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*Tennessee Department of  
Transportation*



**SmartWay Strategic Plan**

**ANNUAL REPORT**

*December 2003*

This Report Prepared By The:

**Intelligent Transportation Systems  
Coordinating Committee**

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## 1. PREFACE

The Tennessee Department of Transportation (TDOT), recognizing a need to develop and implement an intelligent transportation systems (ITS) strategic plan, approved the organization of an ITS Coordinating Committee for the agency in January 1997. Comprised of representatives from the TDOT, the Federal Highway Administration (FHWA) and Vanderbilt University, the Committee was charged with producing a strategic plan to help guide the Department and be responsive to public and private concerns involving ITS. The initial ITS Strategic Plan was produced in June of 1998. In June of 2003, TDOT renamed its intelligent transportation system "SmartWay." This year the document is known as the "TDOT SmartWay Strategic Plan."

This document presents an update to the ITS Strategic Plan, effective December 2003. The key plan elements are listed below:

- A definition of ITS
- ITS user services relevant to the agency
- Performance measures to identify roadway segments and corridors that may need ITS applications
- TDOT's strategic priorities involving the use of ITS
- Ongoing ITS projects within the State of Tennessee
- Issues involved in making implementation of the strategic plan practical and achievable

The intent of this document is for the reader to become aware of current activities within the TDOT that involve ITS, as well as the expected direction of future development. This will enable all interested parties to coordinate their efforts towards an integrated approach for utilizing ITS statewide to:

- Improve operating efficiency
- Improve safety
- Reduce congestion
- Improve reliability
- Improve access, availability and quality of planning information

## 2. WHAT IS ITS?

Intelligent transportation systems (ITS) is a term used to represent the application of advanced information technologies and management practices to improve the safety and operation of highways and other transportation modes, such as public transit. ITS applications can take on many forms, including the use of:

1. **Vehicle detection devices** to report traffic counts, speed and travel time.
2. **Video surveillance** to monitor congested freeways and provide improved incident management capabilities.
3. **Variable message signs** to provide traffic information to motorists.
4. **Freeway service patrols** to reduce congestion by removing minor incidents in a timely fashion.
5. **Transportation management centers** to serve as a focal point for traffic management operations and communications.
6. **Incident management** to detect, verify and respond to incidents in an efficient manner and manage traffic conditions around the incident site.
7. **Traffic control during construction** to provide traffic information to motorists traveling through construction sites.
8. **Information services** to facilitate the communication of data from ITS devices to a central location and the distribution of transportation information to motorists and other interested parties before and during trip making.

These system applications are typically delivered through ITS enabling technologies such as fiber optics, digital transmission, remote and central computers, the Internet, advanced video cameras, geographic information systems (GIS), and global positioning systems. This information is also delivered through many other means, including in-vehicle navigation, personal digital assistants (PDA's) and cellular telephones.

### 3. ITS USER SERVICES

User services document how ITS should perform from the user's perspective. There are currently thirty-three user services that have been jointly defined by the U.S. Department of Transportation and ITS America as being part of the National Architecture. The newest user service was added in the past year, "Disaster Response and Evacuation." Version 5.0 of the National Architecture was released in 2003. Each user service has varying degrees of relevance to TDOT. To identify those user services of importance to the agency, three criteria were used:

1. *Does it apply to controlled access highways?*
2. *Does it involve integration of traffic control for freeway/surface street interfaces in urban areas?*
3. *Does it involve activities within the scope of TDOT's mission?*

Using these criteria, priority user services were identified. As the user services are broadly defined, more specific ITS functions were defined for each user service. These were then classified according to whether TDOT's role would be as the lead, support, or a combination of lead and support agency.

Table 1 provides a listing of TDOT ITS user service priorities. These priorities became the focal point of ensuing strategic planning activities. Under a lead role, TDOT would be expected to provide financial, technical, project management and operational control. Under the support role, TDOT would only provide financial and/or technical guidance to the project. A more detailed description of each priority user service is included as **Attachment A**.

ITS applications related to interstate roadways apply to the entire Tennessee system (rural and urban). In urban areas, TDOT's role includes both freeways and select partial access controlled roadways. The issue of integrating traffic control strategies between TDOT and local agencies for freeway/surface street interfaces is presently concentrated on the four major urban areas within the State: Chattanooga, Knoxville, Memphis, and Nashville. Note that the scope for integrating ITS into the agency's activities can and will cover non-freeway areas such as truck permitting, personal traveler security and ride-matching.

<b>Table 1. TDOT ITS User Service Priorities</b>		
<b>User Service Bundle</b>	<b>User Services<sup>(1)</sup></b>	<b>TDOT Role</b>
<b>1. Travel and Traffic Management</b>		
	<b>Pre-Trip Travel Information</b>	
	• Broadcast information	Lead/Support
	• Interactive information	Lead/Support
	<b>En-Route Driver Information</b>	
	• Highway advisory radio	Lead
	• Welcome centers and rest areas	Lead
	• Private traveler information providers	Lead/Support
	• Dynamic message signs	Lead
	<b>Ride Matching and Reservations</b>	Support
	<b>Traffic Control</b>	
	• Network/probe detection/surveillance	Lead
	• Freeway ramp control	Lead
	• Surface street control	Support
	• Freeway/surface street integration	Lead/Support
	<b>Incident Management</b>	
	• Freeway service patrols	Lead
	• Hazardous material incident response	Support
	• Regional incident management teams	Lead
	<b>Travel Demand Management</b>	
	• High occupancy vehicle (HOV) lanes	Lead
• Parking systems	Support	
<b>Highway-Rail Intersection (HRI)</b>		
• Detection and notification	Lead	
<b>2. Public Transportation Management</b>		
	<b>Public Transportation Management</b>	Support
	<b>En-Route Transit Information</b>	Support
	<b>Personalized Public Transit</b>	Support

<sup>(1)</sup> User service bundles from the National ITS Architecture (Version 5.0) are shown as bold text in grey rows and user services are indicated by bold text (in non-grey cells).

<b>Table 1. TDOT ITS User Service Priorities (continued)</b>		
<b>User Service Bundle</b>	<b>User Services<sup>(1)</sup></b>	<b>TDOT Role</b>
<b>3. Electronic Payment (N/A in Tennessee)</b>		
<b>4. Commercial Vehicle Operations</b>		
	<b>Electronic Clearance</b>	
	• Automated Credentials Exchange	Support
	• Weigh-In-Motion	Lead/Support
	<b>Administrative Processes</b>	Lead/Support
<b>5. Emergency Management</b>		
	<b>Emergency Vehicle Management</b>	Support
	<b>Emergency Notification and Personal Security</b>	Support
	<b>Disaster Response and Evacuation</b>	
	• Disaster Response	Support
	• Evacuation Coordination	Support
<b>6. Advanced Vehicle Safety Systems (N/A in Tennessee)</b>		
<b>7. Information Management</b>		
	<b>Archived Data Function</b>	
	• RTMC Data Mart	Lead
	• Virtual Data Warehouse	Lead
<b>8. Maintenance and Construction Management</b>		
	<b>Maintenance &amp; Construction Operations</b>	
	• Roadway Management	Lead
	• Work Zone Management and Safety	Lead
	• Roadway Maintenance Conditions and Work Plan Dissemination Function	Lead/Support

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<sup>(1)</sup> User service bundles from the National ITS Architecture (Version 5.0) are shown as bold text in grey rows.

## 4. PERFORMANCE MEASUREMENT

In order to gauge where each user service may be applicable in the identified transportation system, performance measures were defined. These performance measures evaluate various aspects of service quality and are represented by:

1. **Traffic volume** as a weighting factor among problem corridors.
2. **Traffic volume per lane** as a uniform measure of roadway utilization and level of service (LOS).

Using data resident in TDOT's databases, these measures were calculated and plotted for each controlled access segment in the State of Tennessee. Maps displaying the performance measures appear in Figures 1 and 2; both an overall system map and magnified insets for the metropolitan areas of Chattanooga, Knoxville, Memphis and Nashville are presented. As expected, the major metropolitan areas exhibit the majority of the performance problems, with certain segments and corridors showing particularly significant effects.

In addition to providing a "benchmark" of existing transportation service quality across the TDOT system, the performance maps are also being used in identifying ITS solutions for problem sites. As has been the case in this version of the SmartWay Strategic Plan, the performance maps will continue to be updated on an annual basis, both to monitor progress and to identify emerging problem areas that warrant attention. Future versions of this plan will map performance measures with the extent of operational ITS projects in Tennessee (such as the I-65 corridor project in Nashville).

Figure 1. Average Daily Traffic Volumes (Source: 2003 TRIMS Data)

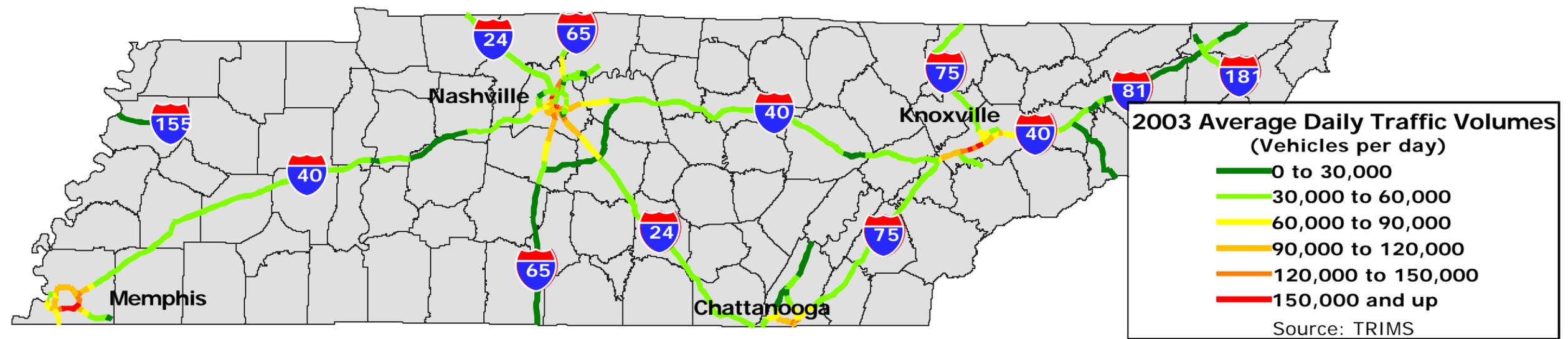
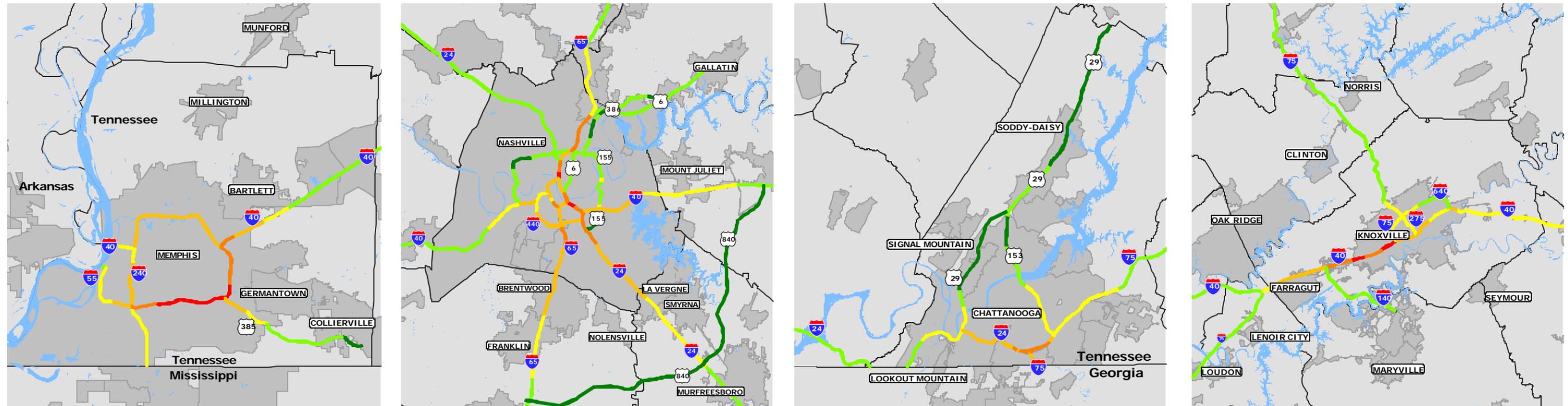
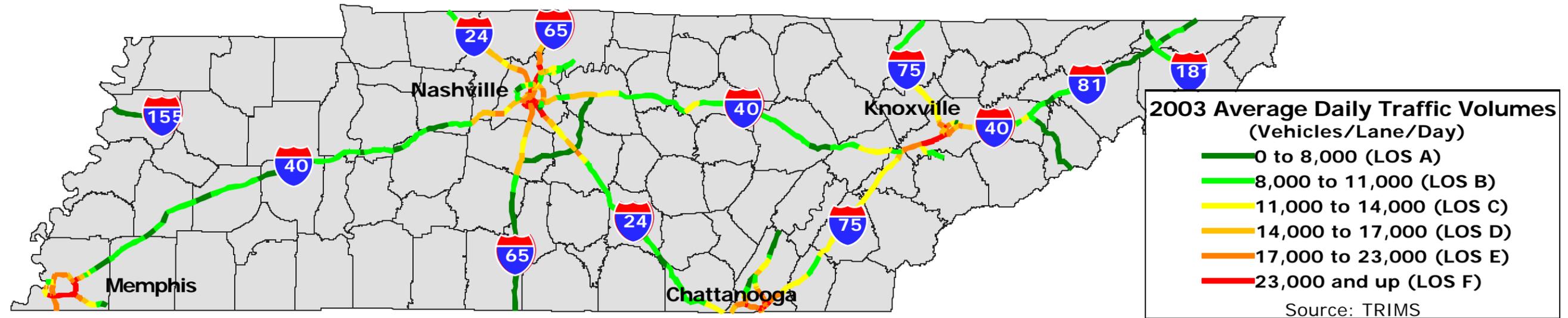
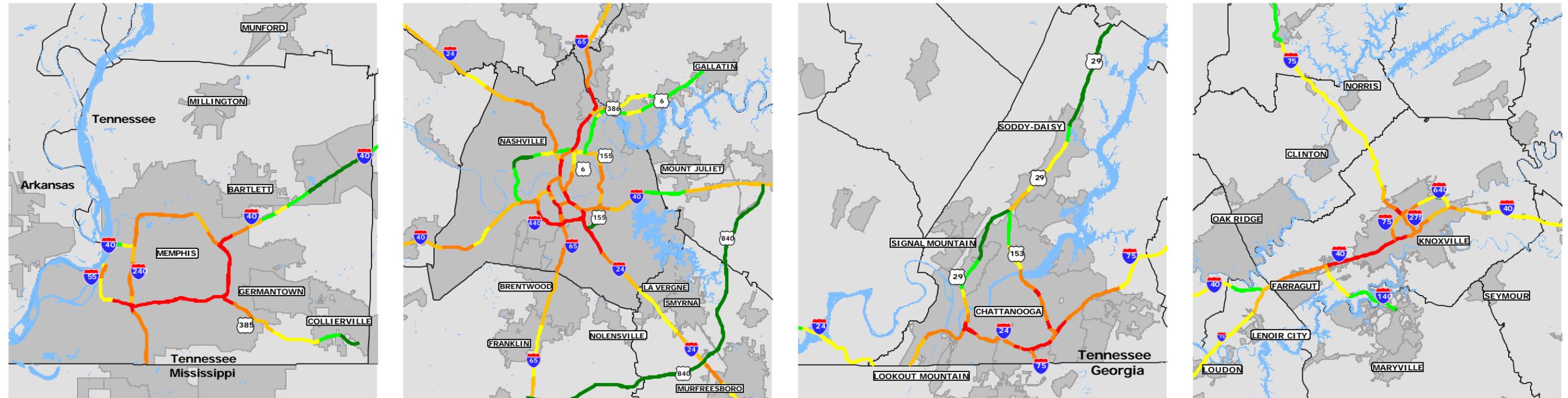


Figure 2. Daily Traffic Volumes Per Lane (Source: 2003 TRIMS Data)



Note:

- 1) Level of service (LOS) is a letter designation that describes a range of operating conditions on a particular type of facility. LOS 'A' represents the best range of conditions and LOS 'F' the worst.
- 2) The level of service (LOS) shown on this exhibit provides only an indication of the general LOS range in which the roadway operates. Actual LOS will depend on geometric, traffic and operational characteristics of the section of roadway.

## 5. PREVIOUS YEAR PROGRESS REPORT

Table 2 provides a summary of past year activities to document the progress made relative to the ITS strategic priorities established in the 2002 plan. As with most planning efforts, the strategic priorities evolved with the expanded knowledge and experience of the ITS Coordinating Committee.

<b>Table 2. Summary of Past Year Activities</b>	
<b><u>2002 Strategic Priority</u></b>	<b><u>Accomplishments</u></b>
1. Freeway service patrol program and region-wide interagency incident management teams operational	<ul style="list-style-type: none"> <li>• Continued operation of the HELP patrols in Chattanooga, Knoxville, Memphis and Nashville.</li> <li>• Produced the first HELP program "annual report"</li> </ul>
2. Application of ITS technologies at welcome centers and rest areas	<ul style="list-style-type: none"> <li>• Evaluated visibility of DTN units at welcome centers and rest areas (and adjusted accordingly).</li> <li>• Began exploring new information delivery mechanisms, prototype kiosk in Smith County rest area operational by end of 2003.</li> </ul>
3. Targeted implementation of ITS elements in selected locations to support data collection and field test deployment strategies	<ul style="list-style-type: none"> <li>• Began construction of Knoxville freeway incident management project. Began design in Memphis.</li> <li>• Began design of remote Closed Circuit Television (CCTV) camera system in Chattanooga.</li> <li>• Completed construction of freeway incident management project (I-65) in Nashville. Initiated operations at SmartWay RTMC in Nashville.</li> <li>• Completed design and construction of overhead cross street signs on overpasses in Knoxville and Nashville.</li> </ul>
4. ITS Regional Architecture development	<ul style="list-style-type: none"> <li>• Completed ITS regional architecture in Chattanooga.</li> <li>• Initiated ITS regional architecture development in Jackson.</li> <li>• Memphis ITS regional architecture adopted by the Memphis Metropolitan Planning Organization (MPO).</li> <li>• Nashville Area ITS stakeholder group meeting quarterly to update ITS activities.</li> </ul>

**Table 2. Summary of Past Year Activities**

<b><u>2002 Strategic Priority</u></b>	<b><u>Accomplishments</u></b>
5. Training program for ITS Stakeholders	<ul style="list-style-type: none"> <li>• Offered several ITS training courses throughout Tennessee to meet specific needs.</li> <li>• FY 2003 ITS Service Plan developed and implemented.</li> <li>• Hosted 511 peer-to-peer information exchange workshop.</li> </ul>
6. Information system infrastructure established to support ITS needs	<ul style="list-style-type: none"> <li>• Completed prototype development of statewide traffic and safety information website based on Internet geographic information systems (GIS).</li> <li>• Initiated deployment of statewide traffic and safety information website at TDOT.</li> </ul>
7. ITS public outreach program established	<ul style="list-style-type: none"> <li>• Conducted several ITS presentations to public agencies, media, professional organizations and schools.</li> <li>• Added webpages for Nashville travel information: CCTV images and dynamic message sign (DMS) messages.</li> </ul>
8. Integrating TDOT/MPO plans and programs	<ul style="list-style-type: none"> <li>• Drafted website with current ITS project status statewide.</li> <li>• Nashville regional architecture update coordinated with the Long Range Transportation Plan (LRTP) process.</li> </ul>
9. Ongoing ITS strategic planning initiative	<ul style="list-style-type: none"> <li>• Held monthly ITS Coordinating Committee meetings to monitor and assess ITS implementation activities.</li> <li>• Produced an update to the ITS Strategic Plan (SmartWay Strategic Plan).</li> <li>• Assisted with implementation of TDOT organizational activities related to ITS.</li> </ul>
10. Statewide roadside weather station system	<ul style="list-style-type: none"> <li>• Upgraded software on existing roadside weather stations and installed new stations at approximately 24 additional sites.</li> </ul>

<b>Table 2. Summary of Past Year Activities</b>	
<b><u>2002 Strategic Priority</u></b>	<b><u>Accomplishments</u></b>
11. Promote the need for adequate resources to sustain and grow the ITS program	<ul style="list-style-type: none"><li>• Used procedures for monitoring costs of ITS programs for planning purposes.</li><li>• Received federal funding to perform a 511 travel information service feasibility study and implementation plan.</li></ul>
12. ITS applications for other modes of transportation	<ul style="list-style-type: none"><li>• Identified and assessed rural ITS strategies applicable to transit.</li><li>• Identified current rural transit related ITS applications in Tennessee.</li><li>• Developed case study for rural transit ITS.</li></ul>

## 6. AGENCY ITS STRATEGIC PRIORITIES

A primary product of the strategic planning process is the list of strategic priorities that serves as the short-term (three-year) focus of the agency in building an ITS program. A consensus process was used to develop and update this list, based on input from multiple stakeholders. In this year's update, the basis for evaluating each priority remained: 1) considerable potential for the initiative to become an ongoing ITS activity within the agency, 2) successful implementation of the initiative could be accomplished in a three-year time period, and 3) the implementation process was feasible in terms of resource commitment and institutional cooperation.

Figure 3 displays the revised December 2003 list of strategic priorities. Each priority is described in terms of what can be expected to be accomplished within a three-year period. The second column in Figure 3 ("Past Accomplishments") presents the accomplishments from October 2002 through December 2003. This is due to the switch from reporting ITS goals and accomplishments by fiscal year to calendar year. The column titled "Current Year" presents planned activities for January 2004 through December 2004. The column titled "Future Direction" presents activities expected to occur in the second and third years of the plan.

As a "road map" for reaching this destination, milestones for each strategic priority are also shown. These represent the tasks that should be accomplished in order for completion of the priority to stay on schedule. The agency is using the current year milestones as the basis for assigning personnel and other resources to ITS initiatives over the coming year.

There are several changes to the list of strategic priorities for 2004. These changes are summarized below:

- The "Statewide roadside weather station system" priority was folded into the "Information Systems" priority. This change was made since the Roadside Weather Information System (RWIS) will become a valuable source of data for emerging TDOT information systems in the next three years.
- The priority titled: "Promote the need for adequate resources to sustain and grow the ITS program" has been deleted as efforts shift to maintaining and operating the ITS program in place in Tennessee.
- "511 travel information service" has been added as a priority. Currently, a feasibility study and implementation plan is under development (federal funds were received to perform this study in July 2003) and the 511 service (a system for disseminating travel conditions accessed via the web and telephone) is expected to be operational in 2005.
- A priority titled: "Evaluate the benefits and costs of ITS projects" has been added. Now that operating data is becoming available from ITS projects in Tennessee (e.g., the transportation management center in Nashville), assessments of the benefits and costs of projects may be conducted.

Two strategic priorities are expected to become more active in the upcoming year: "Integrating TDOT/MPO plans and programs" and "ITS applications for other modes of transportation." The activity level of the "Information system infrastructure established to support ITS needs" priority is expected to remain high throughout 2004 as TDOT prepares to launch several initiatives, including 511 (targeted for 2005).

Several cities in Tennessee are in the process of developing their own ITS architectures (a standardized methodology for tracking ITS projects and transportation elements, and the connections and information exchanged between them) and implementing various ITS projects. For these reasons, it is more important than ever that TDOT coordinate with the local agencies behind these projects to ensure communication regarding upcoming projects. Maintaining close contact with local Metropolitan Planning Organizations (MPO's) is the best way to accomplish this objective.

Similarly, the priority related to transit is expected to have more activity in 2004. The ITS Coordinating Committee conducted a case study of a rural transit agency in Tennessee and the benefits realized by deploying ITS technologies. It is hoped that this case study, which includes a list of possible ITS technologies for transit and methodologies for analyzing the benefits and costs, will serve as a foundation for a case study on urban transit and development of a statewide transit ITS strategic plan in future years.

The ITS Coordinating Committee is spending significant effort in the information systems area, trying to maximize the usage of existing agency data and systems, and identifying information sources for the upcoming 511 travel information service. This service will convey real-time, geographic-specific information on road conditions (including construction and maintenance activities, weather-related road conditions, incidents and road closures) and traffic conditions throughout the state. Existing and emerging information systems must be examined to determine reliability of information and how outputs will be delivered to support 511 service and other delivery mechanisms.

Figure 3. Three Year ITS Strategic Priorities Timeline

Strategic Priority	Milestone Timeline		
	Past Year Accomplishments	Current Year Goals (Jan. '04 – Dec. '04)	Future Direction
1. Freeway service patrols and incident response initiatives	<ul style="list-style-type: none"> <li>a) Continued operation of the HELP patrols in Chattanooga, Knoxville, Memphis, and Nashville and assisted with special events</li> <li>b) Produced the first HELP program "annual report"</li> </ul>	<ul style="list-style-type: none"> <li>a) Prepare plans and cost estimates to expand HELP service (routes, headways, and/or hours of service)</li> <li>b) Prepare plans and cost estimates for equipment and training to facilitate TDOT's response to incidents statewide</li> <li>c) Explore the deployment of incident detection cameras in rural areas of Tennessee (Monteagle, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>a) Implement staged expansion of HELP patrols; add equipment and training as needed</li> <li>b) Deploy additional incident response equipment statewide and expand response training for TDOT forces in the regions, districts, and counties</li> </ul>
2. Application of ITS technologies at welcome centers and rest areas	<ul style="list-style-type: none"> <li>a) Evaluated visibility of DTN units at welcome centers and rest areas</li> <li>b) Explored expanded coverage with neighboring states</li> <li>c) Completed installation and adjustment of DTN units across the state</li> <li>d) Began exploration of new information delivery mechanisms to welcome centers and rest areas, including prototype design at Smith County welcome center</li> </ul>	<ul style="list-style-type: none"> <li>a) Design and test prototype information delivery application(s)</li> <li>b) Evaluate transferability to other welcome centers and rest areas</li> <li>c) Develop plan for delivering traffic and safety information to welcome centers and rest areas</li> </ul>	<ul style="list-style-type: none"> <li>a) Enhance applications based on need and as technology permits</li> </ul>
3. Targeted implementation of ITS elements in selected locations for freeway incident management and to support data collection and field test deployment strategies	<ul style="list-style-type: none"> <li>a) Began construction of Knoxville freeway incident management project</li> <li>b) Began design of Memphis freeway incident management project</li> <li>c) Began design of CCTV project in Chattanooga</li> <li>d) Completed construction of Nashville freeway incident management project. Initiated operations at the Smartway RTMC in Nashville</li> <li>e) Completed design and construction of overhead cross street signs in Knoxville and Nashville</li> </ul>	<ul style="list-style-type: none"> <li>a) Complete construction of freeway incident management project in Knoxville</li> <li>b) Begin construction of early phase of freeway incident management project in Memphis. Complete design of final phase of freeway incident management project in Memphis.</li> <li>c) Complete design and begin construction of CCTV project in Chattanooga</li> <li>d) Complete Phase 2 design and begin construction of Nashville freeway incident management project</li> </ul>	<ul style="list-style-type: none"> <li>a) Monitor and evaluate project performance</li> <li>b) Solicit input on quick hit opportunities</li> <li>c) Survey current technologies and uses</li> <li>d) Implement new and/or expand existing projects</li> </ul>

Figure 3. Three Year ITS Strategic Priorities Timeline (continued)

Strategic Priority	Milestone Timeline		
	Past Year Accomplishments	Current Year Goals (Jan. '04 – Dec. '04)	Future Direction
4. ITS regional architecture development	<ul style="list-style-type: none"> <li>a) Completed ITS regional architecture for Chattanooga</li> <li>b) Initiated ITS regional architecture development process in Jackson</li> <li>c) Memphis ITS regional architecture adopted by MPO</li> <li>d) ITS elements considered in several projects</li> <li>e) Nashville regional architecture stakeholders meeting quarterly to update ITS activities</li> </ul>	<ul style="list-style-type: none"> <li>a) Complete ITS regional architecture development in Knoxville and Jackson</li> <li>b) Initiate ITS architecture development in Bristol and Kingsport</li> <li>c) Submit Chattanooga ITS regional architecture to Chattanooga MPO for adoption and to FHWA for approval as "ready for use"</li> <li>d) Revise Memphis ITS regional architecture, submit to Memphis MPO for adoption and submit to FHWA for approval as "ready for use"</li> <li>e) Consider including ITS elements in future projects, such as urban interstate construction, arterial traffic control and mass transit contracts based on the ITS regional architecture</li> </ul>	<ul style="list-style-type: none"> <li>a) Assist in the development of ITS regional architecture for other cities and counties</li> <li>b) Prepare statewide ITS regional architecture that includes a plan for statewide ITS communications</li> <li>c) Consider inclusion of ITS elements into urban interstate construction, arterial traffic control and mass transit contracts based on ITS regional architecture</li> </ul>
5. Training program for ITS stakeholders	<ul style="list-style-type: none"> <li>a) Offered training courses to meet specific needs</li> <li>b) FY 2003 ITS Service Plan developed and implemented</li> <li>c) Utilized 511 Peer-to-Peer to host an information exchange workshop</li> <li>d) Held an ITS awareness workshop for TDOT staff and executive management</li> </ul>	<ul style="list-style-type: none"> <li>a) Schedule specific training courses and scanning trips as needed</li> <li>b) Develop and implement the next ITS Service Plan (FHWA, TDOT and local stakeholders) – <i>pending continuation in SAFETEA</i></li> <li>c) Hold an ITS awareness workshop for TDOT staff and executive management</li> <li>d) Hold a workshop on TMC operations</li> </ul>	<ul style="list-style-type: none"> <li>a) Implement on-going program</li> </ul>
6. Information system infrastructure established to support ITS needs	<ul style="list-style-type: none"> <li>a) Completed prototype development of statewide traffic and safety information website based on Internet GIS</li> <li>b) Completed training of Region 3 construction and maintenance personnel on traffic and safety information system</li> <li>c) Initiated deployment of statewide traffic and safety information website at TDOT</li> </ul>	<ul style="list-style-type: none"> <li>a) Coordinate development of I-65 corridor project information with TDOT Internet GIS and data sharing activities</li> <li>b) Release statewide traffic and safety information website to the public</li> <li>c) Add road closures, flooded road conditions, incidents, and roadside weather stations to traffic and safety information system</li> <li>d) Explore other means (text messages, emails) for delivering information to the public</li> <li>e) Identify additional data for inclusion in traffic and safety information system</li> </ul>	<ul style="list-style-type: none"> <li>a) Evaluate responsiveness of system to meet customer needs</li> <li>b) Extend information system applications to other areas within TDOT</li> <li>c) Consider integration of weather station data with Internet GIS statewide traffic and safety information system</li> </ul>

Figure 3. Three Year ITS Strategic Priorities Timeline (continued)

Strategic Priority	Milestone Timeline		
	Past Year Accomplishments	Current Year Goals (Jan. '04 – Dec. '04)	Future Direction
7. ITS public outreach program established	<ul style="list-style-type: none"> <li>a) Conducted several ITS presentations to public agencies, media, professional organizations and schools</li> <li>b) Numerous press releases regarding ITS distributed</li> <li>c) Added webpages for Nashville travel information: CCTV images and Dynamic Message Sign messages</li> </ul>	<ul style="list-style-type: none"> <li>a) Continue to create ITS awareness through website, press releases, and presentations</li> <li>b) Convert Web base maps to GIS</li> </ul>	<ul style="list-style-type: none"> <li>a) Continue to create ITS awareness through website, press releases, and presentations</li> <li>b) Integrate plan with TDOT Public Affairs Office (PAO)</li> </ul>
8. Integrating TDOT/MPO plans and programs	<ul style="list-style-type: none"> <li>a) Drafted website with current ITS project status statewide</li> <li>b) All TIP's and STIP reviewed to identify ITS projects</li> <li>c) ITS service plan based on MPO's concerns</li> <li>d) MPO's actively participated in ITS projects and architecture development</li> <li>e) Nashville regional architecture update coordinated with LRTP process</li> </ul>	<ul style="list-style-type: none"> <li>a) Develop program(s) for TDOT assistance -- based on MPO needs, TDOT priorities and available resources</li> <li>b) Update inventory of MPO projects and planning efforts related to ITS through review of transportation improvement program (TIP) and statewide transportation improvement program (STIP)</li> <li>c) Consult with MPO's and federal officials on ITS funding/technical assistance needs and resources</li> <li>d) Identify opportunities for joint TDOT/MPO ventures</li> <li>e) Coordinate the updating of ITS regional architectures with the long range transportation plan (LRTP) update process</li> </ul>	<ul style="list-style-type: none"> <li>a) Implement and refine programs</li> <li>b) Update inventory of MPO projects and planning efforts related to ITS</li> <li>c) Consult with MPO's and federal officials on ITS funding/technical assistance needs and resources</li> <li>d) Identify opportunities for joint TDOT/MPO ventures</li> </ul>
9. Ongoing ITS strategic planning initiative	<ul style="list-style-type: none"> <li>a) ITS Coordinating Committee met on a regular (i.e., monthly) basis</li> <li>b) Monitored and evaluated current ITS-related projects</li> <li>c) Developed and recommended potential ITS projects</li> <li>d) Assisted with implementation of TDOT organizational activities relating to ITS</li> <li>e) Acted as a resource to ELT in establishing TDOT ITS policy</li> <li>f) Coordinated ITS strategic planning with Department's overall strategic plan</li> <li>g) Produced update to the ITS Strategic Plan</li> </ul>	<ul style="list-style-type: none"> <li>a) ITS Coordinating Committee continues to operate, meeting on a regular (i.e., monthly) basis</li> <li>b) Monitor and evaluate current ITS-related projects</li> <li>c) Develop and recommend potential ITS projects</li> <li>d) Assist with implementation of TDOT organizational activities relating to ITS</li> <li>e) Act as resource to TDOT management in establishing ITS policy</li> <li>f) Coordinate ITS strategic planning with Department's overall strategic plan</li> <li>g) Produce annual Strategic Plan update report</li> </ul>	<ul style="list-style-type: none"> <li>a) ITS Strategic Planning Committee continues to operate, meeting on a regular (i.e., monthly) basis</li> <li>b) Monitor and evaluate current ITS-related projects</li> <li>c) Develop and recommend potential ITS projects</li> <li>d) Assist with implementation of TDOT organizational activities relating to ITS</li> <li>e) Act as resource to TDOT management in establishing ITS policy</li> <li>f) Coordinate ITS strategic planning with Department's overall strategic plan</li> <li>g) Produce annual Strategic Plan update report</li> </ul>

Figure 3. Three Year ITS Strategic Priorities Timeline (continued)

Strategic Priority	Milestone Timeline		
	Past Year Accomplishments	Current Year Goals (Jan. '04 – Dec. '04)	Future Direction
10. ITS applications for other modes of transportation	<ul style="list-style-type: none"> <li>a) Identified and assessed rural ITS strategies applicable to transit</li> <li>b) Identified current rural transit related ITS applications in Tennessee</li> <li>c) Developed case study for rural transit ITS, based on East Tennessee Human Resource Agency (ETHRA)</li> </ul>	<ul style="list-style-type: none"> <li>a) Identify and assess urban transit ITS strategies</li> <li>b) Identify current urban transit related ITS applications in Tennessee</li> </ul>	<ul style="list-style-type: none"> <li>a) Coordinate and integrate transit related ITS strategies with other ITS strategies</li> <li>b) Identify ITS strategies for modes other than highway and transit</li> <li>c) Develop transit ITS Strategic Plan</li> </ul>
11. 511 Travel Information Service	<ul style="list-style-type: none"> <li>a) Applied for and received federal funding to develop a plan for a statewide 511 travel information service</li> <li>b) Hosted 511 workshop to gain "lessons learned" from states with active 511 programs</li> <li>c) Initiated plan for 511 service</li> </ul>	<ul style="list-style-type: none"> <li>a) Complete development plan for 511 service. Begin implementation phase</li> </ul>	<ul style="list-style-type: none"> <li>a) Implement 511 service as appropriate in 2005</li> </ul>
12. Evaluate Benefits and Costs of ITS and Incident Management Projects	<ul style="list-style-type: none"> <li>a) This is a new initiative</li> </ul>	<ul style="list-style-type: none"> <li>a) Define potential performance measures</li> <li>b) Identify potential data sources</li> <li>c) Develop benefit-cost methodology</li> </ul>	<ul style="list-style-type: none"> <li>a) Implement benefit-cost analyses on selected ITS applications</li> </ul>

## 7. IMPLEMENTATION ISSUES

Several institutional issues that impact successful implementation of the activities proposed in the strategic plan were identified in 1998 and remain important considerations today. Foremost among these concerns are:

1. **Legislation**, which may need to be enacted for certain ITS applications to operate smoothly.
2. **Partnerships and coordination** among and between federal, state and local agencies as well as business and other private interests; this synergy enables groups to work in harmony towards meeting common objectives.
3. **Funding** at adequate levels to ensure that sufficient resources are available to invest in each strategic priority so that it can be successfully implemented, maintained and operated.
4. **TDOT staff** with dedicated responsibilities for ITS deployment.

Each strategic priority and milestone will require different combinations of legislative involvement, forming and coordinating partnerships, funding levels, and internal TDOT staffing. Recognizing the importance of these elements, each strategic priority has defined tasks that require consideration of varying implementation issues, as appropriate.

These issues will be critical to the ultimate success of TDOT's investment in ITS, and will need considerable attention as the Department moves forward with implementation, operation and maintenance.

## 8. CONCLUDING REMARKS

This document has provided an update to TDOT's ITS strategic planning efforts. Important observations are made concerning the role of ITS in the agency's plans to manage controlled-access highways and other modes in the State. Performance measures have been identified and applied to this network as a basis for determining those segments and corridors that are promising candidates for ITS applications. A list of strategic priorities has been developed, aimed at managing existing ITS projects in the State, implementing new ITS projects where warranted, and developing TDOT policies and programs that enable the agency to integrate ITS into daily operations. Important implementation considerations are also cited which require attention in order for each ITS strategic priority to succeed.

TDOT is currently involved with ITS technologies through the following applications:

- I-75 fog detection system in Bradley County
- Cumberland Gap Tunnel in Claiborne County
- Statewide truck pre-clearance program (PrePass)
- I-65 North ITS project in Nashville
- Installation of cameras to monitor traffic congestion and improve incident management capabilities in Nashville (*completed*) and Knoxville
- Traffic camera and dynamic message sign (DMS) availability through TDOT's website for the public to view current traffic conditions in Nashville
- Regional communications plan and ITS architecture in Knoxville
- Regional ITS architecture development and maintenance
- Freeway service patrols in Chattanooga, Knoxville, Memphis and Nashville
- Interstate 0.2-mile reference markers
- Overhead cross street name signs on overpasses in Chattanooga, Knoxville, Memphis and Nashville
- Providing weather and construction information at welcome centers and rest areas with a prototype Internet-based kiosk system deployed at the Smith County rest area
- Providing real-time traffic information to motorists via dynamic message signs (DMS)
- Completion of an Internet GIS traffic and safety information prototype application in Region 3, this system will be deployed statewide in 2004
- Installation and use of non-intrusive traffic detection equipment
- Roadside weather information system (RWIS) stations remotely accessed to gain information on road conditions

This strategic planning effort has also assimilated these efforts in setting the direction for future ITS activities of the Department.

Internal staffing and ITS funding are important issues that will define the ultimate success of incorporating ITS technologies into TDOT daily operations. New positions and portions of existing staff time will be required to fully complete the priorities

and milestones reported in this strategic plan. The dedication of funds to develop, deploy and maintain ITS technologies will also be necessary.

This document is anticipated to be reviewed by many different stakeholders, and its contents are intended to share TDOT's perspective on ITS, with the hope that it will promote a dialogue that can lead to the development of ITS partnerships and coordination mutually beneficial to all parties involved.

As strategic planning is an ongoing process, this document will be updated annually to keep interested parties apprised of progress made and future plans.

# ATTACHMENT A

## TDOT ITS USER SERVICE DESCRIPTIONS

## RELEVANT ITS USER SERVICES DESCRIPTIONS

The following ITS user services have been adapted from the National ITS Strategic Plan to meet the needs, goals and mission of the Tennessee Department of Transportation. Generally, all of these services are related to freeways when a distinction is needed between freeways and surface streets. Surface streets are understood to fall under the operational responsibility of local agencies.

### TRAVEL AND TRAFFIC MANAGEMENT

1. **Pre-Trip Travel Information** - *Assists travelers in making mode choices, travel time estimates, and route decisions prior to trip departure. Information is integrated from various transportation modes and presented to the user for decision making.*

A. Broadcast Information

- ❖ Information provided through broadcast media such as television, cable television and commercial radio.

B. Interactive Information

- ❖ Information provided on demand to drivers before making a trip. One form for providing interactive information is through a traveler information Web site that allows a user to obtain custom information.

**TDOT Role:**

- TDOT will assume lead and support roles in providing pre-trip information.

2. **En-Route Driver Information** - *En-route driver information provides vehicle drivers with information that will allow alternative routes to be chosen for their destination. Driver information consists of two major functions, which are (1) Driver Advisory and (2) In-vehicle Signing. The potential decrease in traffic demand on congested routes may also provide benefits in highway safety, reduced air pollution and decreased congestion.*

A. Highway Advisory Radio

- ❖ Provides highway users with information by broadcasting a message through an AM radio receiver.

B. Welcome Center and Rest Areas

- ❖ Through monitors in welcome centers and rest areas, information on weather, roadway construction and traffic conditions will be provided to motorists.

C. Private Traveler Information Providers (e.g., Smart Routes)

- ❖ These private companies obtain traffic information from public sources and from their own sources that is consolidated and provided to the traveling public through multiple communications methods.

D. Dynamic Message Signs

- ❖ Provide real-time traffic information to drivers using roadside and overhead signs on which the message can be changed.

**TDOT Role:**

- TDOT will assume the lead role in providing en-route driver information through highway advisory radio, variable message signs, and monitors at welcome centers and rest areas.
- TDOT will assume the lead role in selecting and implementing private information providers and will then assume a support role through providing available information to the providers.

**3. Ride Matching and Reservations** - *Provides travel users with information on rideshare opportunities.*

- ❖ Travelers are provided the capability to request a ride by placing a single request. Based on the traveler's request and specified itinerary, the traveler will be provided with the available ridesharing options. Real-time ride matching will be provided by instantly matching rider and driver.

**TDOT Role:**

- TDOT will assume a support role in ride matching and reservations.

**4. Traffic Control** - *Manages the movement of traffic on full access control and select partial access control facilities. Real-time traffic information from this service provides a foundation for many other user services. Provides for the adaptive control of these facilities using advanced technologies and management practices to improve traffic flow; gives preference to public safety, transit or other high occupancy vehicles; and minimizes congestion (and delay) while maximizing the movement of people and goods.*

A. Network/Probe Detection/Surveillance

- ❖ Monitors traffic flow on highways and road conditions using fixed equipment such as vehicle detectors or vehicle probes.

B. Freeway Ramp Control

- ❖ Uses traffic signals on freeway ramps to control the volume of traffic accessing the freeway.

C. Surface Street Traffic Control

- ❖ Provides for the adaptive control of surface street traffic signal systems through advanced technologies and management practices.

D. Freeway/Surface Street Integration

- ❖ Provides for the coordination of traffic control strategies between freeways and surface streets by TDOT and local transportation agencies. Surface street traffic signal timings are coordinated with freeway management and ramp metering activities.

**TDOT Role:**

- TDOT will assume lead and support roles for traffic control services placed on freeways and integration of freeway/surface street traffic control systems.
- TDOT will assume a support role for installation/operation of traffic signals, variable message signs and traffic detection equipment placed on surface streets.

**5. Incident Management** - *Helps public and private organizations identify incidents, formulate response actions, and support initiation and ongoing coordination of those response actions to minimize an incident's effects on traffic.*

A. Freeway Service Patrols

- ❖ Provide a roving patrol (HELP) that traverses a fixed route in order to identify roadway incidents and provide assistance when an incident is identified. Safety will be increased and traffic congestion will be decreased by the freeway service patrols.

B. Hazardous Materials Incident Response

- ❖ Provides enhanced response to incidents that involve hazardous materials. The objective is to insure that the appropriate response is provided and that the incident is remediated as efficiently as possible.

C. Regional Incident Management Teams

- ❖ Provide a forum for discussion and coordination of incident management procedures. Multiple agencies are required to work together in a coordinated fashion to efficiently handle many roadway incidents.

**TDOT Role:**

- TDOT will assume the lead roles in operating freeway service patrols on full access control and select partial access control roadways, and in facilitating regional incident management teams in urban areas.
- TDOT will assume a support role in hazardous materials incident response.

**6. Travel Demand Management** - *Generates and communicates management and control strategies that will support and facilitate the implementation of TDM (travel demand management) programs, policies and regulations. The two primary functions are (1) increasing the efficiency of the transportation system and (2) providing a wide variety of mobility options.*

A. High Occupancy Vehicle (HOV) Lanes

- ❖ Build HOV lanes and operate efficiently to reduce the number of single occupant vehicles using the roadways.

B. Parking Systems

- ❖ Provide more information to drivers about available parking to allow them to make better decisions on where to park.

**TDOT Role:**

- TDOT will assume a lead role in implementing and operating HOV lanes.
- TDOT will assume a support role in development and operation of parking systems.

**7. Highway-Rail Intersections** - *Improve the safety at highway-rail at-grade crossings through advanced detection, notification, traffic control coordination and preemption systems that will result in reduced accident frequency and severity.*

A. Detection and Notification

- ❖ Detect an entrapped or otherwise immobilized vehicle within the highway-rail intersection (HRI) and provide an immediate notification to the wayside interface equipment, traffic management and the approaching train.

**TDOT Role:**

- TDOT will assume a lead role in the coordination between highway and rail crossing traffic control coordination and preemption.

**PUBLIC TRANSPORTATION MANAGEMENT**

**1. Public Transportation Management** - *Automates operations, planning, and management functions of public transit systems.*

- ❖ Provides computer analysis of real-time vehicle and facility status to improve transit operations and maintenance.
- ❖ Integrating this service with traffic control services can help maintain transportation schedules and assure transfer connections in intermodal transportation.

**TDOT Role:**

- TDOT will assume a support role in public transportation management.

**2. En-Route Transit Information** - *Provides travelers with real-time transit information allowing travel alternatives to be chosen once the traveler is en-route.*

- ❖ This capability integrates information from different transit modes and presents it to travelers for decision-making.
- ❖ The type of information provided will include notification of imminent transit arrival, identification of route of arriving transit vehicle, schedule, actual service provided and next available vehicle based on actual operating conditions.

**TDOT Role:**

- TDOT will assume a support role in providing en-route transit information.

**3. Personalized Public Transit** - *Provides flexibly-routed transit vehicles (paratransit) to offer more convenient customer service.*

- ❖ Small publicly or privately-owned vehicles provide on-demand routing to pickup passengers who have requested service and deliver them to their destinations. Riders can specify special equipment or handling requirements when making a reservation.

**TDOT Role:**

- TDOT will assume a support role in public transportation management.

**COMMERCIAL VEHICLE OPERATIONS**

**1. Electronic Clearance** - *Facilitates weigh-station and border clearance to minimize stops.*

A. Automated Credentials Exchange

- ❖ Enables transponder-equipped trucks and buses to have their safety status, credentials and weight checked at mainline speeds.
- ❖ Vehicles that are safe, legal and have no outstanding out-of-service citations will be allowed to pass the inspection/weigh facility without delay

B. Weigh-In-Motion

- ❖ Provides the ability to measure commercial vehicle weight without requiring the vehicle to stop thus reducing commercial vehicle delays.

**TDOT Role:**

- TDOT will assume a support role in automated credentials exchange and a lead/support role in weigh-in-motion technology deployment in Tennessee.

**2. Administrative Processes** - *Provides electronic application and purchase of credentials (e.g., vehicle size and weight permits), automated mileage and fuel reporting, and auditing..*

- ❖ Provides the commercial carrier with the capability to electronically apply for and purchase annual and temporary permits via computer link, reducing burdensome paperwork and processing time for both the State agencies and the motor carriers.

**TDOT Role:**

- TDOT will assume both lead and support roles in commercial vehicle administrative processes.

**EMERGENCY MANAGEMENT**

**1. Emergency Vehicle Management** - *Reduces the time it takes for emergency vehicles to respond to an incident.*

- ❖ Provides public safety agencies with fleet management capabilities, route guidance, and signal priority and/or preemption for emergency vehicles.

**TDOT Role:**

- TDOT will assume a support role in emergency vehicle management.

**2. Emergency Notification and Personal Security** - *Provides for faster notification when travelers are involved in an incident.*

- ❖ Emergency notification and personal security encompasses technology that supports driver distress signal transmission, including information such as automated collision notification, medical services required, property damage only notification, vehicle location, vehicle identification, distress signal acknowledgment, as well as a means to cancel the distress signal.

**TDOT Role:**

- TDOT will assume a support role in emergency notification and personal security.

**3. Disaster Response and Evacuation** – *Provides a Disaster Response and Evacuation (DRE) function for effective, coordinated management of the surface transportation*

*system during all types of disasters including natural disasters (hurricanes, earthquakes, floods, severe winter storms, tsunamis, etc.), terrorist acts, and other catastrophic events (e.g., nuclear power plant disasters).*

A. Disaster Response

- ❖ Provides support for planning, transportation management, resource sharing, and information coordination between transportation agencies and principal responding agencies (emergency management, public safety, and other allied agencies) to improve the effectiveness and safety of a disaster response.

B. Evacuation Coordination

- ❖ Efficiently manages an evacuation and provides evacuees with the information they need during evacuation and subsequent reentry to the evacuated area.

**TDOT Role:**

- TDOT will assume a support role in disaster response, assisting the Tennessee Emergency Management Agency (TEMA).
- TDOT will assume a support role in evacuation coordination.

**INFORMATION MANAGEMENT**

**1. Archived Data Function** - *Controls the archiving and distribution of ITS data. Provides the historical data archive repository and controls the archiving functionality. The functionality includes: 1) managing data integrity; 2) acquiring historical data; 3) permanently archiving data; 4) producing data products for the planning, safety, operations, and research communities; and 5) providing the common interface to all ITS users.*

A. RTMC Data Mart

- ❖ Provide a focused archive that houses data collected from the freeway system by the RTMC. Key considerations are basic data quality, data privacy, and meta data management. The archive will provide general query and report access to data users.

B. Virtual Data Warehouse

- ❖ Provide broad access to multimodal, multidimensional data from varied data sources using enhanced interoperability between physically distributed ITS archives that are each locally managed. Requests for data are parsed by the local archive and dynamically translated to requests to remote archives that relay the data necessary to satisfy the request.

**TDOT Role:**

- TDOT will assume a lead role in implementing and maintaining a data mart that includes incident and traffic data collected for freeways that are managed.
- TDOT will also assume a lead role in development of protocols for creating a regional virtual data warehouse.
- TDOT will assume a support role in the development of data marts by local agencies and in integrating these data marts into the virtual data warehouse.

**MAINTENANCE AND CONSTRUCTION MANAGEMENT**

1. **Maintenance and Construction Operations** - *Maintenance and Construction Operation (MCO) functions support monitoring, operating, maintaining, improving and managing the physical condition of roadways, the associated infrastructure equipment, and the required resources. MCO utilizes ITS systems and processes to support interchange of information among diverse groups of users, to improve efficiency and effectiveness of operational, maintenance, and managerial activities.*

A. Roadway Management

- ❖ Monitor traffic, road surface, and environmental conditions and forecast traffic and road surface conditions to support management of routine and hazardous road condition remediation and to communicate changes in conditions.

B. Work Zone Management and Safety

- ❖ Provide support for the effectiveness, safety, and efficiency of roadway operations during all work zone activities.

C. Roadway Maintenance Conditions and Work Plan Dissemination Function

- ❖ Support intra- and inter-agency coordination of work plans. This function includes interactions among Traffic Managers, Supervisors, Planning Agencies, Public Safety Organizations, and Information Service Providers.

**TDOT Role:**

- TDOT will assume a lead role in the roadway management function via the roadway weather information system (RWIS) program.
- TDOT will assume a lead role in the work zone management and safety function.
- TDOT will assume a lead and support role in the roadway maintenance conditions and work plan dissemination function.