Executive Summary

The *Revised Strategic Deployment Plan* updates material developed as part of the Kansas Statewide ITS Plan. The Kansas Statewide ITS Plan was completed in March 2000 and this revision builds on those elements of the Strategic Plan portion of that document. The objective of the Strategic Deployment Plan (Y2002) is to develop implementation strategies; operational strategies; revise the statewide architecture; and detail near-, medium-, and long-term deployment plans for the Kansas ITS Program (KITS Program).

Strategies are presented for the Kansas Department of Transportation (KDOT) to consider when deploying ITS. Implementation strategies are grouped into three areas: funding strategies, implementation strategies, and operational strategies. Operations and Management strategies are presented for the ITS Unit and KDOT. The strategies address issues concerning the continued operation and maintenance of the ITS program within the State and are intended to provide guidance in continuing the success of the ITS Unit's work to promote ITS within and outside of KDOT. The Implementation and Operations and Management are presented to assist KDOT realize its goal of increasing the scope of ITS applications in the State, while simultaneously increasing the level of benefits resulting from existing ITS deployments.

A deployment plan is presented for near-term projects, medium-term projects and long-term ideas that form the KITS Program. KDOT's current ITS projects and initiatives provide a solid basis for the KITS program. The KITS program should adopt the continuance and completion of the current initiatives as a primary emphasis. Beyond the completion of the current projects, however, several near-term initiatives are recommended. The results of moving forward with the recommendations set forth in this document will be a KITS program that will allow the ITS Unit to achieve its vision for a statewide ITS program.

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1.0 Introduction

■ 1.1 Objective

The objective of the Strategic Deployment Plan (Y2002) is to develop implementation strategies; statewide architecture; and near-, medium-, and long-term deployment plans for the Kansas ITS Program (KITS Program). Figure 1.1 shows a flowchart of the process that has been used to develop the Statewide ITS Plan for Kansas over the past three years. Sections 1.0 through 4.0 of the Statewide Plan were completed in March 2000. A section for Commercial Vehicle Operations Business Plan was developed during the Statewide Plan development and has been included as Section 5.0 of the Plan. The colored oval represents the need for periodic revisions to the Statewide Plan, and the results of such revisions for the year 2002 are contained in this report. The Strategic Plan is the first step of deployment of ITS technologies in Kansas.

Figure 1.1 Kansas Statewide ITS Plan Methodology
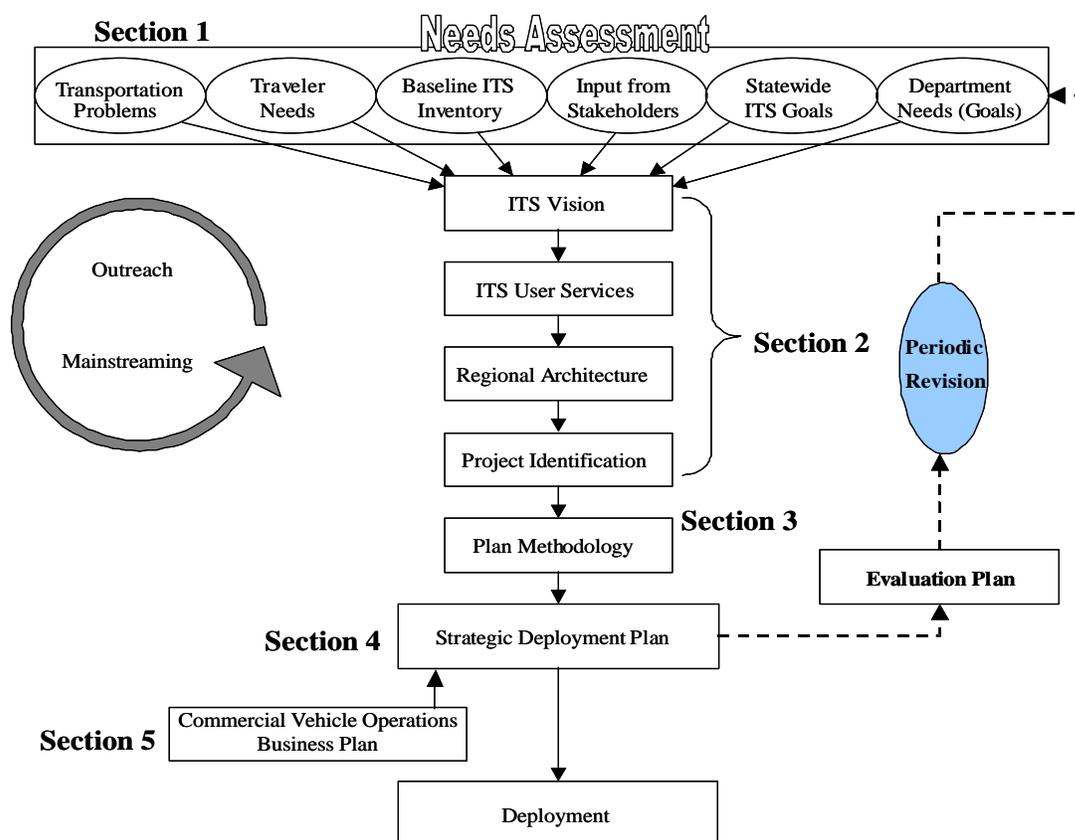
This Strategic Deployment Plan (Y2002) presents recommended strategies for the ITS Unit and KITS Steering Committee, a statewide architecture, and potential phasing plan for ITS projects in Kansas. The different types of strategies discussed include funding strategies, implementation strategies, and operational strategies. The recommendations given in this document builds on the KITS Evaluation Report (April 2002) and the Statewide ITS Plan (June 2000).

2.0 Deployment Strategies

This section recommends a number of different strategies for the Kansas Department of Transportation (KDOT) ITS Unit to consider when deploying ITS. The strategies are grouped into the following three areas: 1) funding strategies, 2) implementation strategies, and 3) operational strategies.

■ 2.1 Funding Strategies

As with any crosscutting program, funding for ITS projects will come from a wide variety of sources. The major sources of funding will be federal-aid funds, state funds, ITS Set-Aside funds, and research funds. Figure 2.1 shows how the funding and project implementation process occurs in Kansas. Note the important role of the Kansas Statewide ITS Plan in the process. Mainstreaming and ITS Set-Aside funds are two ways to initiate ITS-related projects into the process. Another way to get ITS projects started is through research programs, such as K-TRAN, ENTERPRISE, TMC or other pooled fund studies. Strategies for using these funding sources are given below.

Federal Aid and State Highway Funds

Whenever possible, the cost of roadside ITS elements should be included in budgets for highway maintenance and reconstruction projects. Potential roadside elements include conduit, vehicle detectors, changeable message signs, closed circuit television (CCTV) cameras, and road weather information systems (RWIS) stations. Ideally, the process to consider ITS elements in a project design would occur in the discovery phase of a project. This will allow for ITS enhancements to be funded as part of typical design projects and mainstreamed into the design process. ITS applications that are not be eligible for federal aid or state highway funding may be funded with ITS Set-Aside funds, research funds, or public/private partnerships.

ITS Set-Aside Funds

The goal of the ITS Set-Aside program is to further promote ITS within the state by funding studies, research, technology developments, and technology applications. ITS Set-Aside funds are managed by the ITS Unit. Uses of the funding is open to projects that apply to technology, such as advanced sensor, computer, electronics, and communications and management strategies to increase the safety and efficiency of the transportation

system.

Figure 2.1   Funding and Implementation Process for KDOT Projects
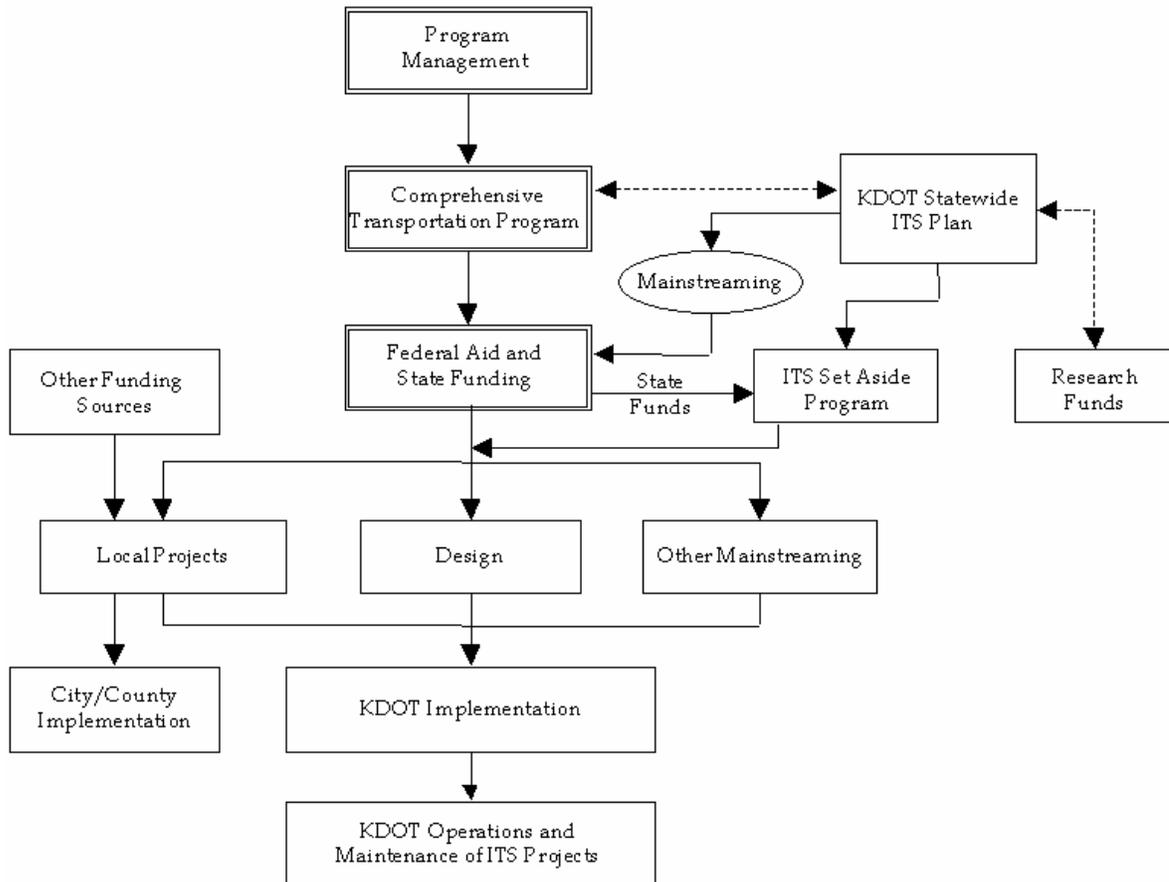
The funding was first available to state and local agencies in FY 2001 (state only projects were available starting in FY 2000). The ITS Set-Aside funds are allocated to various projects based on the following criteria:

- Project support and ability to integrate;

- Telecommunication considerations;

- Design risks;

- Factors of success;

- Project evaluation;

- Benefits;

- Funding benefits;

- Local funding match (FY 2001 and beyond); and

- Cost effectiveness.

The project selection and fund allocation are determined by the ITS Unit and KITS Steering Committee. It should be noted that projects funded through the ITS Set-Aside program are still required to go through the 883 process. ITS Set-Aside funding can be maximized by seeking the alternative funding sources first, and by leveraging the funds to obtain matches from federal sources, local sources, and other areas within KDOT.

Research Funds

Research is an effective method for funding new deployments, especially pilot projects or operational tests. Many ITS applications require changes to the way work is done. Consequently, a deployment is often preceded by an operational test or pilot project in which the application is implemented on a small scale and properly evaluated to determine its merit and to foster support. Studies of this type often do not qualify for funding through the conventional process. However, the evaluations may be funded through KDOT research programs, such as K-TRAN; or through external sources, such as the ENTERPRISE Consortium, FHWA Priorities Technologies Program, TMC, MWSWZDI, other pooled fund studies, or the ITS Set-Aside program.

Other Funding Strategies

An internal process for promoting awareness of ITS issues is a vital part of the ITS funding strategies. As referenced elsewhere in this document, mainstreaming ITS into KDOT is a process that depends heavily on the knowledge of potential applications extending beyond the ITS unit and throughout the agency. Mainstreaming is essential to maximizing the effectiveness of ITS technologies. Special funding of ITS projects through mechanisms, such as federal discretionary funds or Surface Transportation Plan Safety Funds, is appropriate and even necessary in some cases; and an effective awareness process will help to maximize the utility of the available special funding.

Budgeting of maintenance and operations expenditures is a key issue. These costs will vary widely from one program area to another, and, in some cases, from one project to another. Funding the continued maintenance and operation of each ITS project or component should be established prior to deployment. Deploying an application without continued operational funding in place could result in a net loss for the overall ITS program in terms of support within and outside KDOT. Applications that can eventually be self-supporting or else privatized should be given a high priority.

■ 2.2 Implementation Strategies

A significant consideration in the implementation of the Statewide ITS Strategic Deployment Plan is that KDOT is faced with moving a relatively new program forward. Much attention and focus have been placed on raising the awareness of ITS within and external to KDOT in the past two years. KDOT is now faced with continuing the success of the KITS program, and the strategies listed below may be considered to address challenges the agency will face. The strategies are grouped under the following headings:

- Scheduling projects;
- ITS Set-Aside funding;
- Evaluating projects;
- Integrating ITS into the planning and design process;
- ITS awareness;
- Tracking projects and maintaining the ITS architecture;
- Telecommunications infrastructure;
- State-to-state coordination; and
- Partnerships.

Scheduling Projects

Schedule projects with critical elements first. This involves identifying those projects which will provide infrastructure necessary for the deployment of further projects. It also involves evaluating the proposed phasing of the projects to identify those that are on the critical path and should be assigned high priority in their deployment.

Identify related projects and factor them into the schedule. Related projects are those that may influence or be influenced by the deployment schedule of the project being considered. Document these links in the KITS database, so the full impact of any future phasing changes can be easily assessed and evaluated.

Take advantage of stepwise deployment whenever practical. In other words, deploy new technologies at a KDOT area or sub-area levels first, then expand deployment district-wide and eventually statewide. However, in some cases, it may be necessary to forgo stepwise deployment, such as when a good funding opportunity arises, or when a construction project provides a window for efficient installation of equipment.

Carefully analyze each new project against existing and proposed projects. Seek out integration opportunities and recognize cost sharing opportunities with other projects.

ITS Set-Aside Funding

Increase the ITS Set-Aside funding awareness. The ITS Unit has indicated that there were too few applications, particularly from the rural and small urban areas. In addition, applications were made for projects that were clearly not ITS, such as the request for funding a left-turn lane in a small Kansas City. In suggesting this strategy, the ITS Unit should work at increasing the awareness of the funding mechanism, as well as to better clarify the intent of the funding program. This strategy should result in an increased number of applications submitted and improved quality of applications.

Evaluating Projects

Always evaluate new technologies (unless appropriate evaluation has already occurred, perhaps by other state DOTs). Evaluations will serve to justify future expenditures, garner support for future deployments, and enhance the credibility of the ITS program, which, in turn, will help to fuel the mainstreaming process.

Plan for the project evaluations in parallel with the overall project development. Integrating the evaluation into the project design process is a critical element in maintaining the usefulness and relevance of the evaluation.

Use evaluations as an awareness tool. An effective ITS solution will sell itself, if the potential users witness the effectiveness first hand.

Integrating ITS into the Design Process

Integrate ITS checklists into the design process. Evaluate the ITS checklists completed during the 883 process and evaluate the potential for including ITS in the projects. Schedule meetings with the project owners to discuss the application and benefits of including ITS in the project. Conduct follow-up discussions with project owners to ensure that planned ITS elements are properly integrated in the project plans as they develop over time.

Clarify the ITS Unit's roles and responsibilities for KITS stakeholders. Some stakeholders perceive the role of the ITS Unit is to be solely responsible for all issues related to ITS. The ITS Unit is unable to manage all Set-Aside projects and other ITS projects in KDOT. Other stakeholders perceive that the ITS Unit is the lead office on these projects. Ownership of ITS projects should be accepted throughout the agency. Also, it should be understood that the ITS Unit's role is to provide oversight and ensure compliance in mainstreaming.

Provide ITS Unit oversight in the discovery phase. Progress has been documented in the Evaluation Report (April 2002) for including ITS in the discovery phase of design projects. The ITS Unit must foster this early inclusion of ITS into design projects, so that ultimately it is mainstreamed into the discovery process.

Continue to update the mainstreaming process. Develop and periodically review and revise the policies through which ITS applications are introduced into the 883 process. The identification of candidate ITS projects is key.

Develop and adopt design standards and detail sheets for roadside ITS elements as they are being incorporated into design projects. Examples of roadside ITS elements are conduit, vehicle detectors, video cameras, CMS, and RWIS stations. If possible, take advantage of standards that have already been developed in other states. Incorporate the use of ITS design standards and detail sheets in design projects whenever it is appropriate. Progress has been documented through the KC Scout project and the following details of ITS field devices now exist:

- HAR sign with beacon detail;
- HAR transmitter section;
- Typical device layout;
- Induction loop configuration and designation;
- Loop cutting details;
- Pre-formed circular pull box details;
- Splice vault details;
- Controller assembly cabinets and typical base;
- Typical RTMS installation;
- Bridge attachment detail;
- Field power connection diagrams;
- Field power supply assembly;
- CMS overhead sign truss;
- CMS, overhead sign truss, ground-mounted footing;
- CMS, overhead sign truss, median-mounted footing details;
- CMS structural steel, butterfly sign;
- RTMS pole details; and
- CCTV camera pole details.

ITS Awareness and Training

Develop a continuing process of education for KDOT personnel. Separate plans may be necessary for upper management, middle management, and field personnel. Each of these groups has a valuable perspective on KDOT's responsibilities and operations. Diverse participation will maximize the effectiveness of the processes through which potential applications are identified.

Involve the media with publicly visible projects (e.g., work zone traffic control applications or web-based traveler information dissemination). Good press will help to generate public support, but perhaps more importantly, it is an effective and efficient means of educating all levels of KDOT personnel.

Obtain buy-in from the KITS Steering Committee on important decisions relating to ITS. As noted in the Evaluation Report, the KITS Steering Committee has been empowered with significant responsibilities in terms of project selection and overall direction of the KITS program. Involving the KITS Steering Committee in ITS decisions has helped develop ITS champions and spread awareness of ITS projects throughout KDOT.

Find funding opportunities for training and outreach activities. A reduction in service plan funding has introduced a challenge to KDOT in finding either funding or creative ways to increase awareness of ITS industry happenings. In past years, KDOT has been able to capitalize on service plan funding to send representatives on scanning tours and arrange training classes. Without this funding source, alternative methods to accomplish this will need to be investigated.

Tracking Projects and Using the ITS Architecture

Evaluate how future projects fit into the Statewide ITS Architecture. For projects not complying with the architecture, explore reasons for non-compliance or suggest changes to projects to provide conformance or consider updates to the architecture, when justified.

Establish a schedule for periodically reviewing and updating the ITS Architecture. Maintaining the architecture will better allow the efficient incorporation of new technologies and projects, and will better ensure the relevance of the architecture.

Conform to ITS communications standards. Research each project to ensure that the appropriate standards are considered during the design and implementation process. This evaluation should include a comparison with federal standards, as well as informal and local standards, such as the K-Tag transponder.

Outsource for ITS expertise as needed. ITS expertise within KDOT is slowly being developed through exposure, training, and strategic hiring. However, in the short-term, KDOT might need to rely on consultants or peer-to-peer programs to provide this expertise. As noted in the Evaluation Report, KDOT has done an excellent job of training within and developing expertise in many areas of advanced technologies.

Telecommunications Infrastructure

Make efficient use of the fiber resources. The DTI-provided bandwidth, conduit, and dark optical fiber (or optical fiber backbone) will provide the majority of the telecommunications infrastructure KDOT needs to implement its urban ITS projects.

When the rural ITS projects will be implemented, the DTI-provided optical fiber backbone will already be installed.

Become experts on ownership of the fiber backbone. In December 2001, DTI filed Chapter 11 bankruptcy. KDOT has amended its agreement with DTI and has obtained ownership of the fiber optic infrastructure. This includes multiple conduits, dark fiber optic strands, regeneration building space, and handholes along approximately 600 miles of highways in Kansas. KDOT is also now responsible for relocation of the conduit on the right-of-way as required. The ITS Unit has worked closely with DTI on this project and now must adjust to the new ownership, operation, and maintenance issues associated with the fiber.

Make efficient use of the 800 MHz and six GHz radio networks. Another telecommunications resource is the KDOT 800 MHz radio and associated six GHz microwave backbone. This combined system was completed in June 2002. A dedicated data channel is needed to make efficient use of the 800 MHz system.

Interconnect the fiber network with the microwave network, where feasible. There are two locations (Oakley and Salina), where the optical fiber backbone and six GHz microwave are physically close enough to one another that interconnection is practical technically and financially. It is in these locations that there may be some co-efficiency of the two networks. Each network could interface with the other and serve as an extension or a backup to the other.

Expand the optical fiber backbone throughout Kansas. The optical fiber backbone will provide the high bandwidth and/or high-speed telecommunications pipeline. Unfortunately, most counties in Kansas are not near the optical fiber backbone. Once the backbone is constructed, it will be important to extend that backbone, whether by laying more optical fiber or installing high bandwidth wireless systems.

State-to-State and State-to-Local Coordination

Learn what other state and local agencies are doing before deploying ITS applications. For instance, contact other agencies to see if they have already established design standards or detail sheets for a particular ITS application.

Encourage the establishment of multi-state working groups. Use these working groups to facilitate coordination on projects requiring multi-state involvement (e.g., KC Scout and High Plains Coalition projects).

Partnerships

Take necessary steps to ensure successful public/private partnerships. In cooperative projects involving entities external to KDOT (public or private), care should be given to ensure that all participants have a vested interest in the successful completion of the

project. Participants should make a formal commitment to the project before substantial work is undertaken. Informal agreements may allow participants to withdraw easily causing the project to terminate prematurely.

Clearly define the roles and responsibilities of each partner. Public/private partnerships should be a cooperative effort with clear division of responsibility between public and private sectors for each aspect of the operation. Project costs and revenues should be shared.

3.0 ITS Operations and Management Strategies

Increasing the number of ITS projects and deployments is only one-half of the picture when it comes to creating a successful ITS program. An equal effort must be put forth in operational strategies, such as maintaining the efficiency of deployed components, promoting the efficient use of ITS applications, operating the system, and maintaining conformity with the longer-term ITS vision. Failure to incorporate these operational strategies can result in the ineffective deployment of ITS, redundant systems with unnecessary costs, and limited opportunities for interoperability.

While operating the system is not new for transportation agencies, it has often been broadly applied to cover all day-to-day activities. With ITS programs and projects, the operation of the systems becomes an issue that did not exist with the traditional highway and bridge projects. "Operations" has evolved into a term focusing on managing the existing transportation system in order to maximize the performance under dynamic conditions, often through the enhanced capabilities of ITS.

The strategies presented in this section are intended to provide guidance in continuing the success of the ITS Unit's work to promote ITS within and outside of KDOT. The strategies address issues concerning the continued operation and maintenance of the ITS program within the State. The primary function of these strategies is to help KDOT realize its goal of increasing the scope of ITS applications in the State, while simultaneously increasing the level of benefits resulting from existing ITS deployments. A second function served by this set of management strategies is to facilitate the continued updating, and, thus, relevance of the Statewide ITS Strategic Plan and ITS Architecture. The following recommendations represent the suggested operational strategies for KDOT.

ITS Unit Strategies:

- ***Continue to maintain and enhance the KITS database.*** The KITS database provides a tool for tracking ITS projects and the deployment of ITS infrastructure in the State. Its use over the past two years has proven useful when tracking progress of ITS in the State. It is imperative that improvements be made to the database, so that it remains a viable tool for tracking ITS within the agency. Currently, the KITS database is maintained by the ITS Unit.

- ***Continue to strengthen the role of the ITS Steering Committee.*** The authority represented by the members of the committee is an important asset. Involving the committee in the decision-making process will foster a sense of importance in the

members, encouraging consistent participation. This forum should be used to garner support from decision-makers.

- ***Continually perform assessment of ITS Unit activities to internally track progress and provide planning data.*** Performing periodic performance reviews are a useful tool for tracking progress and comparing performance over time. The ITS Unit should prepare a quarterly progress report. This report should contain quantitative and qualitative information that may be used for performance tracking and long-term planning.

- ***Evaluate ITS deployments and disseminate findings.*** Document and distribute benefits information in the case of successful deployments. For less successful deployments, document the project lessons learned so future projects can avoid the identified pitfalls.

- ***Update the Kansas Statewide ITS Architecture.*** Periodically revisit the statewide architecture and assess its ongoing ability to provide suitable guidance. On January 8, 2001, a Notice of Final Rulemaking was issued implementing the requirements of section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21). The section required federally funded ITS projects to conform to the National ITS Architecture. However, it recognized that not all elements of the National Architecture may be applicable for every state, region, or major metropolitan area; thus, "conformance" with the National ITS Architecture is interpreted to mean the use of the National Architecture to develop a regional architecture, and the subsequent adherence of all ITS projects to that regional ITS architecture.

- ***Periodically update the Statewide ITS Plan.*** The Statewide ITS Plan is intended to be a living document that is periodically updated. Given the pace at which technology changes in the ITS arena, this is the only way to ensure the continued relevance of the document.

KDOT Strategies:

- ***Inventory ITS components as they are deployed in the State.*** As projects are completed, document the infrastructure deployed and its location. This will allow for the tracking of deployment progress, and will provide the improved ability to identify equipment and cost sharing opportunities as additional projects are planned. The KITS database provides a tool for performing this inventory; however, some ITS elements, particularly communication infrastructure, need to be tracked with greater detail than provided by the database. Wireless coverage maps and GIS tracking of telecommunication infrastructure would prove useful tools. These inventory efforts also involve the identification of staff with specialized skills that may be used as resources.

- ***Develop a focus on operations and management.*** KDOT should develop ITS strategies so that operations and management ideas are included in such areas as the Long-

Range Plan, internal to the division of operations for technology based positions, and in receiving dedicated funding for technology enhancements. This idea of an operations focus is critical as ITS is deployed and expanded.

- ***Hire additional staff trained to operate, administer, manage, and provide support for ITS field devices and the optical fiber backbone.*** KDOT now owns the fiber network originally built by DTI. With DTI's business situation unknown at the present time, maintenance and operation issues associated with the fiber and conduit need to be addressed. This is an example of how KDOT will need to institutionalize the operation of ITS elements within the agency and address issues associated with its operation and maintenance. Currently, KDOT is planning to outsource the necessary functions in maintaining ITS elements. However, as technology advances and is further deployed along the roadways, KDOT will need additional staff trained specifically to support these technologies.

- ***Provide training for staff who will be involved with ITS deployment and operation.*** Identify areas where specialized skills need to be enhanced in order to deploy particular ITS technologies. Encourage staff to attend training and educational sessions in order to gain necessary skills/knowledge. Cross-train staff on multiple systems, where applicable, to provide technology coverage in the event of staff changes. In the long term, technology is converging. KDOT should consider establishing a cross-functional technology organization. Currently, each technology specialty (computers, networking, radio, ITS, etc.) operates separately from each other, and some stop at District boundaries. As technologies continue to converge, a group of people cross-trained in all of the deployed technologies could run the integrated systems, instead of the highly specialized functions they now perform.

- ***Encourage interagency coordination.*** Support the coordination and cooperation between agencies involved in the deployment of ITS. Form interagency project committees and more permanent working groups, whenever appropriate. The ITS Unit may serve as a liaison between groups to support coordination.

- ***Encourage interstate coordination.*** Review the list of appropriate contacts in bordering states identified in other sections of this document. Update this list, when appropriate, to provide a resource for agencies seeking to develop multi-state coordination. Encourage agencies to research other states' ITS activities when considering deployments, and investigate interoperability potential.

ITS Unit and KDOT Strategies:

- ***Increase public and agency awareness of ITS projects through outreach campaigns.*** Promote ITS internally within KDOT through the continued use of seminars, training, and newsletters. Encourage press coverage of high-profile ITS project openings to increase the public's awareness/support of ITS.

- ***Periodically review proposed ITS projects to identify potential cost sharing opportunities and minimize unnecessary system redundancies.*** Proposed projects should be compared with other proposed projects and existing deployments to identify situations that may allow system integration and cost sharing. The KITS database provides a useful tool for performing this review.

- ***Periodically review proposed ITS projects to identify potential data sharing opportunities.*** Identify opportunities for sharing data among various agencies and stakeholders. Revisit existing projects to identify opportunities to use archived data for planning purposes. The increased data use will increase the usefulness of the ITS deployment.

4.0 KITS Architecture

The National ITS Architecture provides a common framework for planning, defining, and integrating intelligent transportation systems. A regional architecture serves the same function as the National ITS Architecture. Using the National Architecture as a model, the regional architecture can be described as a tool that "…provides a common structure for the design and integration of intelligent transportation systems. It is not a system design nor is it a design concept. What it does is define the framework around which multiple design approaches can be developed, each one specifically tailored to meet the individual needs of the user, while maintaining the benefits of a common architecture…"

The National ITS Architecture is comprised of two architectures referred to as the physical and logical. The physical architecture piece of the National Architecture deals with the interaction of real-world elements, such as an agency center, a traveler, roadside equipment, or a vehicle. Conversely, the logical architecture defines the processes which carry out different ITS functions by establishing the data being exchanged and the form that data will take. Both the logical and physical architectures serve as mechanisms to describe the interaction of various elements in the architecture, and are beneficial in different ways. A physical architecture is easier to comprehend, since it deals with tangible and more widely understood transportation elements, such as a vehicle, equipment, a roadway, or dispatch center; and establishes how those elements can be connected to form a system. The logical architecture deals with processes and functions typically hidden from view, but required to perform some action, such as a database query.

The KITS Architecture is essentially a high-level physical architecture. The KITS Architecture may have different meanings to a wide array of stakeholders, especially when discussed within a statewide context. U.S. DOT has significant guidance on what is required to adequately document regional and project level architectures. The statewide architecture presented here is a revision to the architecture first developed as part of the Kansas Statewide ITS Plan (June 2000). The architecture is a dynamic tool for the agency's use and as such should be maintained and revised at regular intervals.

◼ 4.1 Status of ITS Architecture Initiatives

Several ITS Architecture initiatives have been completed, or are in the process of being completed in the state of Kansas. The following provides a brief description of various ITS Architecture related projects:

Kansas City Area

The Kansas City Metropolitan Region are developing a Regional ITS Architecture through the use of a Tier 2 workshop led by the National ITS Architecture Team in Kansas City. The Mid-America Regional Council, the regional metropolitan planning organization (MPO), maintains the current database.

Wichita Area

The Wichita Region are developing a Regional ITS Architecture through the use of a Tier 2 workshop led by the National ITS Architecture Team in Wichita. KDOT participated in the Tier 2 workshop, and the city of Wichita MPO maintains the architecture.

Kansas CVISN Program Plan

The Kansas CVISN Program Plan for Commercial Vehicle Information Systems and Networks (CVISN) was completed in June 2000. The report includes the definition of several projects associated with Level 1 CVISN deployment in Kansas, including a high-level physical architecture. However, the physical architecture does not directly map to the National ITS Architecture, and did not use the U.S. DOT-endorsed database-mapping tool (i.e., Turbo Architecture). CVISN activities are led by the KDOT Bureau of Traffic Engineering. CVISN team members include the Kansas Department of Transportation, Kansas Department of Revenue, Kansas Highway Patrol, Kansas Motor Carriers Association, Kansas Turnpike Authority, Kansas Corporation Commission, Division of Information Systems and Communications, and the Information Network of Kansas.

■ **4.2 High-Level Physical Architecture (Sausage Diagram)**

Figure 4.1 illustrates the Statewide High-Level Physical Architecture. Systems have been categorized into two deployment status categories: 1) existing and/or under design, and 2) future.

Figure 4.1 Statewide High-Level Physical Architecture
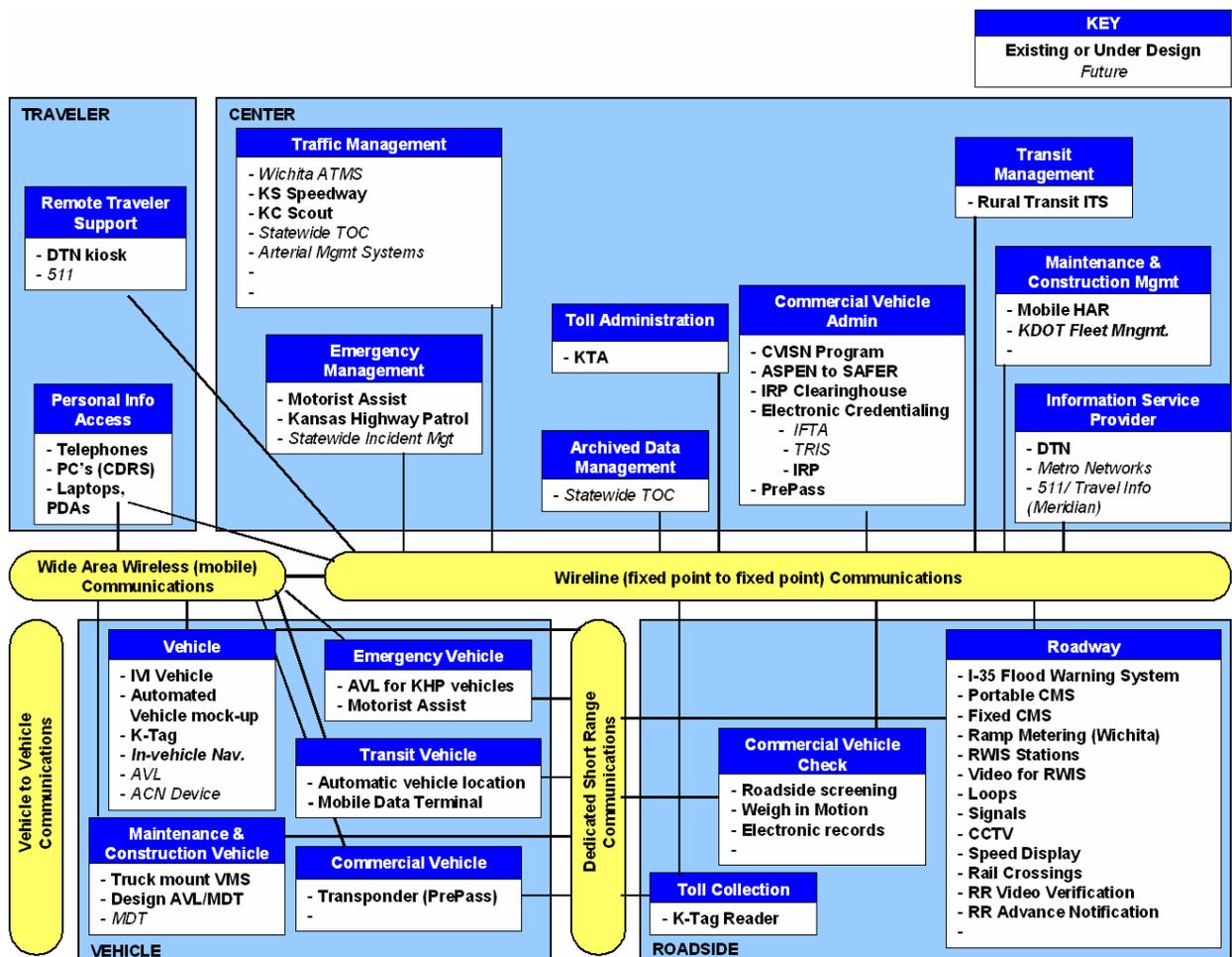
5.0 Deployment Plan

KDOT's current ITS projects and initiatives provide a solid basis for the KITS program. Although many of the current initiatives have been implemented as stand-alone deployments, the technologies deployed are consistent with the short-term high-priority projects identified in the first version of the Statewide ITS Plan. Therefore, *the KITS program should adopt the continuance and completion of the current initiatives as a primary emphasis* – finishing what has been started.

Beyond the completion of the current projects, however, several near-term initiatives are recommended to move KDOT past the situation of deploying isolated, stand-alone systems, and begin to deploy and operate ITS in a coordinated and integrated manner on a statewide basis. In order to meet the objective of developing an integrated and coordinated KITS Program, the following near-term initiatives are recommended to integrate current deployments and provide a solid foundation for a Statewide KITS program:

- **Statewide Traffic Operations Center** – A statewide traffic operations center (TOC) would greatly enhance the integration and interoperability of the numerous existing deployments and ongoing initiatives. This "center" would not necessarily require a physical location, but instead, it is likely that the TOC would be developed as a distributed or virtual center collecting and disseminating information from ITS deployments throughout the State. The first priority in establishing a statewide operations center would be linking with existing traffic operations centers – KC Scout (Kansas City), Wichita's ATMS, and commercial vehicle operations – and integrating data from the network of RWIS weather stations. The data warehousing (data archiving) functions of the statewide TOC would serve as a critical enabling infrastructure for other near-term initiatives, including Incident Management, Advanced Travel Information Services, Corridor, and Homeland Security Initiatives.

- **Advanced Travel Information Services** – This travel information service would provide a single access point and consistent format for travel information across the State. National initiatives have established a goal to develop a 511 system for "the timely establishment of a national 511 travel information service that is sustainable and provides value to users." These initiatives are underway and will eventually integrate this technology nationwide. In Kansas, a 511 program would provide services that would rely on data collected by the statewide TOC to provide traffic conditions data outside of the caller's own region. Information sources would include programs such as the Construction Detour Reporting System (CDRS) and the Road Condition Reporting System (RCRS). This information would be provided to the users of the system through changeable message signs, kiosks, internet and 511.

- **Other Emerging Areas** – KDOT is committed to expanding existing ITS programs in the area of advanced freeway management, automatic vehicle locations/ mobile data terminals communications, and commercial vehicle operations. Each of these areas have begun projects and programs that will be expanded in the near future.

It is important to develop proposed deployment and phasing plans for projects. Specific projects are identified several ways, most significantly, the short-term projects have been identified through two sources: 1) updating the initial listing of projects for the Statewide ITS Plan, and 2) by conducting a thorough review of projects contained in the 10-year Comprehensive Transportation Program. A review of the CTP projects where a possible ITS application could be included have been identified and are shown in Table 4.1. These projects will be investigated in the discovery phase of the project for possible ITS elements to be added to the scope. Projects are also identified through the ITS Set-Aside project applications. The Statewide ITS Plan (June 2000) contained a listing of near-term project priorities. These projects are shown in Table 4.2 with the revised status of the project. These projects are still considered near-term priorities (1 to 5 year horizon) for KDOT. Other projects shown in Tables 4.3 and 4.4 are listed as medium-term (six to 10 years) and long-term (more than 10 years) projects in the KITS program. KDOT will reassess these schedules as funding becomes available for these projects and technologies advance. A map is contained in Appendix A that shows current and proposed ITS projects throughout the state.

**Table 4.1   Projects in the Comprehensive Transportation Program with
Potential ITS Applications (through FY2009)**

KITS #	Project Name	Status
	• The following projects are candidates for installation of CCTV cameras at existing RWIS sites:	
	– 54-87 K-6398-01, FY 2003 Sedgwick Co.	Letting 1/2003
	– 81-85 K-7398-01, FY 2004 Saline Co.	Letting 10/2003
	• The following list of projects should consider adding conduit along the highway Right of Way for future communications:	
	– 54-87 K-6398-01, FY 2003 Sedgwick Co.	Letting 1/2003
	– 81-85 K-7398-01, FY 2004 Saline Co.	Letting 10/2003
	– 54-48 K-8245-01, FY 2004 Kingman Co.	N/A
	– 54-48 K-8244-02, FY 2004 Kingman Co.	N/A
	– 54-76 K-8243-02, FY 2004 Pratt Co.	N/A
	– 59-23 K-7888-01, FY 2006 Douglas Co.	Letting 4/2006
	– 54-48 K-8244-01, FY 2008 Kingman Co.	Letting 2/2008
	– 61-78 K-8252-01, FY 2009 Reno Co.	Letting 2/2009
	– 61-59 K-8253-01, FY 2009 McPherson Co.	Letting 2/2009
	• The following projects shall consider the expansion of the Kansas City Scout ATMS System. This shall include CMS, Vehicle Detection Systems (VDS), CCTV Cameras, Communications System and Software Integration.	
	– 70-105 K-4890-02, FY 2003 Wyandotte Co.	Letting 9/2002
	– 35-105 K-6391-01, FY 2004 Wyandotte Co.	Letting 12/2003
	– 635-105 K-6371-01, FY 2005 Wyandotte Co.	Letting 9/2004
	– 435-105 K-8427-01, FY 2005 Wyandotte Co.	Letting 1/2005
	– 25-105 K-8248-01, FY 2006 Wyandotte Co.	Letting 2/2006
	– 435-46 K-8262-01, FY 2008 Johnson Co.	Letting 11/2007
	– 69-46 K-8251-02, FY 2008 Johnson Co.	Letting 10/2007
	– 69-46 K-8251-01, FY 2008 Johnson Co.	N/A
	– 35-46 K-8261-01, FY 2008 Johnson Co.	Letting 9/2007
	– 435-46 K-7451-01, FY 2008 Johnson Co.	Letting 11/2007
	• The following projects should consider the installation of Changeable Message Signs within the Right of Way to provide Travel Information to the Public:	
	– 70-89 K-6358-01, FY 2002 Shawnee Co.	Letting 1/2002
	– 81-85 K-7398-01, FY 2004 Saline Co.	Letting 10/2003
	– 183-26 K-8240-01, FY 2004 Ellis Co.	Letting 3/2004
	– 70-31 K-8255-01, FY 2005 Geary Co.	Letting 3/2005
	– 59-23 K-7888-01, FY 2006 Douglas Co.	Letting 4/2006
	• The following projects shall consider the expansion of the Wichita ATMS System. This shall include CMS, VDS, CCTV Cameras, Communications System, Signal Coordination and Software Integration.	
	– 54-87 K-8235-01, FY 2005 Sedgwick Co.	N/A
	– 254-87 K-8234-01, FY 2005 Sedgwick Co.	N/A
	– 135-87 K-7332-01, FY 2007 Sedgwick Co.	Letting 2/2007

Table 4.2. Near-Term Deployment Projects (One to Five Years)

KITS #	Project Name	Status
1501-0	CMS on I-70, District 3	Complete
1502-0	Kiosk-Based Travel Information System, Phase I Evaluation	Complete
1503-0	Travel/Tourism Information Web Site	Complete
3003-0	IRP Clearinghouse Participation	Complete
3004-0	Electronic Screening Site Evaluations (PrePass)	Complete
1202-0	Automated Anti-/De-icing System on Bridge in Garden City	Complete
2103-0	Kansas Speedway ITS	Complete
1001-0	Statewide Mayday System Development Plan	Complete
4006-0	Statewide Cellular Coverage Map	Complete
1501-1	CMS on I-70, District 2	In Progress
1502-1	Kiosk-Based Travel Information System, Phase II Statewide	In Progress
3001-0	Electronic Credentialing (Renewal Processing) for KDOR	In Progress
3015-0	Integrated Access to CVO Information/Resources	In Progress
2101-0	Wichita Advanced Traffic Management System (ATMS)	In Progress
2102-0	Ramp Metering on US-54 (Kellogg Blvd.)	In Progress
1400-0	Implement an AVL/MDT system for transit in DSNWK	In Progress
1400-1	Implement a Computer Aided Dispatch System in DSNWK	In Progress
1401-0	Implement an AVL/MDT system for transit in Reno County	In Progress
1401-1	Implement a Computer Aided Dispatch System in Reno County	In Progress
3005-0	Electronic Heavy Vehicle Use Tax (HVUT) Reporting	On Hold
1100-0	Install AVL and MDTs in KDOT winter maintenance fleet, Phase I, District 6	On Hold

Table 4.2.   Near-Term Deployment Projects (One to Five Years) (continued)

KITS #	Project Name	Status
1100-1	Expand AVL and MDT Statewide	On Hold
1102-0	Install AVL in KDOT paint trucks	On Hold
1200-0	Integration of Weather Sensors on Maintenance Vehicles with RWIS, Phase I	On Hold
4004-0	Conversion of 800 MHz radio system from conventional to trunked	On Hold
4005-0	Implementation of a mobile data channel	On Hold
1001-1	Statewide Mayday/ACN Response System	On Hold
1001-2	Mayday/ACN Service Provider Registration System	On Hold
1103-0	Install Infrared Radar on Snowplows in a test District	
1504-0	Deploy CMS or CCTV at trouble spots throughout Kansas	
1500-0	Statewide Operations Center, Phase I (Study)	
4001-0	Last mile connection to District Offices	
4002-0	Last mile connection to the Area Offices	
4007-0	GIS database of KDOT telecommunications infrastructure	

Table 4.3   Medium-Term Deployment Projects (Six to 10 years)

KITS #	Project Name	Status
1502-2	Kiosk-Based Travel Information System, Phase III	
1502-3	Kiosk-Based Travel Information System, Phase IV	
1501-2	HAR on I-70 west of Goodland and east of Salina	
3012-0	Streamline Property Tax and Insurance Verifications	
3014-0	Integrated Access to CVO Information/ Resources	
1101-0	Snow Route Design Optimization Software	
1200-1	Integration of Weather Sensors on Maintenance Vehicles with RWIS (Phase II)	
1500-1	Statewide Operations Center, Phase II	
1505-0	Agricultural Harvesting and Migration Information Services	

Table 4.4   Long-Term Deployment Ideas (More than 10 years)

KITS #	Project Name	Status
2300-0	Installing Cameras on the Inside of Rural Transit Vehicles	
2104-0	Implementing Condition-based Variable Speed Limit Signs	

6.0 Conclusion

This report contains recommendations for the KITS Program. It is a revision to a strategic plan generated during the development of the Kansas Statewide ITS Plan (June 2000). KDOT is committed to having its KITS Program remain dynamic with tools that monitor and track the progress of ITS in Kansas. The results of moving forward with the recommendations set forth in this document will be a KITS program that will allow the ITS Unit to achieve its vision for a statewide ITS program.

Appendix A: Statewide Map of ITS Projects and Programs

Appendix B: Acronyms

ACN	Automatic Collision Notification
ATMS	Advanced Transportation Management Center
CCTV	Closed circuit television
CDRS	Construction Detour Reporting System
CMS	Changeable Message Sign
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operations
DOT	Department of Transportation
DSNWK	Development Services of Northwest Kansas
DTI	Digital Teleport, Incorporated
DTN	Data Transmission Network
FHWA	Federal Highway Administration
FY	Fiscal year
GIS	Geographic Information System
HAR	Highway Advisory Radio
IFTA	International Fuel Tax Agreement
IRP	International Registration Plan
ITS	Intelligent Transportation Systems
KC	Kansas City
KDOT	Kansas Department of Transportation
KITS	Kansas ITS Program
MPO	Metropolitan Planning Organization
MWSWZDI	Midwest Smart Work Zone Deployment Initiative
RCRS	Road Condition Reporting System
RR	Railroad
RTMS	Remote Traffic Microwave Sensor
RWIS	Road Weather Information System
TEA-21	Transportation Equity Act for the 21st Century
TMC	Transportation Management Center, a pooled fund study
TOC	Traffic Operations Center
TRIS	Truck Routing Information System
VDS	Vehicle Detection System