 mile system included 25 detector stations 15 cameras and 4 variable message signs. The re-design and expansion of the Phase 1 system to the current configuration re-used many of the components from the earlier system (e.g., conduit, camera mounting poles, cabinets, etc.). This will make cost comparisons between the Orlando system and other systems more complicated. The cost information presented in this paper has been extracted from the bid tabulations. Example unit costs shown herein are for device installations that were completely new and did not re-use existing equipment or infrastructure.

The Daytona Smart Highways System (DASH) is a functional equal to the I-4 SMIS and includes the same field hardware and central computer software systems. The DASH system was installed as a completely new system. The City of Daytona Beach Traffic Engineering Department operates this system with additional support from FDOT District 5 provided via a remote operator interface.

Phase	Length	# of CMSs	# of Detection Stations	# of CCTVs
Orlando - I-4 SMIS US 192 to Lake Mary Blvd.	39 mi.	22	69	50
Daytona Beach I-4 and I-95	10 mi.	4	10	10
Totals	49	26	79	60

Table 5. Orlando / DASH Freeway Management System Projects

4. FINDINGS

Differences in Component Costs

There are distinct differences in the component costs of the projects. These differences are most notable in the areas of the major infrastructure items and software. Each are discussed below:

Changeable message signs The changeable message signs for the mainline traffic are mounted over the roadway on trusses in Miami-Dade and Broward vs. cantilevered or shoulder mounted in Orlando. In Miami Dade, the structures are designed differently than FDOT standards. The design is unusually deep and utilizes square tubular steel members without diagonal bracing. The Broward system also utilizes truss structures, but employs the FDOT standards. These truss structures add greatly to the cost of the CMS assembly compared with Broward, I-4 and Caltrans.

CCTV The use of tilt-down high mast poles (30 meters height) for camera mounting in Miami-Dade is highly expensive compared with less costly concrete or steel poles used by Orlando and Caltrans.

Detection Stations/Ramp Meters The Video Detection Stations cover all lanes at each ramp junction, utilizing new steel mast arms (17 meter height) in most cases in Miami-Dade. This approach is more costly than the embedded loop design or a more conservative VID design.

Communications In the Miami-Dade ICS, the communications subsystem is highly complex, and has been designed with extensive spare capacity. The communications backbone along I-95 utilizes a total of 96 fibers within a prefabricated four-duct conduit system. The communications link from this backbone to the central TOC is via two high capacity (T3) leased lines. This extensive communications infrastructure (which is all being constructed in Phase A) is more than enough to support the field devices identified for Phases A and B.

In the Broward CMSS design, the communications backbone along I-595 utilizes a 12 strand fiber optic cable in two conduits (one installed empty for future use). The connection between the I-595 corridor and the District 4 TOC is via dial-up telephone lines. This configuration also provided substantial extra capacity - identified for future use by CCTV and vehicle detection systems not included in the initial construction phase.

In the Orlando design, the communications backbone is based on a 36 strand fiber optic cable in two conduits (one installed empty for future use). Four of these strands are used to provide a T-1 network for all data communications between the field devices and the center FMC. Most of the remaining strands are used for video transmission and local to master data communications. There are up to 6 un-used (dark) strands within the I-4 backbone fiber cables. Expansion of the I-4 system will mostly use spare capacity in the T-1 network. Additional fibers may be used for additional video coverage.

DEGREE OF DIFFICULTY

The Miami Dade project presents a high degree of difficulty for the Contractor. This difficulty and its associated risk leads to higher costs, for the following reasons:

- A highly prescriptive specification, to the manufacture level with a large number of referenced specifications and standards. The specification is highly detailed and voluminous resulting in 517 pages of technical special provisions.

- Prescribed communication protocols for all devices. This requires the manufacturers to rewrite their device software to comply with the specification, adding substantial cost to the devices in construction project.
- Design details for all cabinets, hub sites, field conduit layout, and splice points. This approach limits contractor flexibility and innovation, which results in lower costs.
- A complex central system, with the requirement for the contractor to purchase all central electronic equipment. This approach requires the contractor to purchase computers and software without the ability to make it work due to the dependency on application software provided by the system manager. The contractor typically adds a profit margin to this substantial project cost.
- Retainage of payment to the contractor of 25% between subsystem and final acceptance with other intermediate retainage milestones. This adds finance costs to the project, while the Contractor cannot be held fully accountable for the complete working system.

  In the Orlando project, the system manager, who developed the software also purchased the computer equipment, integrated it, and performed the required testing. This approach puts the responsibility for integrating and deploying the system with the system manager rather than the electrical installation contractor. This system manager approach also helps avoid extensive efforts writing defensive specifications and enforcement of test requirements on the installation contractor.

  The Broward project attempts to minimize the degree of difficulty by utilizing separate vendor supplied software for the CMS and detector stations.

Project				Planning	Design	Const	CEI	Total
Miami-Dade Co Intelligent Corridor System								
6140012		ICS Study		$2,063,064			$121,470	$2,184,534
6141888		Golden Glades				$2,354,471.00	$346,969	$2,701,440
6141897		Golden Glades				$622,423.00	$90,446	$712,869
6141898		Golden Glades			$217,321.00	$955,630.00	$135,718	$1,308,669
6141828		Phase A			$10,922,680	$13,354,874		$24,277,554
6141914		Phase B			$2,500,393	$18,663,050	$3,945,305	$25,108,748
6114415		Phase C				$7,533,440	$753,344	$8,286,784
6114412		Interim TOC				$250,000	$20,000	$270,000
6114291		Public Involvement					$180,000	$180,000
Total				$2,063,064	$13,640,394	$43,733,888	$5,593,252	$65,030,598
Broward Co Changeable Message Sign System								
4140960		I-595			$874,319	$5,669,987	$1,940,022	$8,484,328
4140914		I-95			$300,001	$5,578,045	$990,959	$6,869,005
Total					$1,174,320	$11,248,032	$2,930,981	$15,353,333
Orlando/Daytona Surveillance & Motorist Info Sys								
5147222		Phase 1			$536,534		$316,321	$852,855
5147227		Phase 1 Const				$3,251,405		$3,251,405
5140023		Phase 2			$702,815	$5,519,666	$584,023	$6,806,504
5119328		DASH			$347,969	$1,366,510	$219,987	$1,934,466
Total								$12,845,230
Jacksonville Freeway Management System								
2142519		Control Center			$990,611		$2,207,908	$3,198,519
2142539		Infrastructure				$4,000,000		$4,000,000
Total					$990,611	$4,000,000	$2,207,908	$7,198,518.99

Table 1 Freeway Management System Project Cost Comparison

Project			CMS Asssembly	Camera Asssembly	Detector Asssembly	Control Center	Ramp Meter	Comm. System/Mi
Miami-Dade County ICS								
6141828		Phase A	$403,655	$52,860	$53,298	$1,614,862	n/a	$238,272
6114412		Interim TOC	n/a	n/a	n/a	TBD	n/a	

Project			CMS Asssembly	Camera Asssembly	Detector Asssembly	Control Center	Ramp Meter	Comm. System/Mi
Miami-Dade County ICS								
Broward County CMSS								
4140960		I-595	$150,117	n/a	$17,720	n/a	n/a	
4140914		I-95	TBD	TBD	TBD		n/a	
Orlando / Daytona MIS								
5140023		I-4 SMIS Phase 2	$72,793	$6,978	$13,851.00	$170,500	n/a	$227,669
5119328		DASH	$75,438	$7,586	$15,978	$143,178	n/a	$55,609
ITS National Survey								
		Low	$100,000	$7,000	$3,000		$20,000	$29,000
		High	$250,000	$100,000	$45,000		$250,000	$134,000

Table 2 ITS Component Costs

Broward County Changeable Message Sign System

Changeable Message Sign Assembly		Derived from Sheet 44		
Item	Description	Quantity	Unit Cost	Total
2630-1-12	Conduit	70M	$4.45	$312
2630-1-15	Conduit	50M	$6.00	$300
2635-1-11	Pull Box	3	$169.00	$507
2635-1-13	Mounted Junction Box	2	$99.00	$198
2639-1-12	Underground Power Service	1	$620.00	$620
2639-2-1	Service Wire	270M	$2.10	$567
2620-1	Grounding	30M	$12.25	$368
2700-44-062	Sign Truss	1	$112,840.00	$112,840
2700-46-13	Remove Ovrhd Truss	1	$2,796.00	$2,796
2700-89-11	Electric sign	1	$31,610.00	$31,610
Total				$150,117

Detector Station	Derived from Sheet 76

Broward County Changeable Message Sign System

Changeable Message Sign Assembly		Derived from Sheet 44		
Item	Description	Quantity	Unit Cost	Total
2685-160	Microwave Radar Detector	5	$1,995.00	$9,975
2685-102	Transciever	1	$635.00	$635
2750-80	Telephone Service	1	$7,110.00	$7,110
Total				$17,720

Table 3a Detailed Component Costs

Miami-Dade Intelligent Corridor System
Table 3b - Detailed Component Costs

Camera Assembly				CCTV-24-10.91, Sheet 185		
Item	Description			Quantity	Unit Cost	Total
2620-1	Grounding			45M	$18.00	$810
2630-1-12	Conduit			26 M	$6.80	$177
2633-121-1	F.O. Cable			8M	$7.70	$62
2635-1-15	F.O. Pull Box			1	$940.00	$940
2676-110-602	Controller Assembly			1	$4,790.00	$4,790
2685-139	Video Modem			1	$1,325.00	$1,325
2686-101	Camera			1	$12,035.00	$12,035
2715-111-103	Conductor			7M	$1.85	$13
2715-111-105	Conductor			3	$2.08	$6
2715-2-112	Conduit			16M	$11.00	$176
2715-91-30	Pole			1	$32,526.00	$32,526
Total						$52,860

Changeable Message Sign Assembly			FVMS-1-9.4, Sheet 212		
2400-1-15	Concrete		2.7M3	$682.00	$1,841
2455-133	Sheet Piling		86M2	$343.00	$29,498
2515-1-1	Handrail		11.5M	$344.00	$3,956
2521-73	Barrier Wall Removal		9.25M	$588.00	$5,439
2620-1	Grounding		48 M	$18.00	$864
2630-1-12	Conduit		35M	$6.80	$238
2633-121-1	FO Cable		17 M	$7.70	$131

Miami-Dade Intelligent Corridor System
Table 3b - Detailed Component Costs

2635-1-15	FO Pull box			1	$940.00	$940
2676-110-602	Controller Assembly			1	$4,790.00	$4,790
2683-107	Modem			1	$ 62,277/42	$1,483
2700-42-060	Overhead Truss			1	$250,873.00	$250,873
2700-89-3	CMS			1	$102,985.00	$102,985
2715-111-105	Conductor			11M	$2.08	$23
2715-111-109	Conductor			24M	$4.03	$97
2715-14-11	Pull box			1	$200.00	$200
2715-2-112	Conduit			27M	$11.00	$297
Total						$403,655

Miami-Dade Intelligent Corridor System
Table 3b - Detailed Component Costs

Detector Station Assembly				DS-13-3.33, Sheet 92		
2620-1	Grounding			27M	$18.00	$486
2630-1-11	Conduit			12M	$33.00	$396
630-1-12	Conduit			16M	$6.80	$109
2633-121-1	Fiber Optic Cable			5M	$7.70	$39
2635-1-11	Pull Box			1	$195.00	$195
2635-1-15	Pull Box			5	$940.00	$4,700
2647-13-07	Mast Arm			1	$22,760.00	$22,760
2663-70	Optical Veh Detector			2	$6,637.00	$13,274
2672-1-9	Controller Assembly			1	$4,252.00	$4,252
2676-110-602	Controller Cabinet			1	$4,790.00	$4,790
2685-140	F.O. Modem				$1,722.00	$1,722
2715-14-11	Pull Box			2	$200.00	$400
2715-2-112	Conduit			16M	$11.00	$176
Total						$53,298

Miami-Dade Intelligent Corridor System
Table 3b - Detailed Component Costs

Field Communications Equipment				Plan Sheets 12, 13		
2425-2-101	Manhole			69	$2,689.00	$185,541
2620-1	Grounding			1089	$18.00	$19,602
2630-1-11	Conduit			0	$33.00	$0
2630-1-12	Conduit			7942	$6.80	$54,006
2630-1-13	Conduit			550	$13.70	$7,535
2630-1-14	Conduit			150	$133.00	$19,950
2630-1-15	Conduit			1620	$47.00	$76,140
2633-121-1	Fiber Optic Cable			2077	$7.70	$15,993
2633-121-3	Fiber Optic Cable			36669	$16.00	$586,704
2635-1-11	Pull Box			8	$195.00	$1,560
2635-1-13	Pull Box			11	$665.00	$7,315
2635-1-15	Fiber Pull Box			83	$940.00	$78,020
2639-1-22	Power Service			14	$110.00	$1,540
2685-120	Transciever			1	$2,625.00	$2,625
2715-2-112	Conduit			26665	$11.00	$293,315
2715-2-232	Conduit			6194	$22.00	$136,268
2715-2-332	Conduit			5289	$39.00	$206,271
2715-2-432	Conduit			115	$106.00	$12,190
2715-7-11	Load Center			17	$4,045.00	$68,765
2715-14-11	Pull box			288	$200.00	$57,600
2715-14-14	Pull box			33	$355.00	$11,715
2715-111-103	Conductor			5424	$1.85	$10,034
2715-111-105	Conductor			42186	$2.08	$87,747
2715-111-106	Conductor			14281	$3.58	$51,126
2715-111-109	Conductor			3438	$4.03	$13,855
2715-111-110	Conductor			1836	$4.44	$8,152
2715-111-111	Conductor			190	$5.00	$950
2715-111-112	Conductor			1035	$5.12	$5,299
3160-114-204	Multi-duct conduit			24927	$48.00	$1,196,496
3160-114-304	Multi-duct conduit			4765	$116.00	$552,740
3160-134-04	Multi-duct conduit			5047	$103.00	$519,841
Total						$4,288,895
Communications	@ 18 miles	- Cost per mile				$238,272

Miami-Dade Intelligent Corridor System
Table 3b - Detailed Component Costs

Control Center				Plan Sheet	155	
2680-101	Servers			2	$165,100.00	$330,200
2685-106	UPS			1	$10,145.00	$10,145
2680-110	Workstations			3	$26,350.00	$79,050
2680-117	Printers			2	$5,431.00	$10,862
2680-113	Server			1	$42,570.00	$42,570
2682-101	Video Wall			1	$78,360.00	$78,360
2683-108	Telephone			2	$942.00	$1,884
2683-102	MUX			2	$263,000.00	$526,000
2685-142	Codecs			25	$13,195.00	$329,875
2685-144	Video Switch			1	$46,011.00	$46,011
2680-106	Brouter			3	$13,450.00	$40,350
2685-105	Time Broadcaster			1	$4,260.00	$4,260
2680-105	External Storage			1	$78,800.00	$78,800
2685-128	Hub Switch			2	$9,160.00	$18,320
2680-115	Modem			4	$625.00	$2,500
2680-120	Terminal Servers			3	$5,225.00	$15,675
Total						$1,614,862

DASH Freeway Management System

CCTV Installation		
686-101	CCTV Assembly	$5,828.00
641-131-50	Conc. Strain Pole	$1,758.00
639-1-21	Elec. Power Service	$910.00
Total		$7,586.00

Detector Site		
660-1111	Loop Detector (3 x 4ch)	$690.00
660-2102	Loop Assembly (12)	$5,448.00
639-1-21	Elec. Power Service	$910.00
672-1-1	Type 170 Controller & Cab	$8,930.00
Total		$15,978.00

CMS Installation		
700-43-33	Sign structure -cantelever	$23,168.00
700-89-5	CMS Assembly	$52,270.00

DASH Freeway Management System

CCTV Installation		
639-1-21	Elec. Power Service	$1,955.00
Total		$75,438.00

Control Center		
770-210	Building Renovation	$9,300.00
686-102	Monitors	$10,241.00
686-104	CCTV switcher	$34,029.00
685-302	Video support equip.	$7,264.00
N/A	Computers	$82,344.00
Total		$143,178.00

Communications		
630-1-11	Conduit	$1,575.00
630-1-12	Conduit	$146,971.00
630-1-13	Conduit	$2,675.00
630-1-14	Conduit	$15,810.00
630-1-15	Conduit	$3,400.00
632-8-112	Cable	$1,470.00
635-1-11	Pull Box	$60,955.00
635-1-11	Pull Box Special	$14,909.00
635-1-12	Pull Box Aerial	$864.00
668-14	Cabinet	$11,718.00
668-16	Cabinet	$18,160.00
683-107	Modems	$3,090.00
684-11	TWP Cable	$991.00
684-12	Coax Cable	$1,092.00
684-14	Fiber Optic Cable	$207,562.00
685-102	T-1 MUX	$34,820.00
685-139	Video/Data Tx/Rx	$2,600.00
685-139	Video/Data Tx/Rx	$27,430.00
		$556,092.00
Communications @ 10 miles - Cost/mile =		$55,609.20

Table 3d Detailed Component Costs

I-4 Surveillance and Motorist Information System

CCTV Installation		
686-101	CCTV Assembly	$5,240.00

I-4 Surveillance and Motorist Information System

CCTV Installation		
641-131-50	Conc. Strain Pole	$1,738.00
639-1-21	Elec. Power Service	$592.00
Total		$6,978.00

Detector Site		
660-1111	Loop Detector (3 x 4ch)	$699.00
660-2102	Loop Assembly (12)	$5,160.00
639-1-21	Elec. Power Service	$592.00
672-1-1	Type 170 Controller & Cab	$7,400.00
Total		$13,851.00

CMS Installation		
700-43-33	Sign structure -cantelever	$18,200.00
700-89-5	CMS Assembly	$54,593.00
639-1-21	Elec. Power Service	$592.00
Total		$72,793.00

Control Center		
770-210	Building Renovation	$23,585.00
686-102	Monitors	$14,930.00
686-104	CCTV switcher	$55,625.00
685-302	Monitor installation	$608.00
N/A	Computers	$75,752.00
Total		$170,500.00

Communications		
630-1-11	Conduit	$20,070.00
630-1-12	Conduit	$585,400.00
630-1-14	Conduit	$144,960.00
630-1-14A	Conduit	$113,016.00
630-1-15	Conduit	$16,974.00
632-8-112	Cable	$5,097.00
635-1-11	Pull Box	$249,090.00
635-1-11	Pull Box Special	$0.00

I-4 Surveillance and Motorist Information System

CCTV Installation		
635-1-12	Pull Box Aerial	$4,469.00
668-14	Cabinet	$68,060.00
668-15	Cabinet	$2,140.00
683-107	Modems	$20,250.00
684-11	TWP Cable	$991.00
684-12	Coax Cable	$4,052.00
684-14	Fiber Optic Cable	$505,123.00
685-102	Cable	$180,895.00
685-118	Telemetry Tx	$20,400.00
685-119	Telemetry Rx	$20,160.00
685-120	Telemetry Tx/Rx	$10,920.00
685-140	FO Modem	$114,880.00
685-141	FO Mux/Demux (T-1 Mux)	$124,222.00
685-339	FO Video Tx/Rx (Install only)	$160.00
685-340	FO-Modem (Install only)	$515.00
685-102	T-1 MUX	$34,820.00
685-139	Video/Data Tx/Rx	$2,600.00
685-139	Video/Data Tx/Rx	$27,430.00
		$2,276,694.00
Communications @ 39 miles - Cost/mile =		$227,669.40

Table 3c Detailed Component Costs

The Business Plan
Of the Florida Statewide ITS Strategic Plan, 1999:
An Implementation Program for the Next Five Years

SUMMARY OF RECOMMENDATIONS

This Business Plan provides a number of recommended actions for Florida's Department of Transportation and Districts. The following list summarizes those actions.

Department Policy

This Business Plan recommends that the Department add a goal or expand an existing goal in the FTP that addresses the management and operation of the state's transportation system by providing a statewide, integrated transportation system that is managed and operated in real time.

Department ITS Program

The Department should establish an ITS Program office reporting to the Assistant Secretary for Transportation Policy to be responsible for all ITS activities of the Department and for the Department's role in incident management programs.

The Department should establish a position of statewide ITS Program Manager with a responsibility to manage the ITS budget, staff and coordinate all ITS and incident management activities.

The Department should model the ITS Program after the FIHS program, which has a statewide Program Manager and functions as a coordinating and standard-setting office.

The Department should develop ITS Program performance measures that conform to the State's performance-based budgeting requirements.

District ITS Program

Each District should create a District ITS Program and designate a District ITS Program Manager who will be responsible for District ITS and incident management activities and will seek full integration with the urban regions within that District. The District ITS Program should be a separate cost center reporting directly to the Director level with details to be determined by each District.

ITS Program Goal

Each District should develop an ITS infrastructure and initiate development of a freeway management center for the Interstate highways in urban areas that is operated at Level-of Service (LOS) 3 within five years. The Districts will develop an implementation plan to achieve this goal and the Department's ITS Program will support this effort.

Maintenance

Each District should develop a maintenance plan and annual maintenance cost estimate in order to develop budget and staffing needs. The Department ITS Program will coordinate and assist in this effort.

Operations

The Department should develop an ITS Operations Manual. Each District will adapt the policies and procedures to their requirements.

ITS Staff and Training Requirements

Each District should develop ITS staff and requirements and training program that will enable them to meet the ITS services they plan to deliver over the next five years.

Each District should assess staff resources and capabilities to determine which, if any, operations and maintenance functions are appropriate for outsourcing.

Procurement

The Department should conduct an in-depth analysis of the Florida Public Records Law and existing Florida contracting procedures to assess their impact on ITS procurements and private sector response and provide recommendations for needed modifications.

ITS Architecture

The Department should develop and maintain a statewide ITS architecture and supporting standards. This architecture should utilize the National ITS Architecture and adapt as needed to meet Florida's needs.

Each District, in consultation with the appropriate local governments and MPOs, should develop regional architectures or frameworks for short and long term comprehensive ITS deployment for each urban region.

Standards and Specifications

The Department should develop ITS project implementation procedures. The procedures should cover both the planning and project design phases.

The Department should develop ITS project standards and specifications.

ITS Planning

The Department should coordinate with and provide technical assistance, education and training, to the MPOs as they integrate ITS into their long range transportation planning process.

The Department, working in cooperation with the MPOs, should ensure the development of regional ITS architectures consistent with National ITS Architecture guidelines. This should include the development of an ITS tasks in the unified planning work program and an ITS element in the long range transportation plan, and definition of the roles for the MPO and operating agencies in ITS deployment.

Rural/Inter-urban Element

The Department should initiate the development and support of a rural/inter-urban ITS element.

CVO Element

The Department should establish a Commercial Vehicle Operations (CVO) element to coordinate all CVO activities in Florida and to achieve a goal of implementing a safety based pre-clearance system on I-4 and I-95 within five years. A CVO Business Plan to achieve this goal and to address other CVO issues should be developed.

ITS Research

The Department should continue and enhance the coordination and funding of ITS product testing and applied research. The research program should be used in the development of statewide ITS standards and specifications.

Stakeholder Involvement and Private Sector Coordination

The Department should define a model and process for stakeholder involvement at three levels: *Statewide* for strategic planning and policy issues, *Regional* for integration and local issues and directions, and *Project* for specific projects such as the I-4 ITS Corridor Study or program elements such as CVO and take the initial steps of implementing the process.

The Department should create a position of Florida ITS Private Sector Coordinator in the Deprtment's ITS Program to encourage private sector participation in ITS and to direct private sector proposals to the proper District(s)or program element. The Department, through the ITS Private Sector Coordinator should actively solicit public/private partnerships to enhance funding for ITS projects.

The Department should develop, operate and maintain a Statewide ITS Web page that will provide coordination of District ITS Web sites and public information.

Training

The Department should identify training needs, both internal and external to the Department, and in conjunction with ITS Florida, establish priorities, implement and maintain an ITS training program.

ITS Program Budgeting and Funding Sources

The Department should develop a program office and a program level budget to fund needed staff and to provide overview and guidance for ITS programs.

Each District should develop a budget to staff, locally plan and implement the ITS program for the District.

The Department should examine available funding sources for both capital projects and operations and maintenance, the role of public/private partnerships and ITS project main streaming to determine the best method of funding the ITS Program over the next several years.

Each District should produce and update annually an ITS Implementation Plan that defines policies, staff needs, training needs, budgets and projects to be implemented over the next five years.

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1.0 INTRODUCTION

ITS projects and activities are being initiated and implemented all over Florida. Several projects, such as the I-4 Freeway Operations Center in Orlando, the Daytona Area Smart Highways (DASH) Operations Center in Daytona, and the Golden Glades Interchange Integrated System in Miami, are currently operating. Freeway Service Patrols are operational on I-4 in Orlando, on I-595 in Broward County and on I-95 in Palm Beach, Broward and Dade Counties. There are at least forty other ITS projects completed or currently under construction in various parts of Florida and many more are planned. These ITS activities are occurring with minimal statewide coordination and direction being produced by the ITS Working Group. Florida Department of Transportation (DOT) has concluded that coordination of efforts among the Districts and standards for deployment will provide for more efficient use of public resources.

1.1 The Purpose of the Business Plan

The ITS Strategic Plan is the long range (20 year planning horizon) element that describes the State's vision for ITS. It outlines in broad terms the Department's ITS Program, identifies directions in ITS procurement issues, operations and maintenance of ITS, rural applications, ITS user services that the department desires to be deployed, and general roles of stakeholders. The purpose of this Business Plan is to document the resources, arrangements and program elements needed to implement the Florida Statewide ITS Strategic Plan for the next five years (1999-2004). This document also serves to identify, provide justification for and support the development of a statewide architecture and ITS projects that meet the Florida Statewide ITS vision, goals and objectives and guiding principles. The Department will use this Business Plan to define the application of advanced technologies in Florida and the near term activities needed to implement the Statewide ITS Strategic Plan. The process to update and maintain the Plan is shown in section 5.0.

The initial ITS Business Plan includes recommendations for modifications to the Department's policy (see section 2.0). As these recommendations are acted upon over time, future updates of the Business Plan will have fewer and different policy issues to be addressed. As this Plan outlines the vision and activities of the department, other participants in the Florida ITS Program such as other modal agencies, the MPOs, other states, the private sector and jurisdictions within Florida are encouraged to use this document for guidance in developing their own ITS plans and programs. When developing any ITS plan, policy makers and planners are encouraged to follow the ITS axiom of "think regionally and act locally". Local areas are more aware of their own problems and which solutions may be successful and publicly acceptable. Regional thinking is necessary to ensure that coordination is achieved across jurisdictional boundaries providing for maximum benefits to the citizens of Florida.

1.2 New Strategies for a New Era: Managing and Operating the Transportation System

The goals, objectives and strategies of the existing Department Agency Strategic plan focused on the trade-offs in the use of resources for existing facilities' safety and preservation vs. new capacity and services. This approach is not only found in Florida. The Twentieth Century national surface transportation program has been substantially focused on the development of basic infrastructure. The Interstate Highway network and major rail transit investments symbolize the achievements of this construction orientation. As a result, inherited concepts, technology, programs and institutional structure also reflect the needs of a facility development and preservation era. With the addition of major capacity improvement often being cost prohibitive and difficult to construct because of policy, political and environmental constraints, maximizing the operation efficiency and safety of the existing transportation systems will take on added significance.

Management and Operations of the Transportation System

The new challenge for Transportation in the 21st Century is introducing active real time management of these facilities, operating them to maximum advantage on a continuing sustainable basis – as has long been the case in other forms of transportation such as transit, rail, waterways and aviation.

This shift in emphasis reflects the reality that today's economy and quality of life are critically dependent on maintaining passenger and freight service on the basic network in the face of growing travel demand and capacity limitations – while at the same time providing for the range of new mobility needs of a service-based information–driven economy including reliability, security and navigation. The imperative for a consistent and integrated approach to Management and Operations results from a series of forces including:

- Growing and Changing Demands – Urban areas are facing a 50 percent growth in travel over the next 20 years. Spreading peaks and providing new movement patterns for which the existing network was not designed emphasize the need to actively manage the existing facilities to better respond to changing requirements.
- Constraints on Traditional Approaches -- The impacts of new facility construction both high fiscal and environmental costs -- often set practical limits on additions of new capacity. This necessitates the most aggressive efforts to make the best use of available facilities. Additionally, Florida growth management law constrains new roadway capacity.
- Growing Impacts of Disruptions – The "unpredictable" disruption caused by the high frequency non-recurring incidents including crash, breakdown or weather-related incidents are now routinely causing over fifty percent of urban travel delay. Added to this is the continuing reconstruction and maintenance activities associated with the aging infrastructure. These non-recurring incidents are best addressed through the adoption of operational measures.
- Increased Customer Responsiveness -- The service orientation of the US economy is generating customer expectations -- both passenger and freight -- for a broader range of performance and service options. Other sectors increasingly accommodate new services and options appropriate to a "just-in-time" economy. In transportation, these would include reliability, navigation, traveler information, security and crash-avoidance-- in addition to speed and capacity.

- Introduction of Information Technology and Systems Engineering -- The introduction of new computation, communication and control technology now provides the basis for ITS system architectures which can support a wide range of user services that provide operational and management features.

The Emerging Approach

The emerging approach to Management and Operations --- in response to new needs, available technology and emerging concepts -- utilizes ITS as part of a set of related activities that differentiate it from traditional public works approaches. While potential ITS applications would vary in different settings, the essential elements of management and operations include:

- Performance Monitoring - Monitoring of transportation facilities performance on a real time basis including roads, transit or intermodal terminals to provide information for improved operations
- Incident Management - Detection, response, and management of incidents or other disruptions on a seamless regional basis to minimize delay and improve safety
- Information/Data Sharing - Aggressive information sharing, operational cooperation and joint service provision programs among agencies (across sectors), jurisdictions and private service providers for seamless coordinated service
- Facility Improvement - Institutionalizing incremental facility improvements through continuous adjustment of operations and related service features to modify user travel patterns in ways that maximize efficiency and safety
- Traveler Information - Informing the traveling public, businesses and commercial carriers about current and predicted travel conditions and viable travel options to better match travel behavior with available capacity
- Public/Private Partnerships - Supporting private provision of a variety of traveler information, logistics, security and amenity services – both free and custom-tailored consistent with the wide range of needs.
- Maintenance of Operations - Continuing maintenance of operational infrastructure to support fuller utilization of existing infrastructure investments.

These elements of Management and Operations also describe many of the essential elements of Intelligent Transportation Systems (ITS). In fact, the application of a Management and Operations program reveals the proper role of ITS within an organization. ITS is a collection of tools that enables operating entities to manage and operate the various elements of the surface transportation system efficiently.

The Benefits

Management and operations improvements generally provide measurable beneficial impacts on identifiable groups compared to capacity oriented investments, they are cost-effective in the short-run and, in the long run can be “tuned” and upgraded to provide additional advantages. This is demonstrated through applications which show traffic surveillance and signal control resulting in local travel time improvements of 10-15%, ramp metering reducing crashes by 50% and incident management programs reducing delays by 10-45%. These types of improvements typically have

benefit–cost ratios, which average 9:1. An important aspect of management and operations strategies is the ability to maintain and recover capacity lost to incidents. Simulation shows that systematic applications of integrated Management and Operations can substitute for a significant proportion of conventional capacity increases.

The Economic Issues paper produced for this project suggests there are significant economic benefits to be gained in Florida by the implementation of a statewide ITS. Overall the direct economic benefits of deploying a statewide ITS to Florida over the next 20 years is estimated to reach $13 billion. ITS is expected to have positive impacts for the following applications:

- Support of highway pricing initiatives/electronic toll collection,
- Improved regional data collection and dissemination for transportation planning,
- Improved inter-jurisdictional transportation planning, traffic operations, and incident management,
- Opportunities for new service and product innovations,
- Traffic operations during hurricane/flood/fire evacuations,
- Restoration of capacity after disasters/major incidents,
- Tourist travel information,
- Resident travel information/reliability of employee arrival,
- Traffic operations for draw bridges,
- Reliability of goods movement/impact on just-in-time delivery,
- Management of traffic/travel information/electronic clearance at intermodal terminals/access to ports and airports,
- More efficient allocation of existing highway capacity,
- Incident management/special events traffic management, and
- Management of traffic under construction.

The Challenge

Today the level of Management and Operations provided varies substantially among the nation's urban and rural areas. While there are no standards, the state-of-the-art and the-state-of-the-practice are far apart. Only a small proportion of the nation's freeways (16 percent) has incident detection technology installed and only about a quarter has integrated incident response programs. National, only 10 per cent of emergency response agencies participate in formal incident management programs. Almost none of the nation's freeway operations are interconnected with parallel arterials and less than 3 per cent percent of the nation's signalized intersections are operated as traffic adaptive. Transit vehicle location technology is still limited to a quarter of fixed route vehicles. While some basic travel condition information is available by radio in most major metropolitan areas, an average of only 12 percent of key facilities in the top 76 metro areas have route–specific data available.

These statistics hold true in Florida, also. Incident detection is currently available only in relatively short freeway segments in Orlando, Miami, Daytona Beach and Jacksonville. This is less than 100 miles (about 5%) of the Florida's interstates and expressways. Florida has some type of incident

response or service patrol on slightly over 200 miles. There are no major regional incident management programs underway, although several are planned.

However, the credibility of Management and Operations benefits with decision–makers and the public-at-large benefits requires further demonstration. Most Management and Operations improvements (usually ITS projects) are relatively invisible especially given the low expectations of customer-users that may not even be aware of the investments made. Visible impacts will require broader and more intensive application, integration of systems and consistent operations that has not yet occurred in most areas.

2.0 THE APPROACH FOR MANAGEMENT AND OPERATIONS OF THE TRANSPORTATION SYSTEM IN FLORIDA

State and local governments are the owners of the nation's principal surface transportation infrastructure. In Florida, the Florida Department of Transportation (FDOT) is responsible for the Interstate system and the state highway system (the elements of the National Highway System as defined for ISTEA and TEA-21 funding). While the Department is responsible for the management and operation of the State Highway System, priority has also been placed on the management and operation of the Florida Intrastate Highway System (FIHS). The FIHS consists of the Interstate system and Florida's Turnpike plus a number of high volume, limited or controlled access roadways, which is a small portion of the total transportation system in Florida.

Institutionalizing Management and Operations of the entire transportation system is a shared responsibility of the the Department, local transportation agencies and regional planning and operating entities. The metropolitan focus of the federal aid program has been essentially urban, limited to "3C" planning and programming for major capital improvements. Nationally and in Florida, few areas have yet undertaken the extent of regional cooperation and coordination required for seamless Management and Operations. Nor has the federal aid program provided such a focus.

The first step for managing and operating the transportation system in Florida is to adopt a formal policy to do so. The Department has adopted the 2020 Florida Transportation Plan (FTP). The FTP has four goals for the Department, listed in priority order:

1. Provide safe transportation for residents, visitors and commerce.

2. Protect the public's investment in transportation.

3. Provide a statewide interconnected transportation system that enhances Florida's economic competitiveness.

4. Provide travel choices to ensure mobility, sustain the quality of the environment, preserve community values and reduce energy consumption.

The Department should *add a goal or expand an existing goal in the FTP* that addresses the management and operation of the state's transportation system by providing a statewide, integrated transportation system that is managed and operated in real time.

The Business Plan recommends that this new (or enhanced) goal be in third priority order after the Safety and Preservation goals.

The Vision developed for ITS in Florida are shown in the appendix of this document. A number of objectives that correspond to the four FTP goals were developed. Objectives for the new or expanded FTP goal need to be developed. Examples of these objectives are:

- Adopt a common framework for the planning, deployment and integration of systems through ITS architecture and standards consistency.
- Provide performance-driven service.
- Capitalize on private sector resources.

See the Appendix for a list of all the objectives of the ITS Vision.

3.0 THE FLORIDA ITS PROGRAM

The ITS Program in Florida is designed to achieve the ITS vision and guiding principles developed as part of this ITS Strategic Plan. The vision, guiding principles and ITS goals and objectives are also included in the appendix to this plan. This Business Plan describes the initial process or methodologies needed to be achieved over the first five years of the program, 1999-2004.

3.1 Establish a Statewide ITS Program

The Department should establish a *Intelligent Transportation Systems Program* as a part of the Program Resource Plan process and provide a separate cost center under the Assistant Secretary for Transportation Policy to be responsible for all ITS activities of the Department and for the Department's role in incident management programs.

The Department should establish an ITS Program that will be responsible for all ITS and incident management activities conducted by the Department. This ITS Program Office should be located in the Central Office and will work in consultation with the districts and other stakeholders. The Program Manager should report directly to senior management in the Department. In addition to ITS and incident management, other activities could be defined for the ITS Program as the program develops.

The Department should establish a position of statewide *ITS Program Manager* with a responsibility to manage the ITS budget, staff and resources and to ensure coordination of all ITS and incident management activities.

The specific functions and activities that will be the responsibility of the Department ITS Program Manager and staff are as follows:

, Policy, Program Development, Budgeting
- Develop and maintain ITS policies and procedures
- Coordinate ITS input in Program Resource Plan, Legislative Budget Requests and Work Program Development
- Provide guidance on determining ITS staffing and resource needs
- Develop or respond to Federal State Statutory and regulatory changes affecting the ITS program
- Set priorities for and coordinate the Statewide ITS Research Program
- Determine ITS grant sources and coordinate grant applications

, ITS Architecture and Standards
- Coordinate regional and statewide architecture development to ensure consistence with the National ITS Architecture
- Ensure statewide consistence in incident management and implementation
- Coordinate the development of an Operations and Management Manual and any other needed supporting manuals, handbooks or guidelines.
- Coordinate the development of data management / warehousing standards consisten with national requirements and Department databases
- Ensure ITS applications standard consistency
- Provide support and guidance on migration of “legacy systems” to national and statewide ITS standards
- Coordinate, review and input to national ITS architecture and standards development issues

, Intergovernmental and Public / Private Stakeholder Input and Coordination
- Determine the needs and coordinate and support the development of a statewide ITS training, education and public awareness program
- Ensure coordination of ITS activities with public transportation organization including transit agencies, rail agencies and companies, and airline and airport authorities.
- Promote, coordinate and support private sector “stakeholder” involvement activities
- Coordinate state-level partners in service delivery (police, fire, medical)
- Develop and maintain the ITS element of the Department’s webpage integrating general ITS information and real-time traveler information from the Transportation Management Centers
- Coordinate statewide communication with federal officials

, Commercial Vehicles and Toll Operations
- Coordinate the development of a safety based pre-clearance CVO element for Florida
- Coordinate CVO activities with other states, organization and the FHWA
- Coordinate the development of a seamless electronic toll collection systems for all toll facilities in Florida

The recommended staffing level for the Department ITS Program is shown in Table A-2 in the Appendix. In addition to the staffing of the ITS Program Office, other Central Office ITS support positions will be needed. The staffing levels for these positions are shown Table A-2 in the Appendix.

The first duties of the ITS Program manager will be to develop a budget to fund the staff and program activities and organize the staff needed to carry out the program's activities. As with any Department program, the proper financial and management accounting procedures must be established. The recommended staffing level for the Central Office ITS Program Manager and his/her staff is shown in Table 14 in the Appendix.

The Department should model the ITS Program after the FIHS program, which has a statewide Program Manager and functions as a coordinating and standard-setting office.

ITS coordination among the Districts including the direction of this ITS Strategic Plan is currently being conducted by the ITS Working Group. A transition to the establishment of the Department's ITS Program must be made. Senior management of the Department must appoint an ITS Program Manager and direct that person to establish a Program staff and budget that will be able to coordinate and manage the statewide activities described in this Business Plan. Senior management must also direct the District Secretary of each District to appoint a District ITS Program Manager, who in turn will establish the District Program budget and staff needed to carry out the District ITS activities, and, as suggested later, develop a District ITS Implementation Plan.

The Department should develop ITS Program performance measures that conform to the State's performance-based budgeting requirements.

Program performance measures are needed for 1) design purposes, 2) accountability requirements of the legislature, the public and the FTP and 3) the tracing of the ITS Program's progress. These performance measures will be used to evaluate the Program's effectiveness and to provide the data necessary for Florida's performance-based program budgeting process. Examples of performance measures for the Department's ITS Program could include:

- Incident response time
- Number of incidents handled
- Traveler information requests
- Miles of roadway with detection and surveillance
- Number of transit vehicles equipped with ITS devices
- % downtime for ITS equipment
- Travel time and delay

Another application of performance measures should be considered by the ITS Program. That is the development of ITS application standards for deployment. An example of ITS application standards could be that a freeway management system is warranted in an urban area when the volume/capacity ratio reaches 1.0 for several contiguous freeway segments. The application standards will vary by context, i.e. urban vs. rural, level of congestion.

3.2 Establish District ITS Programs

Each District should create a District ITS Program and designate a District ITS Program Manager who will be responsible for District ITS and incident management activities and will insure full integration with the urban regions within that District. The District ITS Program should be a separate cost center reporting directly to the Director level with details to be determined by each District.

A position corresponding to the statewide ITS Program Manager should be created in each district. The District ITS Program Manager should perform a role similar to the statewide program manager at the District level. The specific functions and activities that will be the responsibility of the District ITS Program Manager are:

- ITS Planning
  - Develop and maintain a long-range District ITS program and resource plan
  - Develop and pursue and ITS public involvement plan for the District
  - Seek inclusion of ITS tasks in the Unified Planning Work Program of the District's MPOs
  - Assist MPOs with the inclusion of ITS elements in the Long Range Transportation Plans
  - Promote the advance of ITS projects in the MPO Transportation Improvement Programs
  - Oversee the development and maintenance of ITS architectures so that consistency can be attained to the maximum extent feasible
  - Coordinate ITS Planning with adjacent Districts and with statewide activities
  - Develop and manage ITS based data collection, storage and distribution system to support general transportation planning and traffic engineering activities
- ITS Integration
  - Within ITS architecture development, assure that systems engineering principles are utilized
  - Promulgate and promote the institutional agreements needed to meet adopted ITS architectures
  - Within the ITS architecture development, assure integration of the several transportation modes.
- ITS Production
  - Seek inclusion of adequate skills on design staffs to produce ITS plans and specification
  - In coordination with statewide activities, develop and maintain ITS component standard specifications
  - Oversee production of "stand alone" ITS projects and review plans of other projects for potential ITS inclusions
  - Contribute to maintenance of traffic (MOT) plans for all construction projects
- ITS Construction
  - Assist or perform, as necessary, in the inspection of the construction of ITS projects to assure compliance with ITS architecture and standards

- Assure that existing ITS infrastructure is not damaged by any other construction

, ITS and Public Transportation

- Promote use of ITS in Public Transportation in accordance with an adopted ITS architecture
- Provide technology assistance and ITS support to transit organizations

, ITS and Expressway Authorities

- Promote use of ITS within an adopted architecture
- Assist Expressway Authorities with their ITS planning and implementation

, ITS Operations

- Oversee the operation of regional transportation management centers to assure the availability and reliability of center functions
- Coordinate highway operations with the Florida Highway Patrol, local governments and transit operators, Emergency Operations Center Director and other emergency services
- Develop and maintain District management, operations and maintenance procedures
- Develop and maintain a District ITS training program
- Assist the public, the press and other governmental agencies with information on the District ITS Program activities
- In coordination with the Department's statewide Webpage, develop and support District level Webpage information
- Promote development and coordination of a network of Operations Centers

The implementation, operation and management of rural and inter-urban ITS applications must be a joint responsibility of the statewide program and the districts. The responsibility for funding should be allocated according to the different missions of the district and central office functions. For example, database maintenance for traffic volume data collected in rural areas is currently the responsibility of the Central Transportation Statistics Office; emergency management and evacuation during hurricanes is a shared responsibility and roadway maintenance is a local district responsibility.

The Business Plan also suggests that coordination with MPOs, project implementation, management and operations should remain with the districts. In many cases, a district can manage a project internally while coordinating with the statewide program, other affected agencies and stakeholders. However, in some cases such as inter-urban corridor, rural, intermodal, CVO and tourist traveler information applications, a deployment will cross-jurisdictional boundaries. Those projects may require management by a committee of districts, agencies and stakeholders.

The District ITS Program Manager will need to work closely with the district Government Liaison group and the MPOs and local operating agencies in their District. All projects, including any ITS deployment, ITS studies or incident management deployment must be part of the MPO long range transportation planning process and be consistent with the National ITS Architecture to receive federal funds. Coordination with the MPOs and local agencies will provide for project tailoring to the local situation and possibly additional funding or assistance. More detailed discussion of the roles of the District and the MPO follow in section 4 of this Plan.

4.0 INITIAL ACTIONS FOR THE DEPARTMENT'S ITS PROGRAM

In the course of developing this Business Plan, the Department's ITS Working Group (representatives of each District and the Planning and Traffic Engineering offices of the Central Office) adopted guidance for level-of-service (LOS) of ITS operations statewide. This concept was developed in the Operations and Maintenance Issues paper produced for this project. Furthermore, the Department ITS Working Group adopted a statewide goal of operating traffic management and incident response centers on the Interstate system in all urban areas for twelve (12) hours each Monday through Friday (defined as LOS 3). Some Districts may be able to achieve that goal quickly and may decide to extend service to other segments of the FIHS or to provide additional services.

Each District should develop an ITS infrastructure and initiate development of a freeway management center for the Interstate highways in urban areas that is operated at Level-of Service (LOS) 3 within five years. The Districts will develop an implementation plan to achieve this goal and the Department's ITS Program will support this effort.

4.1 Develop Guidance for ITS Maintenance

Districts should document all ITS operations and maintenance costs, by component, and develop a process to reliably estimate the cost of providing emergency response and routine periodic maintenance for use and support in obtaining adequate funds to carry out maintenance responsibilities. Documenting in-house costs will also allow agencies to estimate outsourcing costs if they elect to out source maintenance activities.

Each District should develop a maintenance plan and annual maintenance cost estimate in order to develop budget and staffing needs. The Department's ITS Program will coordinate and assist in this effort.

Whether in-house or out sourced resources provide maintenance, agencies should develop a preventative maintenance plan. A good preventative maintenance plan will clearly note all required materials, equipment, and procedures, thus allowing in-house staff to expedite and achieve a higher level of consistency and quality in conducting preventative maintenance activities. A good preventative maintenance plan will also allow agencies seeking to out source to properly budget, advertise and receive quality proposals from interested parties. Either way, preventative maintenance, if carried out properly, will reduce response maintenance activities. A maintenance plan should include:

- An adequate spare parts inventory developed and maintained to support proper and professional in-house response maintenance activities.
- A definition of safety requirements, liability, acceptance levels of service, and the degree to of various types of malfunctions tolerance, which establishes priorities needed for the maintenance of specific ITS equipment. Overall, scheduled preventative maintenance is an important element of a comprehensive ITS maintenance program. However, it is also realistic to expect that response maintenance will also create a significant demand on maintenance resources.

- Definition of the necessary maintenance support of field equipment linked to traffic control centers. The prompt repair of field communications and other equipment linked to the traffic control center is essential to the effective real-time functioning of ITS system.
- Procedures to maintain complete as-built and as-modified drawings and specifications of all system equipment.
- A list and description of each ITS maintenance activity.
- Recommended / required ITS maintenance standards.

Procedures to effectively maintain system software should be given a high priority to minimize liability risk. Staffing levels should be maintained for overseeing those areas that can be maintained in-house and funding should be provided for those areas that require outsourcing. District maintenance staff should be as familiar as possible with the operation and interaction of the software because with highly complex software, best results are obtained when in-house and outsourcing staff can work closely together. In order to achieve effective maintenance of system software, the following items are recommended:

- Utilization of the Department's Office of Information Services.
- An annual maintenance contract on all computers and other hardware that is not easily supported by agency maintenance staff.
- An annual maintenance contract on all computer software.
- A detailed inventory of all system components.

4.2 Develop Guidance for ITS Operations & Management

The Department should develop an ITS Operations Manual. Each District will adapt the policies and procedures to their requirements.

The Department's ITS Program, working with the Districts, should develop an operations manual for system operator reference. A typical manual should cover three basic areas -- general information, policies and procedures on internal O&M, and polices and procedures involving traffic management.

Operations and maintenance personnel should be included in all phases of the project to ensure that their perspective is included in all phases of the system life cycle. This approach will also help train these staff in all aspects of the system they will be operating and managing.

4.3 Develop ITS Operations and Management Staffing Requirements

Staffing levels should support the needs and intent of the system. Adequate staff considers all shifts without jeopardizing the individual staff member's mental and physical well being and their ability to perform the task at hand. A signal systems oriented traffic control center that is highly automated and typically addresses routine day-to-day functions could operate with a reduced staff. On the

other hand, a traffic operations center with a need for interagency communications, information and data sharing on a 24-hour basis will be required to maintain a significantly greater number of staff.

Each District should develop ITS staff and requirements and training program that will enable them to meet the ITS services they plan to deliver over the next five years.

The District ITS Program should define staff requirements and classifications. The staff levels should be phased commensurate with the level of ITS services provided by the District. It is also recommended that incident management services be provided on the roadways within the TMC coverage area, especially on the FIHS. It must be noted that additional support staff may be required for administrative and maintenance activities.

For freeway management systems, staffing with no less than two system operators per shift is recommended. This staffing recommendation depends upon the composition, intent, and functionality of the traffic operations center. The need for a break, personal security, lavatory relief, meals, and continuity of operations requires more than one system operator, particularly during major incidents and events.

A set of staffing guidelines for a typical freeway operations center in a Florida urban area is shown in Table 10 in the Appendix. These are guidelines only and their use in determining District staffing will depend greatly on the type of program and concept of operations defined by the District for each center. Other factors that will impact staffing requirements of a particular traffic management center include deployment phasing and geographic area of coverage.

Most Districts will locate their TMC coverage in urban areas however some Districts (particularly Districts 1 and 3) will likely have significant rural and/or inter-urban applications. If so, the LOS requirements for these rural and inter-urban applications may be different than those listed for urban areas.

An on-going training program to provide a well-trained and cross-trained staff for both operating and managing systems must also be developed. Elements of the training program should include exposure to the system architecture, other traffic, transit and related operational systems, debriefings of actual events, and funding requirements for each element of the system.

4.4 Implementation Alternatives for ITS Operations and Management

Outsourcing should be considered as an appropriate method to obtain the necessary staff to provide support for Operations and Management issues and to supplement District staff. Software and hardware maintenance, communications maintenance, and system administration lend themselves to outsourcing.

Each District should assess staff resources and capabilities to determine which, if any, operations and maintenance functions are appropriate for outsourcing.

A sound estimate that addresses the District's strengths and weaknesses should be developed prior to determining the appropriate Operations and Management implementation course. Liabilities and risks should also be considered in selecting the best implementation course.

4.5 Develop Guidance for ITS Procurement

The Procurement Issue paper produced for this project discussed general guidelines the Department should employ in preparing for ITS procurements and provided recommendations for which contracting methods should be considered for specific procurements. There are basic steps described in that paper to be considered in preparing to purchase ITS. While these generally apply to system and software acquisitions, many of these steps can and should be applied to acquiring consultant services, as well. A key decision in this process is to select an appropriate contracting method. The issue paper presented a number of contracting types and issues to consider for each type of procurement.

The Department should conduct an in-depth analysis of the Florida Public Records Law and existing Florida contracting procedures to assess their impact on ITS procurements and private sector response and provide recommendations for needed modifications.

This Business Plan recommends that the statewide ITS Program Manager work with the Florida Attorney General and other agencies to assess several issues regarding procurement for ITS. The breadth and scope of the Florida Public Records Law has been cited as a significant barrier to effective ITS procurement in the state. But very little research and information exists on how the law actually operates with respect to ITS procurements in particular. Significantly more research is needed to truly understand the implications of the law, and "how far the envelope can be pushed." While the language of the statute is restrictive, the law does provide for some exceptions. There is no case law, Attorney General Opinions (AGOs), or detailed DOT guidelines on how the law is to be interpreted. There may be strategies available to reduce or eliminate some of the perceived barriers created by the law. The Orlando-Orange County Expressway Authority (OOCEA) found it had to request an amendment to the Public Records Law in order to protect the privacy of its customers using the new E-Pass electronic toll collection (ETC) system. Without the amendment, which was passed in 1995, all toll records (including times, dates and places of passage) could have been open to the public.

The Department is also encouraged to consider developing new contracting method for ITS procurements. There has been interest and some effort in other states to develop new contracting methods for ITS procurement (or to adopt existing procurement methods from other state agencies to buy ITS). Florida should consider (perhaps in conjunction with other states and/or with the Federal government) developing these new procurement techniques. Other states have toyed with the idea of creating new contracting approaches, building on past procurement successes, and incorporating lessons learned from past failures.

4.6 Prepare Statewide and Regional ITS Architectures

The Department should develop and maintain a statewide ITS architecture and supporting standards. This architecture should utilize the National ITS Architecture and adapt as needed to meet Florida's needs.

The scope of a statewide architecture must recognize and accommodate existing regional ITS architectures in Jacksonville, Orlando, the Tampa Bay area, Miami and Ft. Lauderdale as well as corridor architectures such as for I-4, the Florida Turnpike and existing ITS infrastructure (legacy systems). The statewide ITS architecture should focus on inter-urban and rural applications, but should also add value to urban areas. ITS development would be preceded by an analysis and mapping of the User Services needed to meet the adopted concept of operations.

Each District, in consultation with the appropriate local governments and MPOs, should develop an architecture or framework for short and long term comprehensive ITS deployment for each urban region.

A concept of operations will allow for the desired uses of the infrastructure, thus lowering costs by avoiding unnecessary replication of subsystems for individual purposes. The regional architecture approach would be developed within the ITS National Architecture and used as an appropriate template for user services and market and equipment packages for the region. This systems engineering approach also saves cost by avoiding early obsolescence or failure of ITS projects/subsystems.

The District, in consultation with its MPOs will determine the definition of an urban region. Some Districts may determine that one District wide architecture is appropriate while others may define several urban area architectures within a District. Where more than one architecture is developed within a District, the District is responsible for coordinating and integrating the individual urban areas.

4.7 Define Project Implementation Procedures

The Department should develop ITS project implementation procedures. The procedures should cover both the planning and project design phases.

The Department's ITS Program, working with the Districts, should prepare detailed planning level implementation procedures in conjunction with the MPOs in accordance with FHWA guidelines for each regional ITS deployment and individual project. All phases of project development should be addressed for a well thought out project concept and deployment plan. One approach to ITS deployment does not fit all projects. Each planning level regional and project plan should have adequate resources applied to thoroughly address all implementation plan aspects with project specific analyses to maximize benefits relative to cost and provide decision inputs to the design, construction and operations project stages. The procedures should address architectural

consistency, regional integration and standards, stakeholder input expanded beyond the traditional participants, guidelines for project cost estimates and methods of procurement.

In the project design phase, each ITS project should include preliminary design studies and tradeoff analyses to determine the most cost-effective design from a life cycle cost standpoint. This is especially important with the major subsystems such as communications, control centers, changeable message sign, detector stations and closed circuit television subsystems. Recurring costs of the Department and operators resulting from the design over the project's life cycle must be considered also.

ITS design guidelines should be developed by the Department for ITS projects in the areas of component details and placement, and their density along the roadway. These guidelines will be helpful for streamlining the planning and design process for new deployments. The guidelines will also serve as a starting point for consistent regional deployments.

4.8 Develop Statewide ITS Specifications, Standards and Guidelines

The Department should develop ITS project standards and specifications.

The Department should develop and maintain statewide ITS specifications, and standards for project elements, based on national guidelines such as NTCIP and experience in Florida and other states. They need not be singular for each component, but serve as a baseline for system designers, contractors and suppliers. This will serve to level the costs of ITS elements around the state and reduce the overall costs as bidders begin to recognize the lower risk of known and understood requirements. The specifications should address minimum functional requirements and proven technologies, while remaining flexible to innovative technology.

The Department should also evaluate and revise current guidelines and develop new ones as needed for contract administration for ITS projects, addressing procurement methods, and warrantee and payment provisions.

4.9 The Roles of the Department, the Districts and the MPOs

The Department should coordinate with and provide technical assistance, education and training, to the MPOs as they integrate ITS into their long range transportation planning process.

The Department has a role in ensuring consistency and standards across Florida so that the public encounters a "seamless" system while using the transportation system. The Districts will be applying these standards and deploying ITS at the local/regional level and their role is ensure that projects are integrated with other projects. The MPO's role is to define projects that can be integrated with other projects and to fund them in the long range plan and TIP. Each partner must work closely with the other partners to achieve this integrated, "seamless" transportation system.

The Department, working in cooperation with the MPOs and local governments, should ensure the development of an ITS architecture for each urban area consistent with National ITS Architecture guidelines. This should include the development of an ITS task in the unified planning work program and an ITS element in the long range transportation plan, and definition of the roles for the MPO and operating agencies in ITS deployment.

The successful integration and main streaming of ITS initiatives into the overall transportation planning, programming, and project delivery process does not require making radical changes to the "traditional" highway and transit infrastructure planning and programming framework. Rather, success in advancing ITS initiatives requires a major shift of thinking from capacity improvements to the operation of the system, not a shift in the transportation planning process. The process of advancing ITS projects may start with local initiatives, but must come through the MPO process, coordinated with the District. Other projects related to broad multi-district issues may be initiated by the state and be funded through the Department's ITS Program. In both cases coordination with the other parties is essential to achieve the objective of an integrated system.

The transportation project planning and delivery process, ITS included, remains one of receiving input from stakeholders, establishing a vision, setting goals, identifying actions, prioritization, resource allocation, and the evaluation of results. The MPO is well suited to serve as a facilitator for intergovernmental and jurisdictional coordination. The process of advancing of ITS initiatives would then include a more diverse base of customer partners. This new partnership will have to balance perspectives and interests, address emerging technologies, and new institutional relationships, as well as develop innovative funding partnerships to achieve the full potential of ITS strategies. Over time, the MPO process will need to be modified to accommodate the new issues that will arise from this partnership.

In addition to the Statewide Guiding Principles contained in the appendix of this Business Plan, each MPO should consider the following guidelines in the integration of ITS into their transportation planning process.

- Add a step to consider ITS in all stages of the multi-modal transportation planning process,
- Facilitate institutional and inter-jurisdictional cooperation and coordination in the planning, deployment, operation and management of ITS,
- Determine the consistency and conformance of ITS plans and projects with the National ITS Architecture and standards,
- Identify the special challenges for each stakeholder created by ITS and work to remove the barriers to implementation these challenges create,
- Introduce ITS into the planning process as a combination top-down and bottom-up approach,

- Recognize and seize opportunities for including ITS as an integrated element alongside "traditional" infrastructure improvements,
- Seek out and encourage advocates for ITS within the planning environment,
- Evaluate potential ITS projects in light of alternative roles for the public sector, private sector, or public/private partnerships,
- Develop and utilize resource centers to disseminate ITS information,
- Evaluate public involvement plans and procedures for application to ITS planning and project implementation,
- Develop coordinated concepts of operations to secure the involvement and commitment from a range of regional systems operators across modes and jurisdictions and non-public works agencies; and
- Focus on integration and regional architecture as the key to developing regional multi-jurisdiction ITS projects that are interoperable, expandible and which integrate legacy systems.

4.10 Develop a Rural/Inter-Urban ITS Element

The Department should initiate the development and support of a rural/inter-urban ITS element.

Rural and inter-urban ITS applications may cross more than one Department District and therefore in many cases must be planned and coordinated at the statewide level. This Business Plan has several recommendations regarding rural and inter-urban ITS.

- Connect to urban ITS (cost leveraging). Provide for natural extensions into rural and inter urban areas in proximity to ITS currently being deployed in urban areas.

- Assure adequate coverage of ITS User Services as provided by Advanced Rural Transportation Systems (ARTS),
- Enhance economic redevelopment and provide for more efficient rural trip making in Federally-designated rural enterprise communities with the greatest overall need,
- Identify specific high activity intermodal areas for both passenger and freight real-time information kiosks.
- Develop a virtual transportation management center for areas of rural Florida to be jointly operated by all involved Districts and the State Office of Emergency Management.

4.11 Develop a Statewide Commercial Vehicle Operations Element

The Department should establish a Commercial Vehicle Operations (CVO) element to coordinate all CVO activities in Florida and to achieve a goal of implementing a safety based

pre-clearance system on I-4 and I-95 within five years. A CVO Business Plan to achieve this goal and to address other CVO issues should be developed.

Commercial Vehicle Operations (CVO) are better operated as a statewide program rather than a District level program because the CVO industry is licensed on a statewide basis and the weigh/inspection stations must have interoperable equipment and standards.

The CVO element needs to develop a CVO Business Plan in order to determine needs and priorities. The Department has already established a need for a safety based pre-clearance system on major truck routes. Without waiting for the CVO Business Plan, it is recommended that the Department continue to deploy this pre-clearance system. Real time communications must be established between the pre-clearance locations and a central processing point. This program has been completed on I-75 in Florida (the Advantage CVO project). The pre-clearance program is planned for expansion to other Florida roadways and, as a minimum, should be able to:

- be compatible and inter-operable with Advantage CVO,
- check vehicle weight,
- check for vehicle and driver credential status,
- conduct safety inspections,
- check for out-of-service vehicles and
- communicate directly with the FHWA SAFER program.

The Department has determined that I-4 and I-95 carry the highest volume of commercial traffic. It is recommended that deployment of pre-clearance stations continue on I-4 and I-95. The Department has also begun deployment of communications infrastructure along I-10, the development of pre-clearance stations can be completed later. One consideration in the deployment of pre-clearance stations is the availability of right-of-way on the Interstates. In some cases it may be necessary to place detection and weigh-in-motion devices on the mainline with the pull-off area for inspections and violations located off the Interstate on a nearby local road.

The CVO Business Plan should consider a number of CVO issues as it is developed, including:

- Financing the pre-clearance station deployment through a public/private partnership. The HELP, Inc. program is an example.
- Tag transmitter/receiver standards should be consistent throughout the state.
- All state agencies involved in CVO credentials should coordinate with the Department to provide the most efficient CVO program possible.
- The Department should consider establishing secure CVO staging areas and driver rest stops in some areas of the state.
- Florida should apply to be designated as a CVISN state.

The Commercial Vehicle Information Systems and Networks (CVISN) program is a national program expected to result in enhanced safety for drivers and trucks and improved operating efficiencies for government agencies and motor carriers. In turn, both the public and private sector participants are expected to realize savings in time, resources and the cost of doing business. The program

includes electronic screening for both weight and safety inspection and automated reporting and record keeping for licenses, permits and safety records.

4.12 Develop a Statewide ITS Research Element

The Department should continue and enhance the coordination and funding of ITS product testing and applied research. The research program should be used in the development of statewide ITS standards and specifications.

Florida has an on-going research program through the Traffic Engineering Research Laboratory (TERL) in Tallahassee and in other universities in Florida. The Department's ITS Program should identify and fund needed research to enhance the deployment of ITS in Florida. The focus of the research program will be in two areas, 1) product testing on hardware and software, and 2) the application of national research to update standards and specifications in Florida. Examples of potential research projects are statewide traffic signal controller certification and equipment testing for NTCIP compliance.

4.13 Develop an ITS Stakeholder Process

The Department should define a model and process for stakeholder involvement at three levels: S*tatewide* for strategic planning and policy issues, *Regional* for integration and local issues and directions, and *Project* for specific projects such as the I-4 ITS Corridor Study or program elements such as CVO and take the initial steps of implementing the process.

There are many stakeholders that will play a part in the deployment, operations and management of ITS in Florida. Stakeholders include both public and private sector participants. The successful participation of these stakeholders in Florida's ITS program requires two things: organization and outreach. The MPOs already have developed and documented stakeholder involvement programs, the ITS stakeholder involvement activities should be coordinated with these existing stakeholder programs.

4.14 Develop Stakeholder Organization

The Department, the Regional Planning Councils and the 26 MPOs in the state have a well-established set of roles and responsibilities for planning and deploying transportation system improvements. A key element of this ITS Strategic Plan is that these roles and responsibilities must be expanded to include facilitating the operation and management of this system. This expansion, therefore, will include not only new activities, but also new stakeholders, such as emergency service providers and law enforcement, that must be regularly involved. To help facilitate these expanded roles and responsibilities in complex urban areas, each district and each metropolitan area may develop and maintain a regional architecture and deployment plan that is developed with the

appropriate stakeholders. These regional architectures should be compatible with the statewide architecture and, where appropriate, the National ITS Architecture.

The Department should establish both a statewide policy and model organization for involving other organizations (e.g., FHP and other police agencies) in mission critical activities such as incident response, incident clearance and hurricane evacuation. There are many potential models for organizing stakeholders to maximize input and efficient working relationships. Some states' DOTs are tasking the ITS America state chapter with conducting the stakeholder program. ITS Georgia, for example, has organized a series of interest groups to allow companies, agencies and individuals with similar interests to meet, discuss common interests and coordinate with Georgia DOT. The interest groups created by ITS Georgia to date are CVO; transportation system management; public transportation; emergency services and highway safety; and traveler services and information. These groups meet individually at least quarterly and plan to meet occasionally with other interest groups. All groups participate in the ITS Georgia Annual Meeting.

Similar groups could be formed either with ITS Florida or as separate stakeholder groups. During the development of the ITS Strategic Plan, an ad hoc group, the Florida ITS Advisory Team, was formed to monitor and provide input into the plan. This statewide group and several regional groups could be formalized into a stakeholder association. In any case, it is suggested that groups of similar interest be formed so that stakeholder involvement can be managed.

Examples of stakeholders that will have a role in Florida's ITS are listed below. It is recommended that these groups be contacted along with others as the stakeholder involvement process proceeds.

- ITS Florida
- ITE - Florida District
- AAA
- American Trucking Association
- Private trucking companies
- Fleet managers (FedEx, UPS, utility companies, rental cars)
- Local transit agencies
- Rural transit providers
- Local police and sheriffs departments
- Florida Highway Patrol
- Port authorities
- Tourist and visitor agencies
- Theme parks (Disney, Universal Studios, Sea World, etc.)
- Local Chambers of Commerce
- Metropolitan Planning Organizations (MPOs)
- Local governments, particularly traffic engineering departments
- Towing companies
- Emergency service providers (medical services, fire)
- Emergency management agencies
- Universities and university transportation centers

- Media (TV, radio, print)
- Telecommunications companies
- Toll authorities
- Airport authorities
- Parking managers
- Information service providers
- Management and operations service providers
- Federal agencies (FHWA, FTA, FAA, EPA)

4.15 Develop Private Sector Outreach

The Department should develop a private sector outreach element within the ITS Program to actively encourage private sector participation in ITS and to solicit private sector proposals to the proper District(s)or program element.

Participation by private sector partners is key to the full deployment of ITS in Florida. The Department must strongly encourage proposals, solicited or unsolicited, by firms or persons desiring to participate in the Florida ITS program. One method of encouraging partnerships is for the Department to develop demonstration projects or field operational tests that will be operated through a partnership with private sector participants. In order to properly evaluate and coordinate these proposals, all private sector proposals should be coordinated by a Florida ITS Private Sector Coordinator. It is suggested that this coordinator be co-located with the ITS Program Manager's office in the Department Central Office.

DOTs have not had a relationship with the automobile industry. This industry, including auto manufacturers and after-market vendors, are becoming important participants in the ITS arena through the development of in-vehicle devices. The ITS Private Sector Coordinator should develop contacts with those industries and seek input on issues that will certainly develop in the near future.

4.16 Operate and Maintain a Statewide ITS Web Page

The Department should develop, operate and maintain a Statewide ITS Web page that will provide coordination of District ITS Web sites and public information.

The Department's ITS Program should develop, operate and maintain an ITS web page. This web site would provide links to an ITS web page for each District and provide public information on the ITS Program to the public.

4.17 Develop a Statewide Training Plan

The Department should identify training needs, both internal and external to the Department, and in conjunction with ITS Florida, establish priorities, implement and maintain an ITS training program.

Training the Department's staff to develop an understanding of ITS concepts and guidelines and in the proper use of equipment and operating techniques will provide a more efficient and cost-effective ITS Program. The Central Office staff should coordinate with the Districts to determine staff training needs and provide a menu of training courses to meet those needs. Training will be needed in many elements of ITS such as operations and maintenance of hardware, telecommunications equipment, software operations, software maintenance, ITS planning and incident management. The Department will be responsible for coordinating with and assisting other agencies, stakeholders and the general public in receiving ITS training.

4.18 Coordinate with Public Transportation Plans and Activities

The Department should pro-actively support the development, coordination and deployment of public transportation ITS technology.

Public transportation system have varying degrees of technical and financial capacity to implement ITS applications. ITS applications in public transportation may also cross district boundaries. They also face te unique situation that they are, in most cases, implemented and managed by local and private-sector organization such as transit agencies, rail companies, airlines, and airport authorities. ITS for public transportation is further complicated by the fact that sometimes the implementing agencies are not autonomous entities, but sub-units of a local government. The Department should develop policies and strategies to support and ensure coordination of public transportation related ITS activities, including:

- Assuring a role for the District ITS Program Manager in coordinating with the Department's Public Transportation Office on ITS issues,
- Seel adequate involvement of public transportation operating agencies in the planning, development and operation of transportation management centers (TMC),
- Provide technical and financial support and guidance to public transportation systems for integrating these systems into regional ITS architectures; and
- Supporting multi-modal and inter-modal ITS planning and programming.

5.0 DEPARTMENT ITS PROGRAM FUNDING

The Department should develop a program level budget to fund needed staff and to carry out ITS programs.

The Department's ITS Program must develop a budget to fund the staff and program activities described in the previous sections. Statewide and District program deployment will not only require

an increase in funding for equipment and infrastructure but also for training and operations and maintenance (O&M). Several Federal programs are available to support deployment of Intelligent Transportation Systems (ITS). However, funding levels for the deployment and O&M of transportation systems is currently inadequate. Also, while ITS operations and management costs are eligible for federal aid, maintenance costs are not. However, if federal aid were to be used to pay for operations and management, the MPOs would first need to fund it in their TIPs.

Each District should develop a budget to staff and implement the ITS program for the District.

5.1 ITS Program Needs

The ITS Program in Florida has not been fully defined. This program will be the focus of initial efforts outlined in the ITS Strategic Plan and in this Business Plan. In order to complete this Plan a range of costs must be defined so that Department has a notion of the scale of the ITS effort. For purposes of this initial estimate, the ITS Program is defined as the sum of the Statewide Program and the Districts' Program.

The Department's ITS Program, with the elements described previously in the Initial Actions Section, will likely require seven to nine staff to deliver the initial program. This level of staffing (or equivalent consultant services) along with funding for parallel programs such as standards, statewide architecture, ITS assistance to MPOs, ITS training, etc., will initially require an estimated $2 to $3 million.

The District Program, which is defined to meet a level of service (LOS) 3, will likely require a staff of eight to ten per District. Along with other ITS activities (developing operations manuals, maintenance plans, regional architectures, etc.), the District budget may reach $1 – 2 million per District. Some districts are much further along toward this goal, however it is assumed for this estimate that these districts will continue to expand their ITS program beyond the interstates and onto other facilities. Thus, the total ITS operations budget for the Districts could range from $8 to 16 million annually. Outsourcing of any of these functions would likely cost more to account for a vendor's overhead and margin.

ITS work program funding is subject to a needs analysis, an analysis of architectural requirements and project development. The Central Office is currently gathering a detailed ITS needs analysis. For the purpose of this Business Plan, it is assumed that each district will develop a freeway management center for each major urban area within five years. Based on Florida (and national) experience, this basic freeway management infrastructure will cost $10-20 million, per urban area to implement (see the Cost Analysis Issue Paper). The urban areas of Miami, Orlando, Daytona and Jacksonville already have a basic freeway management center infrastructure. The remaining urbanized areas with any significant freeway and/or expressway facilities include Ft. Lauderdale, West Palm Beach, Titusville/Melborne, Naples, Fort Myers, Sarastoa/Bradenton, Tampa (1), St. Petersburg (1), Gainesville, Tallahassee, Pensacola, and Panama City. The Turnpike District has plans for an operations center in Pompano Beach and Orlando. These 14 freeway/expressway management systems will cost $140 million to $280 million in capital expenditures over the next five years.

There are other ITS project needs for elements such as CVO and rural applications. Statewide expenditures are estimated at $20 million to $30 million over five years for CVO and intra-urban projects.

Operations and maintenance funding can be estimated to be approximately 5 to10% of the initial capital costs annually. Therefore, operation and maintenance costs for the ITS deployments can be expected to be $7 million to $28 million annually for the urban projects and $1 million to $3 million annually for non-urban projects.

In summary, the initial 5-year budget to implement the Florida ITS Business Plan can be estimated for planning purposes as shown in Table 1.

Table 1.
Estimated 5-Year ITS Program Budget

Cost Element	Statewide Program *	District Program * (all districts)
Program Operating Costs	$1 - 2 million	$8 - $16 million
Capital Costs	$20 - $30 million (Rural and Inter-urban)	$140 - $280 million (Urban)
Operations and Maintenance	$1 - $3 million (Rural and Inter-urban)	$7 - $28 million (Urban)

* 5-year total, in 1999 dollars

These estimates must be refined as part of ITS Program development.

5.2 Current ITS Spending

The Florida Department of Transportation is a trust funded state agency. That means funds for the Department's operations are earmarked for transportation from such sources as state fuel taxes, motor vehicle fees, and federal transportation apportionments/grants. No general revenue is customarily used to fund the Department or any of its transportation projects. Turnpike projects are funded by toll collections, concession revenues, and bond revenue proceeds. State law requires the Department to develop a Five-Year Work Program. That is the Department's commitment to the public to build specific projects during that time period. Most of the Department's funds are spent on projects in the work program.

The Department is the only state agency authorized to operate on a **cash flow basis**, but it is required to maintain a minimum cash balance in the State Transportation Trust Fund of 5% of outstanding obligations or $50 million, whichever is less. The sources of Department funds are shown in Table 2.

Table 2.
Department Revenue and Appropriations Sources

Revenue Sources	1995-96	1996-97	1997-98
State Fuel Taxes	$1,057,700,000	$1,124,000,000	$1,202,100,000
Motor Vehicle Fees	$476,800,000	$494,600,000	$495,100,000
Federal Apportionments/Grants	$854,500,000	$809,600,000	$694,700,000
Other	$302,400,000	$418,400,000	$618,200,000
Total	$2,691,400,000	$2,846,600,000	$3,010,100,000

Source: Florida Department of Transportation

Legislative Appropriations	1998-99
State Trust Funds	$3,795,468,230
Total	$3,795,468,230

Source: Florida Department of Transportation

The TEA-21 program of federal transportation will increase the federal grants from the ISTEA level of $800 million per year to approximately $1.2 billion per year. This may increase the total State Trust Fund to over $4 billion per year.

The Highway Construction and Engineering Program is outlined in the table below. This program constitutes the largest portion of the total Department annual budget. A summary of this program is shown in Table 3.

Table 3.
Department Program Allocations

Agency Program Component Allocations	1996-97	1997-98	1998-99
Highway Construction and Engineering	$1,429,600,000	$1,531,500,000	$1,821,092,805
Pre-Construction and Design Services	$277,700,000	$347,900,000	$343,373,211
Transportation Planning	$44,100,000	$45,800,000	$45,595,089
Materials Testing and Research			
Materials Testing	$23,900,000	$25,000,000	$25,688,779
Research	$6,800,000	$8,300,000	$6,771,129
Traffic Operations	$12,400,000	$11,700,000	$14,750,899
Total	$1,794,500,000	$1,970,200,000	$2,257,271,912

Source: Florida Department of Transportation

As the table indicates, the Traffic Operations Division, which will include operations and management programs and ITS, currently has a budget of 0.66% of the Highway Construction and Engineering Program and 0.375% of the Department total projected budget. There are also numerous construction projects that are ITS projects or that include ITS components. This analysis indicates that funding for operations and maintenance of ITS is small in Florida.

The amount of money currently being spent on ITS deployment is difficult to define since some ITS projects are included within roadway capacity construction projects. It is recommended that a summary of statewide ITS capital project costs be gathered by the ITS Program Office as an initial action. This will be useful in further developing the Department's ITS Program and in measuring overall cost effectiveness and performance.

5.3 ITS Program Capital Funding Alternatives

The Department should examine available funding sources for both capital projects and operations and maintenance, the role of public/private partnerships and ITS project main streaming to determine the best method of funding the ITS Program over the next several years.

There are many possible approaches to funding ITS projects, including most federal aid categories, state funds, local funds and public/private partnerships. Internally there are decisions that the Department must make regarding budgets and accounting of funds. Among these decisions are should the ITS Program be funded by a pre-determined allocation or line item the overall Department budget or should individual projects be funded as they become priorities (main streaming).

The available federal funding program, which can include ITS are described in detail in the appendix. The total TEA –21 (five year program) federal funds for programs that can fund ITS projects are Interstate Maintenance - $1.2 billion, National Highway System - $1.7 billion, Surface Transportation Program - $1.9 billion and Congestion Mitigation/ Air Quality - $250 million.

5.4 ITS Operations and Maintenance Funding Alternatives

Each District should estimate and budget recurring costs such as response and preventative maintenance activities, staffing, spare parts inventory, and in-house equipment needed to operate and maintain systems. In areas of rapid technology change that are subject to significant pricing variations, like communications and computer systems, special attention should be directed to maintaining a current strategy.

Budget estimates for all systems should include the cost of anticipated system and component replacements that deliver the same functionality as the deployed system. Driving forces in anticipating these "in-kind" replacements include the service life of the components, technology obsolescence, cost and availability of spares, and access to qualified O&M staffing resources. System expansion costs should be developed and included in the ITS Strategic Plan. Districts should consider the training requirements for all personnel when preparing plans and budgets.

The most common funding source is federal transportation funds. System Operations and Maintenance costs should be estimated in a manner that allows agencies to take full opportunity in securing federal STP, NHS, IM and CMAQ funds.

Innovative funding sources should be explored within statutory constraints to supplement available federal and state funds. These potential funding sources could include public / private partnerships, resource sharing with public agencies both within and external to the Department, and revenue opportunities. Examples of potential funding sources are: revenue from Information Service Providers and leasing of telecommunications capacity.

6.0 BUSINESS PLAN PROCESS

The Business Plan is a living document. It must be flexible and significant modifications are to be expected often. The plan must also provide input to the Department's program planning, work program development and budget process.

Each District should produce and update annually an ITS Implementation Plan that defines policies, staff needs, training needs, budgets and projects to be implemented over the next five years.

The Business Plan define and describes processes or methodologies for implementing ITS Strategic Plans. It also provides a basis for ITS planning activities in the form of an ITS vision, goals and objectives and guiding principles.

ITS Processes and Methodologies

- Planning - The ITS planning process is described in terms of a vision, goals and objectives, the development of ITS Strategic Plans and ITS Architectures and the need for checking architecture consistency in planning.

- Operations and Management - Guidance is provided for local development of manuals to describe and make uniform the management of highway operations and maintenance.

- Staffing - A new concept for determining the staffing of a District's highway operations and management activities, termed Level of Service, is described. Each District is to utilize the Level of Service to derive Staffing Plans.

- Staffing Plans - Districts will develop Staffing Plans which consider each of the functions defined within operations and management, what Level of Service is to be provided and to what degree the staffing will be out-sourced.

- Transportation Management Centers (TMC) - The Business Plan proposes that, as a matter of Department Policy, each District wold staff and activate at least one TMC within five (5) years.

- Procurement - Several methods to procure ITS improvements are discussed and evaluated, and a determination made as to which are most suitable for each type of Market Package.

- Rural and Inter-Urban Applications - Rural and Inter-Urban ITS applications are compared and contrasted with strictly urban applications and a determination made as to which ITS User Services have greater potential for rural areas.

- Rapid Technology Change - The Business Plan recognizes the importance of keeping up with rapidly developing technologies and techniques.

- ITS Finance - Several ways of funding ITS improvements are described, including directly within the Department's Finance Plan, in partnership with the MPOs or with private entities.

A number of actions are recommended to be conducted by the Department's ITS Program. Since the Department has given the responsibility of operations and maintenance of the roadway system to the Districts, each District needs to develop an action plan to implement ITS based on the priorities established in the Business Plan.

The Florida ITS Business Plan should be reviewed annually and updated as necessary. Since there are few ITS specific funds in TEA 21, ITS project funding may be mainstreamed into the Department funding cycle. Therefore, the update process should be coordinated with the Department budget update cycle. On rare occasions consideration may be given to "off-cycle" updates between annual updates if all participating parties agree. The Districts should provide input through updates to the District ITS Implementation Plan.

The Business Plan support ITS Strategic Plans and Architecture within an environment of rapidly changing technologies, techniques and institutional agreements. It must be sufficiently flexible to deal with rapid change and provide for an adequate revision cycle. The Plan should, therefore, be scheduled annually for review and potential revision. The initiator and facilitator of these reviews would be the proposed Department's ITS Program Manager who will coordinate this function with the District ITS Program Managers.

Each participant will be asked to submit specific tasks or projects needed to accomplish the required modifications. The Department's ITS Program Manager will facilitate a meeting of participants within a month of the notice so that the proposed modifications can be coordinated and discussed. The meeting will include a discussion of priorities for programs, projects and tasks and likely funding sources. After the Business Plan update meeting a draft updated Business Plan will be developed and sent to the participants for review.

Items in the Business Plan will often be implemented via the Department's Work Program and Budget Process. Therefore, the annual ITS Business Plan updates will be scheduled in accordance with the needs of those who take part in Work Program and Budget activities (see Figure 1). The Business Plan may also have impact on other Department plans, procedures or policy development activities (e.g., the Florida Transportation Plan update, development of procedural manuals or promulgation of new procurement policies). In each case, the ITS Business Plan updates must be scheduled to provide the necessary inputs.

A final Business Plan document will be produced and submitted to the Department Executive Committee in time for the annual Program and Resource Plan process cycle, which is normally initiated each summer. After program level resources are allocated in the ten-year Program and Resource Plan, the Department conducts a gaming exercise each fall to balance projects and funding and produces a Tentative Department Work Program. The five-year Work Program projects, staff requests and required resources are refined in the Work Program process and provided to the Florida Legislature. The Legislative Budget process produces the final budget for the Department, which is adopted by the Department Secretary each July. Feedback from the Legislative Budget process is input the next year's Program and Resource Plan process.

Figure 1 shows the current policy, budget and work program development process with the addition of steps recommended to accommodate the ITS Business Plan. Note that the ITS-specific program elements are driven by the same policy and program objective requirements as the traditional work program elements.

Policy, Budget & Work Program Development

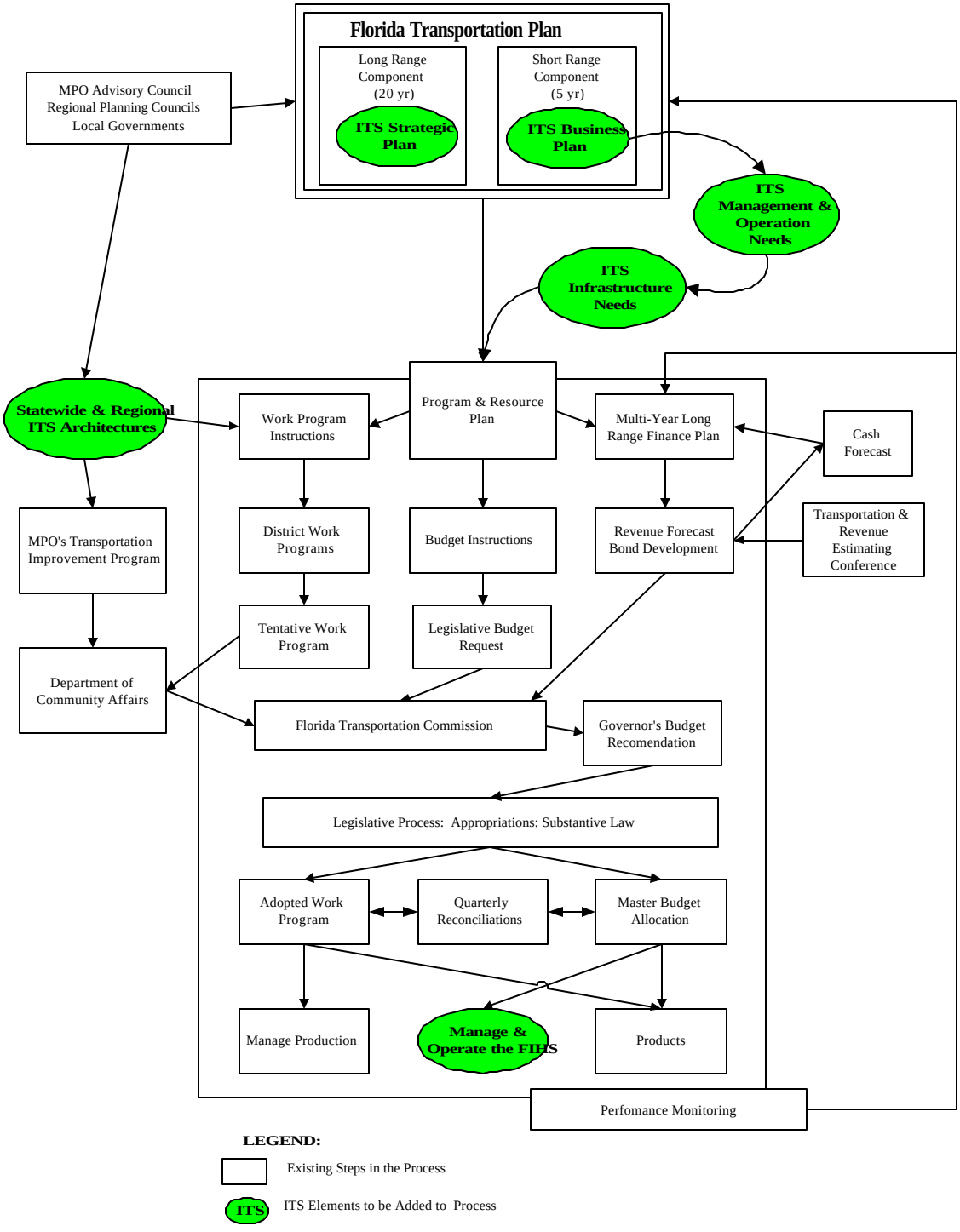

Figure 1.
Integration of the ITS Business Plan into the Department's Budget and Work Program Development Process

Appendix

Florida's ITS Vision, Guiding Principles and Goals and Objectives

This material provides a framework to guide Florida's ITS program and is designed to be flexible enough to accommodate regional differences, but still relate to the 2020 Florida Transportation Plan (FTP) and the plans of the Metropolitan Planning Organizations (MPOs) and local governments. Because ITS projects must compete for limited resources and contribute to Florida's overall goals, the ITS Vision, Guiding Principles, Goals and Objectives should reflect the unique features of Florida, the existing program legacy and the best efforts of other larger complex states.

Vision Development Background

The scope of this plan is clearly strategic in nature. Therefore, the time frame for the ITS vision, goals and objectives is long term (20 years plus) so that would fit within that of the 2020 Florida Transportation Plan (FTP). Many ITS strategies will be long term in nature and, therefore, compatible with the long-range component of the FTP. There is no "short term" component, per se, of the ITS Strategic Plan. However, ITS offers several "early winners" that can benefit travelers now (zero to 5 years) and demonstrate the cost effectiveness of ITS strategies. The concept of ITS early winners is embodied in the Guiding Principles of this plan.

The vision, guiding principals, goals and objectives should be developed to support the 2020 FTP, since ITS is demonstrably a cost-effective means of pursuing the FTP goals. Consideration should be given to selection of measures of effectiveness (MOEs) that will confirm this.

After reviewing the visions of several states' ITS programs, it was clear that a short general statement, clearly linked into state policy would be the most useful for a Florida Vision. Program characteristics and specific services are then handled within program principals and goal-related objectives. Note that the vision below is explicitly linked to the four 2020 FTP goals.

Florida's ITS Vision

Nearly two decades into the 21st Century, travelers in Florida are seeing more and more benefits from an integrated and coordinated Intelligent Transportation System within each of its urbanized areas and along all major transportation corridors. ITS provides valuable services to travelers, business, industry and government that were unavailable just a few decades ago. Pedestrian, automobile and transit mobility have benefitted from real-time information sharing, route navigation, electronic payment systems and system management activities made possible through ITS. Business and commerce are both partners and benefactors in ITS using the improved information and intermodal linkages provided by the system to improve business operations. The economic vitality of Florida has never been better aided by a statewide transportation system made safer and more efficient by ITS. All stakeholders in Florida's transportation system benefit from improved safety provided by ITS technologies in our vehicles and the network of systems assisting emergency service providers. Florida's ITS Strategic Plan, first adopted in 1999 and updated regularly ever since, assures that Intelligent Transportation Systems are considered at all levels of planning, production, operations and management, providing improvements in safety, mobility and economic vitality to maximize the investment in Florida's multi-modal transportation system.

Guiding Principles

Guiding principles are designed to describe how the vision will be realized, i.e., they characterize the ITS program itself. The following set of principles have been adapted to Florida's ITS needs.

Planning and Development

- Undertake strategic deployments - clarify ITS project priorities; develop a cost-effective incremental approach to deployment, consider both short and long-term elements.
- Provide a common framework for the planning, deployment and integration of systems through ITS architecture and standards consistency - develop regional applications of the National ITS Architecture, maximize the use of common architecture and standards; provide for a migration plan for older (legacy) systems to meet ITS standards and architecture consistency; establish a statewide ITS infrastructure through the use of statewide and national standards and architecture.
- Promote institutional and inter-jurisdictional cooperation and coordination in the planning, deployment, operations, management, and maintenance of ITS infrastructure - include ITS in all regional and statewide processes for transportation infrastructure planning, development and maintenance, emergency operations planning and management, and system operations and management; optimize cooperation and coordination among key stakeholders, both "vertical" (Department, local government, MPOs) and "horizontal" (transit and toll authorities, police, fire, emergency management services (EMS), etc.)
- Provide service on a regional, integrated and interoperable basis - provide seamless service through the integration of traffic operations and transit services across jurisdictional lines.
- Integrate ITS planning and ITS-related operations planning with statewide, metropolitan, authority and local government planning processes; incorporate ITS plans with Long Range Transportation (LRTP) and with State Implementation Plans (SIP), Transportation Improvement Program (TIP), Congestion Management System (CMS) Transportation System Management (TSM), activities, etc.
- Support concurrency / growth management program - use ITS as means of both monitoring and supporting program objectives; maximize the use of ITS developed data as a resource for other planning needs.
- Emphasize Intermodal/multi modal orientation to enhance both passenger and freight connections and transfers at ports, airports, and via all applicable modes.
- Utilize proven cost-effective technologies to deliver new and enhanced services to travelers and system users; use total life-cycle cost analysis to select appropriate ITS components and designs.

Operations & Management

- Provide performance-driven service – provide real-time operations and management of all transportation systems to maximize system performance, safety and time reliability; use ITS data to make real-time traffic control decisions and to evaluate transportation system performance.
- Adapt system operations and management strategies to changing conditions - incorporate new and modify existing service attributes based on performance evaluations.

- Provide emergency operations support - ensure traveler information systems and traffic management systems be capable of supporting hurricane and other emergency evacuation procedures.
- Actively pursue inter-agency operations and management agreements - agreements for the operation, maintenance, staffing, data-sharing and management of ITS deployments.

Finance

- Provide ITS Funding for Architecturally consistent projects - funding priorities should favor those ITS projects which are consistent with state and national ITS architecture and standards.
- Leverage value of "conventional" capital investment in roadway and transit improvements through ITS features that improve operational efficiency.
- Develop ITS funding strategies - pursue development of specific funding strategies for ITS deployment in the MPOs' TIP and Department's Work Program. Such strategies should include funding for long-term operations and management.
- Capitalize on private sector resources - access technology, capital and entrepreneurship through public-private partnerships and private sector information service providers (ISPs); coordinate electronic payment services, such as "smart card technology", with private sector financial institutions, maximize customer-responsive commercial opportunities (with revenue potential); capitalize on innovative finance for both capital and operations funding through the use of privatization, commercialization, and cost-sharing; support private sector initiatives for personal safety and mobility (e.g., May Day systems, on-board navigation, etc.).

Public Awareness / Involvement

- Include education, training and outreach for policy makers, general public and technical staff.
- Respond to special user needs – provide for the mobility and safety needs of commuters, tourists, goods movement, pedestrians, bicyclists, older road users and mature drivers.
- Identify and support ITS advocates / champions - seek out and promote ITS champions in local government, public agencies, academia, and the private sector including the general public.

Research & Development

- Support continued research and operational testing – provide a systematic research program to evaluate emerging technologies, new systems, markets, and planning methods.

Florida's ITS Goals & Objectives

These ITS Strategic Plan goals parallel the four 2020 FTP Goals. The corresponding objectives are designed to show how the ITS program contributes to FTP goals and can be measured through a common set of performance measures. Potential relevant ITS applications are shown in parentheses after each objective. This is important to help insure a goal-oriented ITS program.

Goal 1:

Safe transportation for residents, visitors and commerce.

ITS Objectives

- Minimize response time for incidents and accidents (incident management programs)
- Reduce commercial vehicle safety violations (commercial vehicle operations safety programs)
- Reduce weather related traffic incidents (road-weather information systems)
- Minimize grade crossing accidents (highway-rail interface safety systems)
- Improve emergency management communications (coordination of communication frequencies; real-time traveler information systems for evacuation and major route closings, re-routings or restrictions)
- Improve security for highway and transit users (surveillance cameras, call boxes, and emergency services support)
- Improve the security, safety and convenience of pedestrians and bicyclists (improved interfaces at pedestrian crossings, signalized intersections, kiosks, surveillance systems)

Goal 2:

Protection of the public's investment in transportation

ITS Objectives

- Reduced vehicular delay from incidents (incident response programs)
- Improved peak period flow and throughput (traffic control systems and operations)
- Reduce cost of commercial vehicle fleet operations (CVO and intermodal systems)
- Assist in providing safe and efficient maintenance of traffic during project construction (work zone monitoring systems, real-time traveler information systems)

Goal 3:

A statewide interconnected transportation system that enhances Florida's economic competitiveness.

ITS Objectives

- Reduce cost and delay of intermodal connections (commercial vehicle operations and information systems)
- Minimize shipping and delivery delays to improve freight operations (real-time system management programs)
- Improved predictability of travel and delivery times (incident management systems)
- Improve efficiency of fleet operations (CVO information systems)
- Improve tourist access and convenience (special traveler information systems)
- Increased employment (new ITS industry in Florida)

Goal 4:

Travel choices to ensure mobility, sustain the quality of the environment, preserve community values and reduce energy consumption.

ITS Objectives

- Improve mobility and choices for highway and transit users (traveler information systems for conditions and modal / route options)
- Improve tourist access (specialized traveler information systems)
- Reduce need to travel (communications infrastructure to support telecommuting, teleconferencing, teleshopping, etc)
- Reduce energy use and environmental degradation (ITS systems management to reduce vehicle trips, and vehicle miles of travel)
- Improve service for special traveler needs (smart cards, computer aided dispatch and automated vehicle location system to enable true demand-responsive transit systems)
- Improved multi modal travel (smart cards, traveler information and transit management systems to reduce transit travel times)
- Reduced energy use and delay associated with major incidents (ITS systems management and route diversion)
- Improve efficiency of toll operations (electronic toll collection systems)
- Enhance and support ride sharing opportunities (high occupancy vehicle / high occupancy toll systems)

ITS FUNDING

Traditional Federal Funding Sources

On June 9, 1998, President Clinton signed into law the Transportation Equity Act for the 21st Century (TEA 21), thereby authorizing the federal surface transportation program until 2003. The total funding is $217.5 billion over six years. The provisions of TEA 21 are very similar to the previous bill, ISTEA. On October 21, 1998 President Clinton signed the Omnibus spending bill, which included the FY 99 transportation appropriations. The total amount appropriated for FY 99 is $26.7 billion. Florida's portion totals $1.2 billion for FY 99. Details regarding funding and regulations are described on the FHWA web site: www.fhwa.dot.gov/tea21. The total federal funds by program for TEA 21, which covers years 1998-2003 are shown on the next page.

ITS Program

TEA 21 reauthorizes the federal ITS program administered by FHWA. The bill provides overall funding for ITS at $1.28 billion from 1998 to 2003. There are two broad categories 1) ITS standards, research and operational tests funded at $95 to $110 million per year, and 2) ITS deployment funded at $101 to $122 million per year.

The deployment incentives program will focus on projects of three types:

- Integration of ITS infrastructure in metropolitan areas deployed using other funds,
- Development of ITS infrastructure in rural areas, and
- Development of Commercial Vehicle Operations (CVO) infrastructure.

Agencies applying for these funds must submit an analysis of the O&M life-cycle costs and a multiyear financing and operations plan for consideration by FHWA.

The ITS program appropriated for FY 99 totals $200 million, which includes $95 million for research, development, evaluation and other programs and $105 million for deployment incentives. All of the deployment funds are earmarked for specified projects in FY 99. There are four earmarks for Florida, $1 million each for Dade County and Volusia County, $1.5 million for ITS improvements on US 19 in Pasco County and $750,000 for the I-275 ATMS in Pinellas County.

Federal Aid Highway Program

The Federal-Aid Highway Program is the primary mechanism used by Congress to finance surface transportation in the United States. The first Federal-aid Highway Act was passed in 1916 when Congress Provided direct aid to states to in the form of matching money to construct post roads.(4) The 1916 bill provided for the same federal-state matching partnership that still exists today. Funds to support these programs are derived from collection of user fees at a Federal level. These funds are in turn apportioned to states for the purpose of planning, design and construction of roadway facilities. This partnership between the Federal and State governments has historically proven to

be very effective. Programs under TEA 21 that fund the deployment of ITS technologies to support incident management activities include:

- National Highway System (NHS)
- Surface Transportation Program (STP)
- Congestion Mitigation Air Quality (CMAQ)

National Highway System (NHS)

The National Highway System (NHS) focuses federal resources on projects that are most important to interstate travel and national defense, roads that connect with other modes of transportation, and roads essential for international commerce. These roads are collectively referred to as Federal-aid roads or the National Highway System.

Previously this Act limited the time period that funds could be used for start-up costs for traffic management and control to two years. ISTEA and TEA 21 both eliminate the two-year limitation on reimbursement of start-up and operating costs for traffic management and control. Also "infrastructure-based intelligent system capital improvements" are added as eligible projects for NHS funding. Additionally, as now defined in 23 U.S.C 103(b)(6) the term “operating costs for traffic monitoring, management and control” includes

- Labor costs,
- Administrative costs, cost of
- Utilities and rent,
- and other costs associated with the continuous operation of traffic control, such as integrated traffic control centers

Operating expenses can also include costs incurred for hardware and software system upgrades, and system maintenance activities to assure peak performance of installed systems. Replacement of defective or damaged computer components and other traffic management system hardware, including street-side hardware, is considered eligible as well. However these funds are still restricted from being used for maintenance activities.

The NHS allocation for Florida for FY 99 is $283.4 million.

Surface Transportation Program (STP)

The Surface Transportation Program (STP) is a block-grant type program that may be used by states and localities for any roads (including NHS) that are functionally classified as local or rural minor collectors or above. Once funds have been allocated by the states, each state must set aside 10% of the funds for safety construction activities and 10% of the funds for transportation enhancements. As under the NHS program, "infrastructure-based intelligent system capital improvements" are added as eligible projects in STP. STP funds can be used indefinitely for capital and operating costs for traffic monitoring, management, and control facilities. As with NHS funds,

STP funds however can not be used for maintenance activities. Other funding sources may also augment STP funds.

Florida's STP funding for FY 99 is $328.6 million. Additionally, Florida receives $217.3 million from the minimum guarantee program that is added to the STP funds.

Congestion Mitigation and Air Quality Program

The Congestion Mitigation and Air Quality Program (CMAQ) directs funds towards transportation projects in Clean-Air Act non-attainment areas for ozone and carbon monoxide (CO).(7) Both traffic management and congestion management strategies are eligible for CMAQ funding if they can prove that they improve air quality.

CMAQ guidance issued on July 13, 1995 and continued in TEA 21 provides that operating expenses for traffic monitoring, management or control is eligible for CMAQ funding under the following conditions:

- Projects must be proven to have beneficial air quality benefits
- Expenses for the project are incurred by new or additional services
- Previous funding mechanisms, such as fees for services, are not displaced

Operating expenses are eligible under the CMAQ program for a period of three years from the start of the additional service. Operating expenses of traffic management and control services are eligible under NHS and STP with no time limits. TEA 21 permits the transfer of CMAQ funds to other funding sources including NHS and STP if additional operating expenses are required to operate a traffic management system. If a State does not have non-attainment areas, the funds may be used as if they are STP funds. CMAQ funds are also restricted from being used for maintenance activities.

Florida has been allocated $45.1 million in CMAQ funds in FY 99.

Table A-1
Summary of FY 1999-2003 Federal Apportionments - TEA-21 Restoration Act

Year	Interstate Maintenance	National Highway System	Surface Transportation Program	Bridge Replacement & Rehabilitation	Congestion Mitigation & Air Quality	Recreational Trails	Metropolitan Planning	High Priority Projects	Minimum Guarantee	Grand Total
1998 Apportionment	$167,837	$235,795	$273,344	$74,329	$36,641	$1,179	$9,969	$31,124	$207,954	$1,038,172
1999 (After Redistribution)	$193,721	$275,797	$319,327	$84,858	$41,772	$1,571	$11,491	$42,442	$225,949	$1,196,929
2000 Projection	$196,231	$279,333	$323,399	$85,962	$42,303	$1,964	$11,600	$50,930	$228,029	$1,219,751
2001 Projection	$201,170	$286,283	$331,400	$88,133	$43,362	$1,964	$11,829	$50,930	$227,498	$1,242,570
2002 Projection	$205,317	$292,117	$338,116	$89,957	$44,237	$1,964	$12,022	$53,760	$227,882	$1,265,372
2003 Projection	$210,202	$300,155	$346,028	$92,105	$45,269	$1,964	$12,248	$53,760	$227,299	$1,289,030
Total (1998-2003)	$1,174,478	$1,669,480	$1,931,614	$515,344	$253,584	$10,606	$69,159	$282,946	$1,344,611	$7,251,824

Source: U.S. Department of Transportation Federal Highway Administration (After Redistribution, All Numbers in Thousands)

State and Local Funding

Several mechanisms are available to fund the deployment and operation of ITS. However sources of funding to support maintenance activities are limited. Mechanisms used to leverage O&M funds typically include:

- Gas Taxes and General Funds
- State General Funds
- User Charges and Fees

Each of these mechanisms is discussed below as they relate to ITS.

Gas Tax Funds and General Funds

Revenue for O&M of transportation systems from state gas tax funds and state and local general funds has stagnated. Over the years, vehicles have become more fuel-efficient. As a result, the increase in state gas tax revenues has not kept pace with the increase in annual vehicle-miles traveled. With the introduction of electric vehicles, and their performance potential, state gas tax revenues may even decrease in years. In addition, increasing costs of maintaining roadways and bridges is crowding out other uses of state gas tax funds.

Revenues from state and local general funds have also stagnated or decreased. Taxpayer revolts, such as Proposition 13 in California, have reduced general fund revenues for cities and counties to the point that little is left over for anything but the most vital services. Meanwhile, the growing demands of entitlement and police programs are limiting the use of state and local general funds for other purposes.

Currently the average Florida driver pays taxes of $0.465 per gallon of gasoline, which includes $0.184 per gallon for federal excise tax and $0.281 per gallon for state taxes. Local option gas taxes add 2 to 5 cents per gallon in some counties.

State General Fund

Although each state assesses taxes at different rates, a state may utilize collected taxes from toll collection, gasoline taxes, property taxes, and/or sales taxes. This state income may be combined into a general uses fund that can be used for various purposes. Incident management programs can be one of the items that may use some of the general use funds that have accumulated.

- *Gas tax* - A gas tax or a portion of funds collected from existing gas tax revenue may be used for ITS.
- *Special tax* - A special type of tax may be levied by the State to use for ITS and other applications.

Toll Revenues

Toll revenues are a potential source of funding for ITS, although the terms of the bonds used to finance the toll facility will usually restrict the use of any toll revenue funds to that particular facility. Gross toll revenues on Florida's Turnpike will approach $300 million in 1999. In the past, net revenues (gross revenues less operation and maintenance costs) have exceeded two times the annual debt service. This excess has been applied to the expansion and reconstruction of Turnpike facilities, but could also be applied to ITS implementation.

User Charges and Fees

Revenue for operating and maintaining of incident management programs may come from a number of user charges, fees, and taxes. User charges, fees, and taxes are collected from those who directly benefit from, or are associated with, the use of a specific, publicly provided service. An example is the gas tax. Those who drive on public roadways pay for them through a tax on fuel. The amount paid is proportional to the amount of product or service consumed. Below is a partial list of user charges, fees, and taxes that may be applied to state and local transportation systems:

- Motor vehicle registration fee
- Vehicle sales tax
- Certificate of title fee
- Weight-distance tax for commercial vehicles
- Vehicle inspection charge
- Motor oil tax and tire tax, etc.

Other Sources

Other methods, which are available on a state or local level to generate funds for the O&M of incident management programs, include:

- Advertising
- Licenses and permits (liquor / beer, cigarettes, etc.)
- Utility fees
- Lottery

These mechanisms may not produce substantial revenue, or depending on the given state may not be allowed as a means of financing. However, they provide possibilities that are worth investigating, and collectively, may make a difference.

INNOVATIVE FEDERAL FUNDING SOURCES

"Innovative financing" refers to moving the traditional Federal-Aid highway financing process from a single strategy of federal funding on a "grants reimbursement" basis to a diversified approach that provides new options drawn from the most innovative financing concepts developed from the public and private sectors. A prime objective of innovative financing is to maximize the ability of states to

leverage federal capital for needed investment in our nation's transportation system as well as more effective use of existing funds.

Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA)

TEA 21 established a new innovative finance program called the "Transportation Infrastructure Finance and Innovation Act of 1998" (or TIFIA). TIFIA permits USDOT to provide financial assistance to projects in the form of direct loans, loan guarantees and lines of credit. Almost any project costing over $100 million is eligible for this program. ITS projects are specifically included for costs of $30 million or more. The federal credit assistance may not exceed 33% of the total project cost. A state must apply for loans for each project that is desired to be assisted by this program.

State Infrastructure Bank (SIB)

State Infrastructure Banks (SIBs) are infrastructure investment funds, which can be created at the state or regional (multi-state) level. SIBs provide states with a wide range of loan and credit enhancement to eligible projects. Through the SIB program, states may test the use of SIBs as a means of increasing and improving both public and private investment in transportation. ISTEA set up 38 pilot SIBs that were able to provide loans, enhance credit, serve as capital reserves, subsidize interest rates, ensure letters of credit, finance purchase of lease agreements for transit projects, provide bond or other debt financing security, and provide other forms of assistance that leverage funds. The funds from the banks can not be used as a grant.

TEA 21 established a new SIB pilot program for four states including Florida. The states can enter a cooperative agreement with US DOT to set up infrastructure revolving funds eligible to be capitalized with federal transportation funds (NHS, STP, CMAQ). SIBs provide various forms of non-grant assistance to eligible projects, including below-market rate loans, interest rate buy-downs, guarantees, and other forms of credit enhancement.

DEPARTMENT STAFFING RECOMMENDATIONS

The Operations and Management issue paper produced for this project addressed staffing needs for the ITS Statewide Program and a typical District ITS Program. The following paragraphs are excerpts from the recommendations of that issue paper.

The following tables present recommended staffing guidelines for the operation of ITS in Florida. Because there are a wide variety of ITS user services that could be offered in a "typical" TMC, several tables are presented. Recommended staffing tables are shown for the ITS Market Packages of Freeway Operations, Incident Management, and Regional Multi modal Traveler Information. An underlying assumption in each of these tables is that these staffing requirements are for the stand-alone needs of each particular ITS Market Package / User Service. That is, these are all new positions needed to operate (and in the case of TOC computer equipment, maintain) each representative ITS operation. In most cases, these operations will be integrated and combined at one or more levels within each District. There are opportunities for combining and sharing positions for operations that are integrated, especially those that are co-located in the same building,

such as within a TOC. For example, a freeway operations center is often used to enhance the effectiveness of freeway service patrols. In this example, the positions of Program Manager and Administrative Support could be combined into one position, but the positions required for tow-truck drivers could not be combined with any existing positions in the TOC. These guidelines are presented as separate tables for example only. Each District will have the flexibility to combine positions and provide the appropriate level of service.

Table A-2 presents the recommended staffing for a TMC in a "typical" urban area in Florida. A "Level of Service" categorization is used to define the different staffing needs of different levels of operation. The assumptions used to develop this table are shown below the table

Table A-2. Freeway / Expressway Operations Center Department District Staffing Guidelines - for a Typical Urban Area

(Final Version - 6/6/99)

Level of Service	Program / Center Manager	Shift Manager / Supervisor	System Operator	Computer / Network Support	Public Safety Liaison	Admin. Support	Total
LOS 1: Ad Hoc, As-needed response	1 (F-1)	-	-	-	-	-	1.0
LOS 2: Peak Period Coverage	1 (F -1)	1 (F-1)	1 (F-1)	0.5 (C)	1 (F-1)	-	4.5
LOS 3: Full Weekday 12+ hours	1 (F-1)	1.5 (F-1)	2 (F-1)	1 (C)	1.5 (F-1.5)	1 (C)	8.0
LOS 4: Extended Day 16+ hours	1 (F-1)	3 (F-2)	5 (F-2)	1.5 (C)	2 (F-2)	1.5 (C)	15.0
LOS 5 : Full 24 hr / 7 day Coverage	1 (F-1)	5 (F-2)	9 (F-3)	2 (C)	5 (F-5)	2 (C)	24.0

Notes:

(C) - These positions could be either Contractor or Department provided employees.

(F-#) - These positions must be Department or other government employees (# = how many out of the total).

Staffing Guideline Assumptions:

1. All staffing shown in terms of full-time equivalents (FTE) at 1854 staff-hours per year.
2. "Typical urban area" refers to one of Florida's major cities. Tampa, St. Petersburg, Miami, Ft. Lauderdale and Palm Beach would all be considered separate urban areas for this assumption. Moderate complexity (roadway coverage and number of incidents). It is assumed that the system would be capable of being handled by one to two system operators and one (1) dispatcher during peak periods.
3. Does not include field equipment maintenance personnel.
4. Public safety dispatcher may be provided by law-enforcement agency (i.e., FHP). Does not include service patrol personnel or dispatchers.
5. Does not include District or Central Office Traffic Operations or Systems Planning staff (see Table 10).
6. Does not include multi modal or transit operations personnel
7. Personnel shown above are total FTEs, contract operations could be provided by consultant services. In order of priority, consultants could provide the following positions: Computer/Network Support, System Operator, Admin Support, Dispatcher and Supervisor. It is recommended that the Ops Center Manager always be Department personnel.

It is important to provide the administrative support for Florida's ITS program. This is needed at both the District and Central Office levels. It is assumed that the existing Department organizational structure and responsibility will remain, with the possibility of additional divisions or offices at both the Central Office and the District levels. The detail of this organization will be decided by the

managers at each level. It has been recommended that the Central Office ITS Program Manager report to the Assistant Secretary for Transportation Policy.

Department currently provides a Central Office support and guidance role through the Central Office of Traffic Operations and the Transportation Research Laboratory (TRL) and through the Systems Planning Office for the FIHS Program. As the ITS program grows within each of the Department districts, the support for that program (in Traffic Operations, Public Transportation and Planning) should grow as well. It is recommended that the following six (6) key positions form the initial staffing for the Department's ITS Program in the Central Office:

- ITS Program Manager
- Assistant Manager #1
  - Public Information
  - Research
  - Training
  - Grants
- Assistant Manager #2
  - Urban
  - Inter-Urban
  - Multi modal
  - Public / Private
  - Finance
- Assistant Manager #3
  - Commercial Vehicles
  - Electronic Toll and Traffic Management
- Assistant Manager #4
  - Architecture and Standards Coordination
- Administrative Assistant

The Districts should have the flexibility to assign a District ITS Program Manager to the Director's office that makes the most sense for each district, however the important aspect is that the ITS Program Manager have cross-cutting responsibility and authority to manage ITS projects in all stages of planning, production, construction and operations. The District ITS Program will require and administrative and key staff similar to the Central Office's shown above.

STATUS OF ITS ACTIVITIES IN FLORIDA

The following pages list activities that are currently underway, planned or have been completed by agencies in Florida. The Statewide and District Programs are listed separately by program element.

DEPARTMENT'S ITS PROGRAM

Policy Element

Policy commitment to management and operations of the transportation system - Defining the *New Mission* as a commitment to the management and operation priority implied by ITS.

ITS program planning in agency overall statewide plan context – reflecting the importance of improved operations and management and new ITS user services in the statewide planning and programming process.

Coordination of staffing needs - Developing appropriate staffing level standards for systems operation and management in districts.

ITS application standards – defining the appropriate level of ITS services application as a function of metro area size and problems consistent with other Department Level-of-service concepts

Projects Underway

FDOT ITS Statewide Strategic Plan Development (WPI 0590596) Contact Lap T. Hoang (850) 414-7619

FDOT ITS Planning Guidelines (currently on hold)

Financial Element

State level budgeting committed to ITS – capital and operating -- consistent with management and operations commitment level. The ITS capital investments required for a strong management and operations program may be modest by conventional capital budget standards. However, they must increasingly compete for priority with alternative investments that which are normally less cost-effective, but are better understood. The operational commitment also focuses on constrained staffing slots and scarce technical capabilities that is often the major barrier to a vigorous commitment to management and operations.

Projects Underway

N/A - to be coordinated with the Department budgeting and work program development process.

Planning Element

The planning element will set the agenda for the other program elements on both a statewide and district/regional basis. The statewide ITS plan must be developed by consensus by Department

headquarters staff along with the eight districts and other stakeholders. The activities described in the next few pages provide for coordination across jurisdictional boundaries and consistency of plans.

ITS program planning - ITS program planning is an on-going activity that includes annual updates of the ITS Business Plan and periodic updates of the Florida ITS Strategic Plan.

Integrating ITS and the MPO process, architectural consistency and other planning activities - This project may include assistance to MPOs in planning for ITS, developing a statewide architectural consistency review process, providing planning level architectural consistency checks for MPOs and providing project level architectural consistency checks for districts.

Data management - This project may include developing standards and formats for data warehousing, maintaining archival data storage from ITS deployments across the state and developing analysis tools for use of ITS data for operators and planners.

Projects Underway
FDOT ITS Statewide Strategic Plan Development (WPI 0590596)
Contact Lap T. Hoang (850) 414-7619

Institutional Arrangements Element

Recognizing New Stakeholders and Partnerships – The range of seamless regional systems management and operations services that can provide stronger interagency cooperation and new forms of public-private relationships operating organization -- involving not only the Department, local governments and MPOs; but also law enforcement and emergency services and private sector transportation service providers.

Developing New Levels of Regional Cooperation and Coordination – Closer operating relationships in real time – both vertical and horizontal and between infrastructure owners and those with other legal responsibilities -- must be forged in the form of "virtual operating institutions" if the promise of integrated Management and Operations through ITS is to be realized. Initial tasks are to develop organization chart and stakeholders groups for Business Plan updates. On-going work includes monitoring coordination issues for district/regional deployments across the state.

Architecture and standards - This project is to develop a statewide ITS architecture with high level subsystems and data flows. Standards review and recommendation and coordination with national standards groups are also included.

Project development and design consistency - Design standards, CADD standards and drawing templates are to be developed in this project.

Projects Underway
N/A

Telecommunications Element

This project is to develop statewide standards for telecommunications. Also deployment of major systems (Florida FiberNet, etc.) are to be coordinated through this project.

Projects Underway

District 8 - Florida Fiber Network (FFN) (WPI 0150518) Contact : Chester Chandler Status: RFP under review.

Public Awareness/Involvement Element

Public education and awareness activities to be coordinated through this project, individual tasks may be carried out by districts or regions. Stakeholder involvement in districts and regions is to be reviewed.

Projects Underway

N/A

Research and Development Element

Coordination of research activities is to be conducted in this project. Annual updates of the Business Plan will identify needed research and this project will monitor and review research progress. Types of research may include the following:

- Technology Applications such as hardware and software testing or development
- Institutional Arrangements
- Public/Private Partnering

Projects Underway

Incident Detection Research - Univ. of Central Florida

DISTRICT/REGIONAL ITS ELEMENT

District/Regional Planning and Programming Element

Project level planning within a district should capitalize on existing mobility management initiatives, ITS deployments and completed EDP efforts.

Projects Completed

District 1 - Collier County/City of Naples Computerized Traffic Signal System Feasibility Study (WPI 1114174) Contact: Chris Birosak
District 2 - Jacksonville Early Deployment Planning Study (WPI) Contact: Marc Bounds
District 5 Metro Orlando Early Deployment Planning Study (WPI 5114834) Contact: Trey Tillander
District 7 ITS Strategic Plan (WPI) Contact: Jerry Karp

Projects Underway

Districts 1, 5 and 7 - I-4 Corridor ITS Regional Framework (WPI) Contacts: Chris Birosak, District 1; Jerry Karp, District 7; and Trey Tillander, District 5

Projects Planned

District 7 - ITS for Interstates Master Plan (FPID: 258372-1-32-01) Contact Bill Wilshire

Regional Stakeholders Organization and Coordination Element

Stakeholder groups should be developed at the project level. Coordination among agencies and stakeholders, both within the district and sometimes between districts and regions will be required.

Projects Underway

District 6 - Southeast Florida Intelligent Corridor System (ICS) Public Involvement Program (WPI 6114291) Contact: Arvind Kumbhojkar Status: on-going.

Regional Architecture Element

Regional architecture that is consistent with local requirements and conditions, the statewide ITS architecture and emerging FHWA requirements must be developed and applied.

Projects Underway

District 7 – Development of Technical Requirements and Planning Guidelines for a Regional ITS Architecture (WPI No. 7590015) Contact: Jerry Karp (813)975-6413.

Projects Planned

District 1 – ITS Regional Architecture

Traffic Operations/Incident Management Element

This element includes regional deployments of Traffic Management Centers. Individual projects to be managed by districts, regional agencies or local governments. Incident management projects such as freeway service patrols will also be managed at the regional or local level. Roadside traveler information (CMS and HAR) is assumed to be included in this element.

Projects Completed

1. District 5 - Seminole County Traffic Action Center Contact: Bob Zaitooni, (407) 323-2500 x5629
2. District 4 - I-95 Service Patrol Contract, Broward/Palm Beach Counties (FIN 231172313204/ 23192413204) Contact: Rick Mitinger
3. District 4 - I-595 Service Patrol Contract, Broward County (FIN 23165712101) Contact: Rick Mitinger
4. District 4 - I-595 Ramp Identification Signing (WPI) Contact: Rick Mitinger
5. District 5 - I-4 Surveillance Project - Relocation of FMC, Revised maintenance contract (WPI 5140023) Contact: Trey Tillander
6. District 5 - I-4/I-95 Daytona Area Smart Highways (DASH) - CMS coordination with District 2 (WPI 5119328) Contact: Trey Tillander
7. District 5 - I-4 Motorist Assistance Program - Coordination between FDOT and LYNX Contact: Rob Gregg (407) 841-2279 x3212.
8. District 5 - Freeway Incident Management Team - emergency shelter signs Contact:
9. District 6 - Service Patrols for I-95 in Dade County - AVL for service trucks (WPI 6141912) Contact: A. Kumbhojkar
10. District 4 - Broward County Traffic Signal System Design Group 6 (FIN 22808715201 / 22803315201) Contact: Mark Plass
11. District 6 - Service Patrols for SR 836, Dade County (WPI 6141912) Contact: A. Kumbhojkar

Projects Underway

1. District 6 - Integrated System at the Golden Glades Interchange (WPI 6141888, FM 251656) Contact: N. Gomez, G. Cestari, (305) 470-5335 Status: construction.
2. District 6 - Additional CCTV cameras at Golden Glades Interchange (WPI 6141856, FM 251624) Contact: A. Kumbhojkar Status: Re-advertised for bid.
3. District 7 - Northwest Area Communication and Video Surveillance System (WPI 7114055) Contact: Status: construction.
4. District 4 - I-595/I-95 Changeable Message Sign System (CMSS) (FIN 23170515201 / 23165912101) Contact : Mark Plass Status: construction.
5. District 4 - Intercoastal Waterway Changeable Message Sign System (ICWW CMSS) (FIN 22811913101) Contact: Mark Plass Status: master plan development.
6. District 4 - Freeway Incident Management Team Contract (FIN 23035713101) Contact: Rick Mitinger Status: project on-going.
7. District 8 - FDOT-Turnpike District/OmniPoint Communications Lease Agreement (WPI) Contact: Chester Chandler Status: most wireless sites operational.

8. District 4 - Broward County Traffic Signal System Design Group 7 (FIN 2280813101) Contact: Mark Plass Status: design
9. District 4 - Broward County Traffic Signal System Master Plan (FIN 22808713101) Contact: Mark Plass Status: study almost completed.
10. District 4 - Broward County ITS Operations Facility Master Plan (FIN 22820912101) Contact: Mark Plass Status: study almost completed.
11. District 4 - Palm Beach County Traffic Signal System Design Group 4 (FIN 22973115201 / 22959715201) Contact: Mark Plass Status: construction
12. District 4 - Palm Beach County Traffic Signal System Design Group 5 (FIN 22973313101) Contact: Mark Plass Status: construction
13. District 4 - Palm Beach County ATMS Master Plan (FIN 22980713101) Contact: Mark Plass Status: study on-going
14. District 5 - Orlando UTCS Upgrade (City of Orlando) Contact: Harry Campbell (407) 246-3255 Status; design.
15. District 7 - Tampa Computerized Traffic Control (WPI 7113912) Contact: Keith Crawford Status: design.
16. District 1 - Punta Gorda/Charlotte County Computerized Traffic Signal System (WPI 1110174) Contact: Chris Birosak Status: construction
17. District 1 - Highlands County Computerized Traffic Signal System Implementation (WPI 1119950) Contact: Chris Birosak Status: installation underway.
18. District 1 - Sarasota Retiming Project (WPI 1119268) Contact: Chris Birosak Status: study underway.
19. District 4 - City of Belle Glade Traffic Signal System (FIN 22955313101) Contact: Mark Plass Status: construction.
20. District 4 - City of Boca Raton Traffic Signal System (FIN 22968413101) Contact: Mark Plass Status: construction suspended.
21. District 5 - US 192 Closed Loop System Melbourne/Brevard County (WPI 5110636) Contact: David Bradford (407) 690-3230 Status: construction.
22. District 7 - Hernando County Computerized Traffic Signal System (WPI 7112153) Contact: Status: feasibility study completed.
23. District 6 - Southeast Florida Intelligent Corridor System (ICS) Phase A (WPI 6141828) Contact: Arvind Kumbhojkar Status: construction.
24. District 6 - Southeast Florida Intelligent Corridor System (ICS) Phases B and C (WPI 6141828) Contact: Arvind Kumbhojkar Status: design on-hold pending funding.
25. District 6 - Southeast Florida Intelligent Corridor System (ICS) Interim Control Center (WPI 6114412) Contact: G. Cestari/R. Laboris Status: construction.
26. District 6 - Southeast Florida Intelligent Corridor System (ICS) Metro Dade Signal System Update (WPI 6114084) Contact: Arvind Kumbhojkar Status: design.

Projects Planned

1. District 5 - I-4 Surveillance Project - Expansion of SMIS in Polk and Volusia Counties Contact: Trey Tillander

Public Transit Element

The transit element includes all urban transit ITS deployments, including AVL, buses as probes and advanced transit management. Local transit agencies will manage the individual projects.

Projects Underway

LYNX (Orlando) Downtown LYMMO Bus Circulator with Real Time Information Displays; contact: Rob Gregg, LYNX. Status: completed and in-service.
LYNX (Orlando) AVL / Smart Card Demonstration; contact: Rob Gregg, LYNX. Status: test phase completed.
Miami-Dade Bus System AVL Transit Management System; contact: . Status: completed and in-service

Projects Planned
Lakeland Area Mass Transit District AVL and Data Messaging Systems (FPID: 40559919401; 40447818401) Contact: Status: pending.
Sarasota County Transportation Authority AVL System Upgrade (FPID: 20578119401) Contact: Status: pending
Manatee County Area Transit AVL and Dispatch System (FPID: 20521919401) Contact: Status: pending

Rural/Inter-Urban Applications Element

This element includes rural ITS applications such as weather warning systems and applications for rural paratransit systems. Linking traveler information systems between dense urban areas along high priority corridors is another type of rural project.

Projects Planned
Commission for Transportation for the Disadvantaged - US DOT Rural ITS Operational Test; Contact: ; Status: pending.

Intermodal/Commercial Vehicle Operations Element

The CVO element includes electronic clearance, enforcement and weigh-in-motion applications. Particular emphasis will be on intermodal connections such as at ports and major transfer terminals.

Projects Underway
Advantage CVO - Multi-state project along I-75 for electronic credentials and weigh-in-motion for commercial vehicles; Contact: ; Status: complete and in-service.

Emergency Services Operations Element

Emergency services projects will be coordinated with regional and local TMCs. Types of services include:

- Fire, rescue, emergency medical services, 911
- Emergency evacuation, disaster management
- Hazardous materials response

Projects Underway

1. District 5 - Tri-County Traffic Signal Preemption System (WPI 5114817) Contact: Status: construction.
2. District 8 - Turkey lake Traffic Operations Center (TOC) (WPI 5254270) Contact: Chester Chandler Status: construction bid advertisement out.

Traveler Information Services Element

Pre-trip and en-route (except for roadside CMS and HAR) traveler information is included in this element. Projects may include agency-developed services such as web sites or telephone information systems. Many services are likely to be provided by private value-added resellers (VARs) of travel information. The management of these information service providers (ISPs) will be conducted at the district or regional level. Many areas may need to differentiate traveler information for commuter/resident travelers and tourist/visitor travelers.

Projects Underway

1. District 8 - ATIS Phase 1, Pompano TOC, VMS, HAR (WPI 190717) Contact: Chester Chandler Status: design, RFPs being developed.
2. District 8 - Southeast Florida Traveler Information (WPI) Contact: Arvind Kumbhojkar, Chester Chandler Status: on-hold pending coordination among Districts 4,6,8 other agencies and MPOs.
3. District 8 - Broward Civic Arena Variable Message Signs (VMS) (WPI 4151707) Contact: Chester Chandler Status: installation underway.

Electronic Payment Services Element

This element will include coordination of toll tag standards for toll facilities in Florida. Other uses of toll tags may be developed including the addition of readers for detection, development of HOT lanes, and development of payment systems for other travel modes and facilities such as transit and parking.

Projects Underway

1. District 5 - E-Pass AVI Orange, Osceola, Seminole Counties (OOCEA) Contact: Joe Berenis Status: fiber optic installation underway, planning for operations center underway.
2. District 8 - SunPass Electronic Toll and Traffic Management (ETTM) (WPI 0150401) Contact: Chester Chandler Status: construction/installation.

Traveler Safety Services Element

Traveler safety services may include projects such as ITS for Grade crossings, highway-rail intersections, traveler security, MayDay systems, and ITS for Pedestrian/bicycle safety.

Projects Underway

N/A

Florida Statewide ITS Strategic Plan

Department Organizational Structure Alternatives to Implement ITS

The following is an excerpt from the approved consultant scope of work:

Based on input from other states and Department staff received in Task 1, the Business Plan developed in Task 4 and from input received from the Project Panel and the Florida Advisory Team, the Consultant shall develop a draft report defining potential Department organizational alternatives to implement the Florida's ITS vision and Business Plan. The alternatives shall consider both short and long term organizational structures and shall recommend appropriate phasing. The report may also include recommendations for the establishment of the ITS program as a separate funding category within the Department. This determination will be made by the Project Panel prior to the initiation of the development of this report.

1.0 INTRODUCTION & PURPOSE

The purpose of this report is to evaluate available information on organizational structures used to implement Intelligent Transportation Systems (ITS). A primary source of this information is the response received from the various states surveyed as part of this Strategic Plan study. Other sources include input and recommendations from the Project Panel and the Florida ITS Advisory Team. Potential alternative organizational structures for the Florida Department of Transportation (FDOT) will be evaluated and a recommended structure for implementing Florida's ITS program will be developed.

The implementation of new technology and new ways of doing things always presents multiple challenges - both technological and institutional. More often than not, it is the non-technical, institutional challenges that present the most difficulty. This fact has been found to be especially true for ITS, which requires the cooperation and involvement of stakeholders that have not historically been a part of the transportation planning and implementation process.

2.0 SPECIAL NEEDS OF ITS

What's different about ITS implementation that it needs a "special" organizational structure? A major recommendation of this ITS Strategic Plan and its accompanying ITS Business Plan is that the Department adopt the policy of providing real-time management and operation of the state highway system. Committing to the proactive management and operations of the transportation system expands the traditional role the Department and many agencies with which FDOT does business. This new expanded role emphasizes the fact that recurring and nonrecurring congestion impacts the economy in a manner which is not acceptable to the public. Although proactive management of the transportation system does not eliminate delay, this effort does effectively minimize the impact to society and the economy.

Planning, deploying, operating, managing and maintaining an ITS provides both challenges and an opportunities to implementing and operating agencies. The challenges are created because of the

dependance on established institutional processes, and the various technical options associated with system integration. The opportunities are many, including the potential to provide a higher degree of service to the traveling public for a relatively small investment compared to capacity improvements. Understanding both the challenge and the opportunity is the foundation to a successful ITS Program.

There is no question that ITS demands new technical skills, including systems engineering, computer programming and telecommunications engineering. These skills must be available to the agencies implementing, operating and maintaining ITS. Adding these skills to the FDOT, either in the form of Department employees or as consultants, is a major challenge. Coordinating these technical skills is another challenge. The technology of ITS is progressing rapidly. Without technical coordination, it would be very easy for one District to select a particular technology that could be incompatible with that selected in other Districts.

New "institutional" skills must be learned as well. The expanded role for FDOT, as the real-time manager and operator of the state transportation system, requires that the Department interface with many new agencies and stakeholders - both public and private - that it has not been involved with before.

3.0 OTHER AGENCY'S ORGANIZATIONAL STRUCTURES FOR ITS IMPLEMENTATION

As an early task in the development of this ITS Strategic Plan, a survey was conducted of 15 transportation agencies (state DOTs and ITS priority corridor agencies) that have been actively involved in implementing ITS. The complete results of this survey are documented in a separate report. The results of questions regarding each agency's organizational structure are summarized here (not all agencies answered all questions, therefore the number of responses vary by question).

The responding DOTs are typically divided into districts. The number of districts varied from 2 in New Jersey to 12 in California and 25 in Texas. Florida DOT currently has seven geographic districts plus the Turnpike District. The number of MPOs in the responding states varies from 25 in Texas, 15 in California, 13 in Washington to 2 in Maryland. Florida, with 26 MPOs, has the most of all states in the survey.

Several states have a statewide ITS division or branch with headquarters staff and district or regional engineers staffing the districts for ITS operations. This model is representative of Colorado, Washington, Virginia, and California. Wisconsin has a small headquarters staff and no district staff. Missouri has district urban ITS coordinators and a statewide rural ITS coordinator. New Jersey has ITS engineers in each of their two districts. Florida DOT has a Central Office of Traffic Operations which includes ITS. Most ITS deployment is handled by the FDOT districts.

Eight states described themselves as being decentralized (Colorado, Washington, Virginia, Missouri, California, Texas, Utah and New Jersey). Wisconsin and Maryland were described as being centralized. Colorado and Virginia stated they are in the process of becoming more centralized. Florida DOT has traditionally been de-centralized.

All the responding states except Missouri, Utah and Texas stated that they are responsible for all aspects of ITS (strategic planning, programming, design / specification, procurement, operation and maintenance). Missouri DOT stated that they are responsible for ITS design, procurement, and operations only. Utah DOT is responsible for all activities except planning. Texas DOT is

responsible for only planning, programming and design. As an agency, FDOT is involved is all of the listed activities, however, the level of involvement varies considerably by district.

All agencies, except Caltrans and Texas DOT, report that the DOTs lead regional planning and programming activities. In California and Texas, the MPOs take the lead in planning for ITS. Several of the large MPOs (including SANDAG in San Diego and MTC in the San Francisco Bay Area) are national leaders in ITS activities. In Florida, especially recently, this has been a cooperative effort between the MPOs and FDOT.

All responding states and Priority Corridors stated that they are active in ITS Planning and Architecture. All agencies except the I-95 Corridor have an ATMS component. All agencies except Utah DOT have ATIS and CVO functions. Seven agencies (GCM Corridor, Colorado, I-95 Corridor, Wisconsin, Texas, Houston Corridor, Minnesota, and California) are involved in APTS. Nine agencies are active in ARTS (Colorado, Washington, Virginia, Wisconsin, Texas, Minnesota, Missouri, California, and Maryland). Houston and Minnesota added weather and incident management as other activities. FDOT has had some experience with all of these ITS project types.

All eight responding DOTs are responsible for real-time transportation operations or ITS. The three Priority Corridors do not operate ITS as a Corridor, their member agencies conduct operations that are planned and coordinated through the Corridor. FDOT has had limited experience with operation of ITS.

In summary, there are two states which are similar in some ways to Florida - California and Texas. Each has a relatively large population in several large to medium sized metropolitan areas. Each has several MPOs and a large state maintained highway system. Texas DOT is somewhat centralized and provides planning, design and programming support for ITS, but does not operate any systems exclusively. Caltrans is decentralized, but with a large centralized Office of Advanced Transportation Systems that provides ITS technical support, strategic planning, research and development for its districts. All ITS project planning, implementation and operation is provided by the Caltrans districts.

4.0 ALTERNATIVES FOR FDOT ORGANIZATIONAL STRUCTURE

There are a number of alternative organizational structures for FDOT's emerging ITS Program. These may be categorized into the following three types:

- Status quo - continue deploying ITS under the existing organizational structure.
- Centralized - create a new centralized ITS Department with broad powers to coordinate all aspects of ITS implementation
- Hybrid - create a new ITS Program that is a combination of a stronger Central Office role with a corresponding ITS office in each District.

4.1 Status Quo

Currently the implementation side of the ITS program in Florida is administered primarily at the District level. The State Office of Traffic Operations provides some technical support in the way of

standards development and research. The State Office of Systems Planning is providing ITS planning and policy support.

Pros: This structure is familiar to the Department and requires the least amount of reorganization and shifting of responsibilities.

Cons: There is no clear policy direction for the program (technically, there is no "program" as defined by statute). The level of involvement and participation varies from district to district and within each district there is often no single point of contact for ITS planning, production and operation.

4.2 Centralized

There are various ways a centralized organizational structure could be developed. An example of a very strong centralized approach was reported from Virginia where all ITS projects are planned and funded from the central office of VDOT. Operations and maintenance are conducted by the VDOT districts, but with performance reporting to the VDOT central office for ITS.

Pros: This structure provides a high degree of standardization and program continuity across the state. There is a clear line of responsibility with a centralized single point of contact. Project funding priorities are consistently applied statewide.

Cons: The enabling legislation for the Florida DOT requires that the department be decentralized. Thus, this type of organizational structure would require significant, perhaps controversial, legislation. In a large state like Florida, this structure also reduces the amount of contact with and input from the local jurisdictions and stakeholders.

4.3 Hybrid

A hybrid organizational structure would take the best parts of the centralized approach with a central ITS Program Manager providing support to a district-based program. Each District would have a single point of contact for ITS planning, production, operation and maintenance.

Pros: This structure is also familiar to the Department and could be similar to that used to administer the Florida Intrastate Highway System (FIHS) program. No new legislation is required since the Central Office role will be one of support, albeit with a greater level of responsibility and coordination. The ITS Program would become a true "program" as defined by statute with goals and performance objectives.

Cons: This is a new organizational structure and there will likely be "growing pains" and "turf battles" as the ITS Program is established. New positions are required to establish both the Central Office program and the district programs. Depending on the level of the Central Office ITS Program Manager (i.e., division director level), legislative approval may be required.

5.0 RECOMMENDATIONS FOR FDOT'S ORGANIZATIONAL STRUCTURE

Each District of the Florida Department of Transportation, each county, and each city functions in a unique way. Currently, the FDOT is involved in a number of ITS activities that utilize multiple

processes. This is dependent on the institutional framework, project scope, and the jurisdictions involved. The personal relationships among FDOT staff are the greatest asset in advancing the respective program. Unfortunately, the current institutional framework does not guarantee the continued progress being realized by these relationships. Specifically, a clear ITS Program, with responsibility for the ITS deployment and management process is not recognized by the institutions and agencies with which FDOT does business.

It is recommended that an ITS Program Manager, responsible for statewide efforts be established in the Central Office. This Program Manager would report to the Assistant Secretary for Transportation Policy and would be responsible for coordinating ITS activities with the various division offices of the Central Office. The ITS Program Manager would also coordinate standards development and research, coordinate with other state government agencies such as the Florida Highway Patrol and Department of Management Services, and assist each District regarding the needs of the ITS Program.

At the District level an ITS Program Manager should be created reporting directly to a Director level office. The selection of which director this new program manager reports to is left to the discretion of each District. The important aspect of the District level ITS Program is to identify one responsible party within each District which has the authority to guide and advance the ITS Program.

Within each District, the ITS Program Manager must:

- Work with MPO and District Planning Staff to plan for and coordinate the ITS Program. This includes the identification of user services, creation and continual update of the regional architecture, and the programming of identified projects. These activities may be done in coordination with planning staff and/or via a contract.

- Coordinate with centralized program coordinator, and District peers, to minimize redundant activities.

- Identify and execute the effective procurement method which deploys the previously identified services.

- Ensure that deployment, operation, management and maintenance funding is secured to provide a reliable and effective system.

- Direct design activities regarding ITS deployment, with the assistance of production staff.

- Direct construction activities regarding ITS deployment, with the assistance of Construction Staff.

- Direct operations, management and maintenance activities, with the assistance of Maintenance Staff.

- Coordinate with other operating agencies, including transit providers, city and county staff, local law enforcement, emergency responders, and the local media.

- Determine staffing requirements to provide an effective and reliable system, including the use of contract staff.

- Ensure that the investment is maintained and managed in a manner that optimizes operations of the transportation system. This measure must be performance based and recognize that each corridor, community and region is unique and dynamic.

The concept of a single point of contact and responsible party, who has the authority to guide and/or direct the above activities (within each District), provides for the following situation:

- Provides the flexibility to use the existing institutional framework.
- Permits Districts to determine if in-house, contract, or a combination staff is necessary.
- Recognizes that Systems Deployment requires a responsible party with the authority to direct the ITS Program.
- Recognizes the global ramifications of changes, decisions and enhancements, and can balance the risk to the project and program with measures of cost and time.

The utilization of a responsible party (single point of contact) is consistent with recent and planned project level contracts being developed throughout the State. Specifically, recent FDOT contracts have strived for one responsible entity in the design and integration of ITS Projects. This realization was reached because of the level of complexity in such activities. A parallel structure would enhance the FDOT's ability to be responsive to the changes in the ITS Program and related projects. Additionally, this approach will provide time for the institution to adapt and truly mainstream ITS so that it is as common as the considerations regarding access, lighting, lane width, drainage and guardrail.

The appendix provides several organizational charts that reflect the recommended organizational structure for FDOT for implementing, managing and operating ITS. Staffing guidelines for these organizational structures were developed as part of the operations and management issue paper. The development of detailed position descriptions and lines of authority will be a very dynamic process. Therefore, the proposed organization charts are also presented as guidelines only.

Appendix