EXECUTIVE SUMMARY

STRATEGIC DEPLOYMENT PLAN

INTELLIGENT TRANSPORTATION SYSTEM (ITS)

Early Deployment Study
Kansas City Metropolitan Bi-State Area

March 1996

Deployment Phases for Freeway Management System

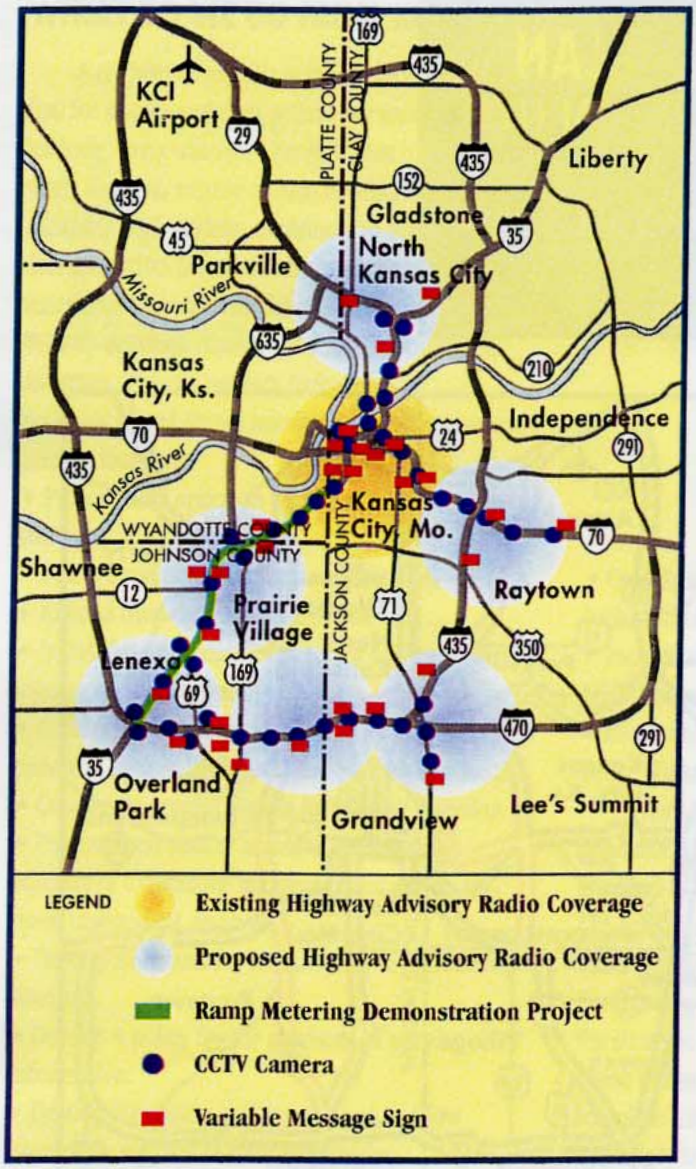
STRATEGIC DEPLOYMENT PLAN

The United States has one of the most extensive and best transportation systems in the world. Nevertheless, increasing vehicle miles of travel have resulted in increased congestion and decreased mobility in many urban areas. The increasing demand for transportation comes at a time when there are limited opportunities to build more roadway lanes — development physically constrains the addition of lanes, limited highway funding is available, and environmental considerations often suggest that other alternatives be explored.

To address increasing congestion and increasing demand without building additional facilities, and to better utilize the existing facilities, more and more urban areas are turning to advanced technologies. Computer, communications and process control technologies are used to improve the efficiency and safety of the transportation system. These advanced technologies are components of an Intelligent Transportation System (ITS).

Recognizing the importance of these systems, the U.S. Department of Transportation has identified ITS as a national priority. Early deployment studies are being conducted in the 75 largest urban areas, and Intelligent Transportation Infrastructure is targeted for implementation within the next ten years in these metropolitan areas.

The purpose of the Intelligent Transportation System (ITS) Early Deployment Study for the bi-state Kansas City metropolitan area was to identify the ITS user services appropriate for Kansas City and develop a Strategic Deployment Plan based on these user services.



SHORT TERM PRIORITIES

Freeway Management System		PHASE 1	2	3	4	ALL
Annual Benefits (in Millions)[1]		$13.5	$4.7	$5.6	$1.3	$25.2
Kansas		$4.7	$1.3	$1.3	$0.7	$7.9
Missouri		$8.9	$3.5	$4.4	$0.6	$17.3
Annualized Cost (in Millions)		$4.7	$2.5	$4.4	$5.7	$17.4
Kansas	Capital	$1.2	$0.6	$0.5	$1.7	$3.9
	Operating and Maintenance	$0.7	$0.4	$0.4	$1.1	$2.6
	Total	$1.9	$1.0	$0.9	$2.7	$6.5
Missouri	Capital	$1.8	$0.9	$2.0	$1.8	$6.5
	Operating and Maintenance	$1.0	$0.6	$1.5	$1.2	$4.3
	Total	$2.8	$1.5	$3.6	$2.9	$10.9
Benefit/Cost Ratio		2.9	1.9	1.3	0.2	1.4

1 Total values may not be the sum of the values shown for Kansas and Missouri due to rounding.

BENEFIT/COST RATIO FOR EACH PHASE

The Strategic Deployment Plan was developed to coordinate ITS activities in the Kansas City area and to provide a common framework for implementation.

The study focused on the freeway system, and considered the arterial and transit systems to the extent that they affect the operation of the freeway system and contribute to mobility in the metropolitan area. Kansas City has an extensive freeway system, and there are locations that experience recurring congestion, particularly I-70 east of downtown, I-35 south of and immediately north of downtown, and the south leg of I-435. Unless some action is taken, recurring congestion may be expected to increase as traffic volumes increase. Currently, much of the congestion in the urban area is related to incidents, and many issues that were identified as priorities are related to incidents. These issues include both technical issues, such as rapid identification and verification of incident location, as well as institutional issues, such as agency coordination and recognition of the goals and objectives of all the agencies at the incident site.

The highest-priority user services, based on agency rankings and the results of a survey conducted at public meetings, are:

- Incident Management.
- Traffic Control.
- Emergency Notification and Personal Security.
- Emergency Vehicle Management.

These user services address both recurring and incident-related congestion, and contribute to the prompt identification and removal of incidents.

THE TECHNICAL BLUEPRINT

The system architecture may be considered a technical blueprint for the coordination of all the ITS activities. The recommended architecture includes two central servers with an information server. This control logic will provide autonomy for the two states, yet will facilitate coordination and provide redundancy. Coordination will also be enhanced by having a single traffic operations center. The traffic operations center will be located in MHTD's new District 4 facility, although it could be located anywhere along the fiber optic backbone. With respect to data processing, the recommended architecture utilizes centralized data processing, which is the standard and proven system used in most applications across the country. The communications network is a dual

ring fiber optic backbone in a star/ring configuration, which will provide redundancy as well as capacity adequate for all anticipated components. Emergency management coordination will be based on the existing 911 dispatch system; traffic operations center personnel will contact emergency responders directly using the 911 system. The recommended architecture takes a hybrid approach to arterial signal control. Some arterial signal systems will be controlled from the traffic operations center, while others will be controlled outside the traffic operations center, for example, by cities. The final characteristic of the architecture is coordination with public transit. Public transit functions will be maintained outside the traffic operations center, although transit information will be provided in conjunction with freeway information.

FREEWAY MANAGEMENT COMPONENTS

Number of	PHASE 1	PHASE All
Miles	48	258
Vehicle Detector Stations	96	516
Closed Circuit Television Cameras	96	516
Variable Message Signs	35	79
Highway Advisory Radio Signs	22	54

THE KANSAS CITY SYSTEM

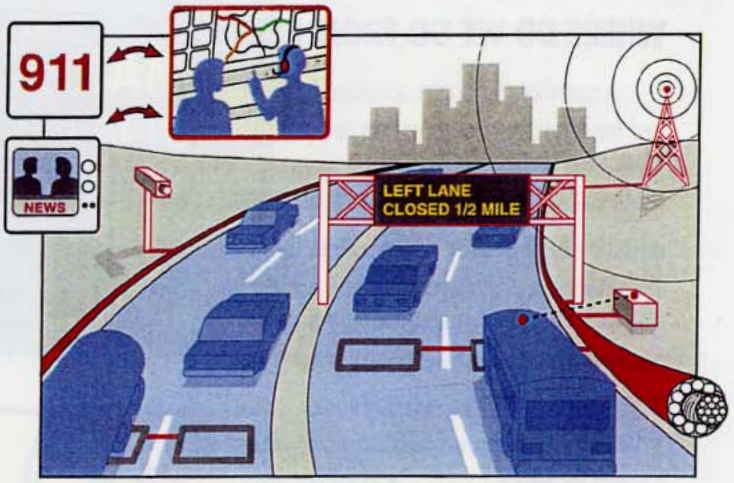
The primary focus of the Strategic Deployment Plan is a freeway management system. System components have been identified for a freeway management system that provides coverage of the entire metropolitan area. The Strategic Deployment Plan also includes a variety of technologies to enhance transit service.

The proposed freeway management system addresses roadway monitoring and incident detection, verification, and response, and includes vehicle detectors, closed circuit television cameras, highway advisory radio, variable message signs and a traffic operations center.

IS IT WORTH IT?

The costs and benefits associated with a freeway management system were calculated for four phases of deployment, as shown in the table on the previous page. The estimated annualized costs, annual benefits, and benefit cost ratios are shown for each phase. The values shown in the table reflect each state paying a percentage of the shared costs proportional to the system mileage in the state. The total capital cost for the deployment of Phase 1 is $29.1 million.

The benefit cost ratios are used to examine the return on an investment. A benefit cost ratio of 2.9 for Phase 1 indicates that for every dollar spent, the public will receive $2.9 of benefits due to reduced delay. Based on the estimated benefit cost ratios, a freeway management system is recommended on Phase 1 facilities in the short term (within 5 years) and on Phase 2 facilities in the medium term (in 5 to 10 years). A major finding of this study is that ITS is a cost effective solution in a medium-sized city, when strategically deployed on the most traveled facilities.



Freeway management system includes video monitoring, vehicle detection and motorist information.

WHAT ELSE?

Other activities identified for deployment (but not reflected in the costs shown in the table) include:

- Integration of weather information into the traffic operations center (short term).
- Ramp metering (a demonstration project on I-35 in Kansas in the short term, and for evaluation elsewhere in the medium term).
- Coordination with transit for the provision of information (medium term).
- Coordination with the provision of in-vehicle information (long term).
- Technologies to encourage alternatives to the single occupancy vehicle (long term).
- Technologies to enhance compliance with clean air mandates (long term).

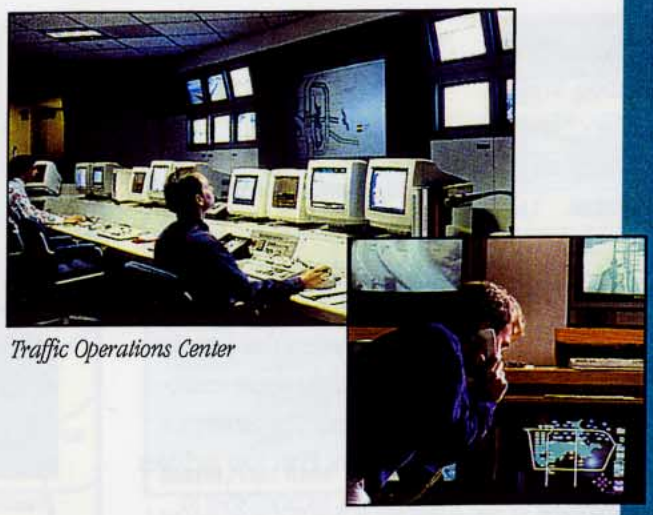
A number of ongoing activities have also been identified. These activities include coordination of arterial signal systems on freeway diversion routes, coordination with the Kansas Turnpike Authority, and coordination with emergency responders and local public works agencies.

The deployment plan also includes transit applications such as video monitoring, automated scheduling and transit information, expansion of the automatic vehicle location system and personalized public transportation.

WHERE DO WE GO FROM HERE?

A number of priority activities have been identified for implementation within two years. These include "early winners," projects that have a relatively low cost, require a short development time, are relatively high priority, contribute to the Intelligent Transportation Infrastructure, and are expected to be successful and enhance the public image of ITS. Priority activities also set the stage for future ITS activities. Priority projects include:

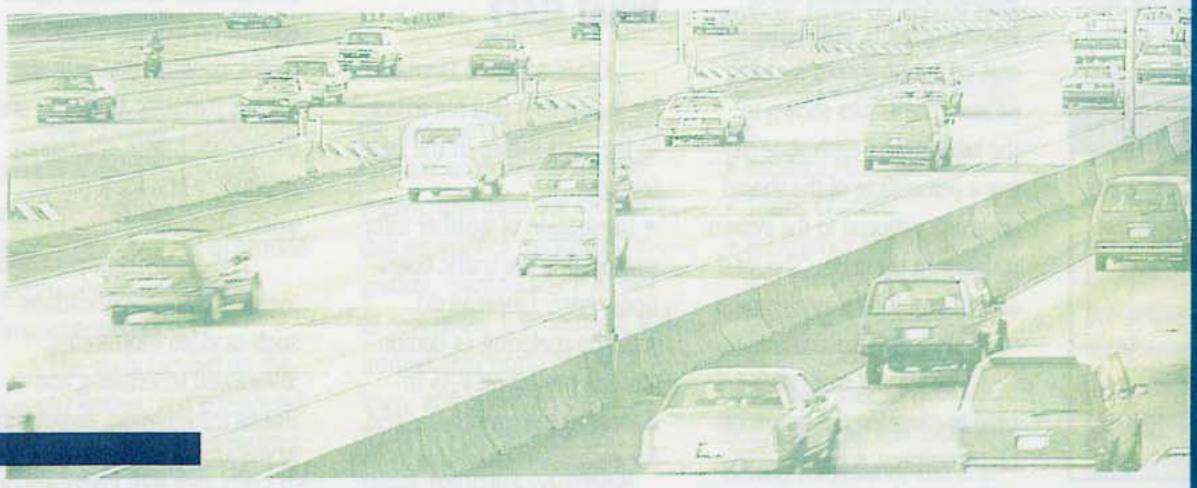
- Deploy closed circuit television cameras in selected priority locations.
- Procure fiber optics on Kansas interstates and freeways.
- Procure additional portable variable message signs.
- Expand motorist assistance patrol.
- Install freeway reference markers and overpass signing on priority facilities.
- Consider a partnership with a private entity for the provision of traveler information in the short term.
- Coordinate arterial signals for freeway diversion.
- Procure total station accident investigation equipment to facilitate accident investigation and speed up incident removal.
- Develop standards for construction to include ITS elements.
- Develop a policy for the provision of traveler information.
- Develop legislation and regulations to allow immediate removal of disabled vehicles.



Traffic Operations Center

- Coordinate with planning agencies to assure inclusion of ITS projects in local and regional plans.
- Include the ITS traffic operations center in MHTD's new District 4 facility.
- Incorporate ITS elements into the construction of Bruce Watkins Drive.

There is no specific funding set aside for ITS applications. For this reason, applications are expected to be implemented in stages. While many ITS activities will be funded by public agencies, there are also opportunities for the private sector. Fortunately, significant benefits can be realized by the strategic application of selected technologies. These technologies will lay the foundation for the complete Intelligent Transportation System that will ultimately be implemented in Kansas City. ■



This plan was prepared by HNTB Corporation, in association with AlliedSignal Technical Services Corporation, and Edwards and Associates, Inc. under contract with the Kansas Department of Transportation (KDOT) and the Missouri Highway and Transportation Department (MHTD). A project Steering Committee, which included representatives from KDOT and MHTD, as well as the Federal Highway Administration (FHWA) and the Mid-America Regional Council (MARC), provided suggestions and feedback throughout the study.