

Executive Summary

The United States has one of the most extensive and best transportation systems in the world. However, 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. Land development often physically constrains the addition of lanes, limited highway funding is available, and environmental considerations often suggest that other alternatives be explored.

In response to the need to address increasing congestion and increasing demand without building additional facilities, as well as the need to better utilize the existing facilities, more and more urban areas are turning to advanced technologies. Computers, communications and process control technologies are being used to improve the efficiency and safety of transportation systems. These advanced technologies are generally components of an Intelligent Transportation System (ITS).

The federal government has recognized the importance of these systems, and significant funding for their study and deployment was included in the Intermodal Surface Transportation Efficiency Act of 1991 and the recently authorized Transportation Equity Act for the 21st Century (TEA-21).

Early deployment studies have been conducted for most of the larger urban areas, and ITS infrastructures are targeted for implementation within the next few years in many of these metropolitan areas.

This ITS Strategic Deployment Plan was prepared by the HNTB Corporation, TransCore, and the Baughman Company study team under contract with the City of Wichita Department of Public Works for an Intelligent Transportation System (ITS) Early Deployment Study in the Wichita metropolitan area. The purpose of this study is to identify the ITS user services appropriate for Wichita and to develop a Strategic Deployment Plan to provide these user services.

This study focuses on the existing transportation facilities, infrastructure and operations. The existing highway system in the Wichita metropolitan area includes both extensive freeway and arterial facilities operated and maintained by the Kansas Department of Transportation (KDOT), the Kansas Turnpike Authority (KTA), the City of Wichita, and Sedgwick County. Much of the congestion experienced in the area is related to incidents on these systems. There are, however, areas that do experience recurring congestion, such as US 54 (Kellogg Avenue) to the east of downtown and at the I-235 interchange. Transportation improvement projects outlined in the 2020 Transportation Plan for the Wichita-Sedgwick County Metropolitan Area, produced by the Metropolitan Area Planning Department (MAPD) in 1994, are anticipated to mitigate the growth of the recurring congestion areas.

Many of the issues identified as priorities during this study are related to incidents. These issues include both technical issues, such as rapid identification and verification of incident location, and 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, are Traffic Control, Emergency Vehicle Management, Hazardous Material Incident Response, Incident Management, and Highway-Rail Intersection. These user services address both recurring and incident related

congestion, as well as contribute to the prompt identification and removal of incidents and enhance the safety of motorists and agency personnel.

SYSTEM ARCHITECTURE

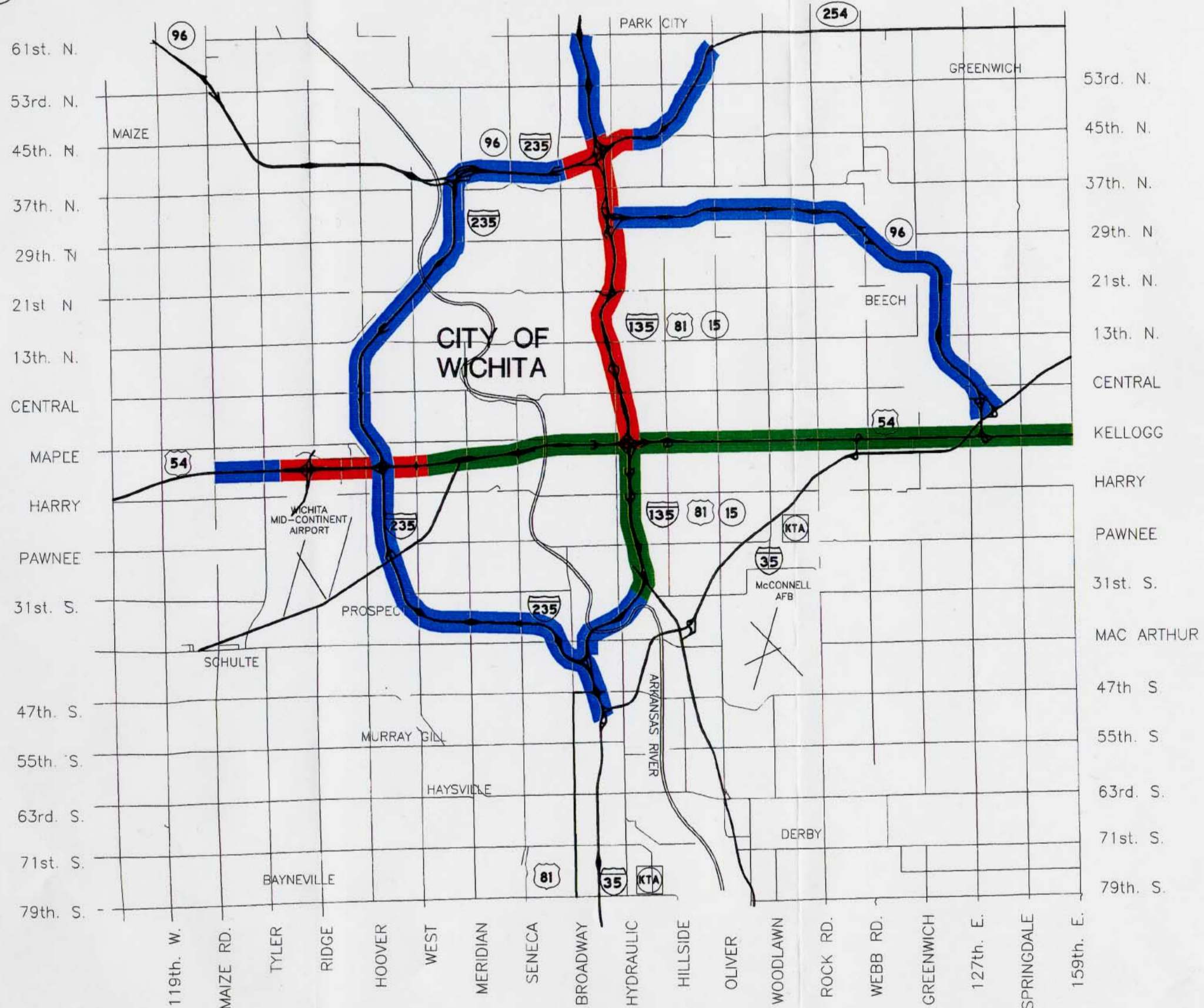
The system architecture may be considered a technical blueprint for the coordination of all of the ITS activities. Development of the system architecture was based on an examination of three different architecture alternatives; centralized, distributed and hybrid. A hybrid system configuration is recommended to be implemented which would combine all traffic management and emergency management functions into a combined traffic/emergency operations center (T/EOC). A separate study is currently underway by Sedgwick County Emergency Communications to evaluate and develop recommendations for a new 911/countywide emergency communications center. It is recommended that additional space be included in the planning for the new 911 center to accommodate the traffic management requirements and that a site be selected in close proximity to the fiber optic network that will be installed in Wichita. For the short term, at least, the transit management function will remain outside the T/EOC in the new transit administration center. This system will have the ability to evolve over time into a fully centralized system if the transit management function is ever relocated to the T/EOC. Coordination and efficient use of staff will be greatly enhanced by the implementation of a single T/EOC.

THE WICHITA SYSTEM

The major activity in the short term is the implementation of a freeway management system in the Wichita metropolitan area, mainly along I-135 through the center of Wichita. This facility carries high traffic volumes and has a high occurrence of accidents. Consequently, any breakdown in traffic flow due to an incident or construction can have significant impacts in terms of delay. System components have been identified for a system that provides coverage of the entire metropolitan area. The proposed intelligent transportation system addresses incident detection, confirmation, and response, and includes vehicle detectors, closed circuit television cameras, highway advisory radio, variable message signs and a traffic/emergency operations center. Figure ES-1 illustrates the deployment time frames for complete ITS coverage of the Wichita area and Figure ES-2 shows the recommended freeway management system equipment deployment for the short term.



**WICHITA METROPOLITAN AREA
ITS EARLY DEPLOYMENT STUDY
STRATEGIC DEPLOYMENT PLAN**



LEGEND

- SHORT TERM
- MEDIUM TERM
- LONG TERM

**FIGURE ES-1
FREEWAY MANAGEMENT
SYSTEM
IMPLEMENTATION**



61st. N.
 53rd. N.
 45th. N.
 37th. N.
 29th. N.
 21st. N.
 13th. N.
 CENTRAL
 MAPLE
 HARRY
 PAWNEE
 31st. S.
 47th. S.
 55th. S.
 63rd. S.
 71st. S.
 79th. S.



53rd. N.
 45th. N.
 37th. N.
 29th. N.
 21st. N.
 13th. N.
 CENTRAL
 KELLOGG
 HARRY
 PAWNEE
 31st. S.
 MAC ARTHUR
 47th. S.
 55th. S.
 63rd. S.
 71st. S.
 79th. S.

**WICHITA METROPOLITAN AREA
 ITS EARLY DEPLOYMENT STUDY
 STRATEGIC DEPLOYMENT PLAN**

LEGEND

-  VEHICLE DETECTION
-  VMS
-  CCTV CAMERA
-  HAR TRANSMITTER
-  HAR SERVICE AREA
-  HAR SIGN

**FIGURE ES-2
 SHORT TERM
 IMPLEMENTATION**

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COSTS AND BENEFITS

An examination of costs and benefits for the freeway management system was conducted for three phases of deployment, as shown in Table ES-1. The estimated annualized costs, annual benefits, and benefit cost ratios are shown for each phase. Estimates of benefits are based on anticipated savings in travel time and fuel consumption through the implementation of the freeway management system. Based on the estimated benefit cost ratios, a freeway management system is justified for the Short and Medium Term. Deployment at the same level of concentration is not justified under forecasted conditions for the Long Term; however, the plan as well as the strategic placement of system elements at critical locations in the outlying areas should be reevaluated in the future. The overall plan provides for greater than a 3:1 benefit cost ratio, indicating a very positive return on investment to the citizens of Wichita.

Table ES-1 Benefit-Cost Ratio by Phase

Phase	Short Term	Medium Term	Long Term
Annual Benefits			
First Phase Equipment Deployment	\$2.90	\$6.51	\$9.92
Second Phase Equipment Deployment		\$4.46	\$7.63
Third Phase Equipment Deployment			\$1.29
Incremental Annual Benefit by Phase	\$2.90	\$4.46	\$1.29
Cumulative Annual Benefit	\$2.90	\$10.97	\$18.84
Incremental Annual Cost by Phase			
Capital	\$0.88	\$0.73	\$0.87
Operating and Maintenance	\$0.92	\$0.93	\$1.21
Total Annual Cost by Phase	\$1.80	\$1.66	\$2.08
Cumulative Annual Cost	\$1.80	\$3.46	\$5.54
Incremental Benefit-Cost Ratio	1.61	2.69	0.62
Cumulative Benefit-Cost Ratio	1.61	3.17	3.40

All costs and benefits in millions

OTHER PROJECTS

Other short term activities include beginning the implementation of arterial and emergency management systems. The following are some of the projects recommended for the short term:

- Expansion of the Motorist Assist Patrol during peak periods.
- Freeway milepost markers at 0.2 mile intervals and overpass signing on all freeway facilities.
- Study the expansion of the arterial signal system to include all of the signals in the metropolitan area.
- Traffic signal timing plans to accommodate freeway diversions should be developed.
- Expansion of the Incident Management Plan to the entire freeway system.

- Implementation of signal preemption for fire department vehicles along heavily traveled corridors in the City.
- Implementation of an AVL system for emergency response vehicles in the City of Wichita and Sedgwick County.
- Transmit railroad crossing gate status to the Emergency Management Center.
- Development of standards for construction to include ITS elements.
- Development of a policy for the provision of traveler information.
- Consideration of a partnership with a private entity for the provision of traveler information in the short term.
- Coordination with planning agencies to assure inclusion of ITS projects in local and regional plans.
- Consideration of facility needs for the traffic management functions during the planning and design of the new 911 center.

AFTER THE STUDY

A number of priority activities listed above have been identified for implementation in the next five years. These include “early winners,” projects that have a relatively low cost, require a short development time, are relatively high priority, and are expected to be successful and enhance the public image of ITS. Priority activities also set the stage for future ITS activities. The expansion of the Motorist Assist Patrol and implementation of freeway reference markers have been identified as “early winners”.

Following adoption and approval of the recommendations contained in this study by the appropriate state and local agencies, the next step will be to secure the funding for implementation. These applications are expected to be incrementally deployed so the cost of implementation can be spread out over time. 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 Wichita.